MILITARY PHYSICIAN / LEKARZ WOJSKOWY

Military Physician / Lekarz Wojskowy

Quarterly
Official Organ of the Section of Military Physicians of the Polish Medical Society
Oficjalny Organ Sekcji Lekarzy Wojskowych Polskiego Towarzystwa Lekarskiego
Scientific Journal of the Military Institute of Medicine
Pismo Naukowe Wojskowego Instytutu Medycznego

Published since 3 January 1920

Number of points assigned by the Polish Ministry of Science and Higher Education (MNiSW) - 4

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Practical Medicine Publishing House / Medycyna Praktyczna
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Print
TECHNET, Cracow, Poland
Circulation: 700 copies
Price PLN 14

ISSN 0024-0745

The journal is financed by the **Military Medical Chamber**

For many years, "Military Physician" has been indexed in the Polish Medical Bibliography (Polska Bibliografia Lekarska), the oldest Polish bibliography database.

Translation, proofreading and DTP of the English version by Skrivanek Sp. z o.o.

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2) Main text

Original articles should be prepared according to the following structure: introduction, aim, material and methods, results, discussion, conclusions, references; case reports: introduction, case description, discussion, summary (conclusions), and references.

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Hospitalization of Polish soldiers deployed to Afghanistan for International Security Assistance Force operation

Leczenie szpitalne polskich żołnierzy pełniących służbę w Afganistanie w ramach operacji International Security Assistance Force

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Abstract. Aim: The article presents the analysis of morbidity in members of the Polish Military Contingent (PMC) deployed to Afghanistan who were either hospitalized or received medical treatment at level 2 medical evacuation. Material and methods: The retrospective analysis was based on medical records of 231 members of PMC Afghanistan who were hospitalized in the Medical Support Group (MSG) at FOB Ghazni in the period January-December 2012. As many as 5,000 Polish soldiers were engaged in International Security Assistance Force (ISAF) operations within the given period. The MSG was the main medical facility providing hospital treatment and was used as a medical evacuation center in the theater of operations in the Ghazni Province. The analysis was performed on the basis of structure rate and intensity rate per 1,000 persons. Results: The studies demonstrated that the most common health problems in the population of soldiers serving in the PMC, who were hospitalized in the MSG, included battle and non-battle injuries as well as non-infectious and infectious diseases of the digestive system. Conclusions: The incidence of the most commonly reported health problems was associated with combat activities, injuries sustained while being on duty or injuries suffered while doing sports or due to poor standards of sanitation and harsh environmental conditions.
Key words: Afghanistan, hospital treatment, ISAF, Polish soldiers

Streszczenie. Cel: W pracy przedstawiono analizę zachorowań żołnierzy Polskiego Kontyngentu Wojskowego w Afganistanie hospitalizowanych oraz zaopatrywanych na etapie ewakuacji medycznej na poziomie 2. Materiał i metody: Przeprowadzona analiza retrospektywna została oparta na dokumentacji medycznej 231 żołnierzy PKW Afganistan leczonych szpitalnie w Grupie Zabezpieczenia Medycznego (GZM, Polski Szpital Polowy) w FOB Ghazni w okresie od stycznia do grudnia 2012. W operacji wojskowej International Security Assistance Force (ISAF) w Afganistanie brało w tym czasie udział 5 000 polskich żołnierzy, dla których GZM był głównym ośrodkiem leczenia szpitalnego i ewakuacji medycznej na teatrze działań w prowincji Ghazni. Analizę wykonano z wykorzystaniem wskaźnika struktury oraz wskaźnika natężenia w przeliczeniu na 1000 osób. Wyniki: Badania wykazały, że najczęstszym problemem zdrowotnym hospitalizowanych żołnierzy PKW Afganistan były urazy bojowe i niebojowe, nieinfekcyjne i infekcyjne choroby układu pokarmowego. Wnioski: Występowanie problemów zdrowotnych wiązało się z działaniami wojennymi, urazami doznanymi podczas wykonywania obowiązków służbowych i zajęć sportowych oraz z niskimi standardami sanitarnymi i ciężkimi warunkami środowiskowymi.
Słowa kluczowe: Afganistan, ISAF, leczenie szpitalne, polscy żołnierze

Received: 26.06.2013. Accepted: for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 14-18

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Introduction

Soldiers of the Polish Military Contingent have been engaged in the military operation carried out in Afghanistan continuously since 2002. Initially, Polish personnel fulfilled their mandated tasks within the framework of Enduring Freedom Operation. In 2006, however, when the International Security Assistance Force (ISAF) operation was launched, both the organizational structure and the reporting lines in the Polish Task Forces were changed. In 2008, the Polish Military Contingent (PMC) assumed responsibility for one of the 34 Afghan provinces, i.e. the Ghazni Province [1]. Polish personnel are primarily responsible for ensuring safety in their area of responsibility, training Afghan troops and the police, and providing humanitarian assistance to the local population [2]. The medical support of the PMC Afghanistan involves coordinated cooperation between all levels of medical evacuation, health prevention, providing medical treatment and the evacuation of the sick and wounded. Military personnel are provided with medical assistance on the spot (medics), in outpatient facilities and medical centers (level 1) [3] or in the Medical Support Group (Field Hospital, level 2), which is the main Polish medical center in the theater of operations [4]. Patients suffering from serious diseases, patients with severe injuries or those who require medical treatment which is beyond the capabilities of a level 2 facility, are evacuated to a level 3, which for members of the PMC is the U.S. Combat Support Hospital at Bagram Airfield, and/or are transferred to a level 4 medical center, which is outside the theater of operations, in Germany (Landstuhl Regional Medical Center) [5] or in Poland (Military Institute of Medicine, 4th, 5th, and 10th Military Clinical Hospital) [4].

Aim

The aim of the study was to analyze morbidity in the population of soldiers serving in the Polish Contingent deployed to Afghanistan who were hospitalized or provided with medical assistance at level 2 of medical evacuation at the Medical Support Group at FOB Ghazni.

Organizational structure and tasks of the Medical Support Group

The Medical Support Group (MSG) is a level 2 medical facility whose task is to provide qualified medical assistance to all sick and wounded personnel of the Polish Military Contingent (both military and civilian), to any other members of the ISAF, to Afghan soldiers and police officers as well as to Afghan civilians (as humanitarian aid). The primary tasks of the MSG include: admission and triage of the sick and wounded, stabilizing and maintaining vital functions of patients, resuscitation, performing life/limb/eyesight-saving surgical procedures, preparing patients for evacuation to a higher-level medical facility, short-term hospital treatment of patients who can be returned to duty (no longer than 7 days), outpatient treatment including primary health care and dental care, analytical diagnostics, microbiological diagnostics (environmental and clinical), and health prevention (preventive vaccinations) [1]. The Medical Support Group operates on a 24-hour basis: one mobile team (a physician, 2 nurses, a sanitation NCO - a driver) and three other teams on stand-by (each team consisting of a physician, 2 nurses and a recorder compiling information about the patients) [4]. There are 40 full-time staff members in the MSG at FOB Ghazni: 8 physicians, a dentist, a vet, a pharmacist, a medical analyst, a microbiologist, a laboratory technician, a pharmacy technician, an X-ray technician, 13 nurses, 2 medics, 3 junior medics, and 6 others. The MSG personnel work in the following organizational units: the headquarters, admission and triage team, hospital team, surgical team. X-ray room, dental room, analytical laboratory, microbiological laboratory, pharmacy, medical support section [1].

Material and methods

The retrospective analysis was conducted on the basis of the medical records of 231 soldiers from the Polish Military Contingent hospitalized or treated at level 2 of medical evacuation in the Medical Support Group (Polish Field Hospital, level 2) at FOB Ghazni within a 12 month period (January-December 2012). The analysis was carried out on the basis of structure and intensity rate per 1,000 persons. As many as 5,000 Polish soldiers had been deployed to the theater of operations in Afghanistan within the given period. The study population was random (no selection). The data which had been collected were then presented in the form of figures and tables. The most common health problems were analyzed in line with the ICD-10 classification: infectious diseases, psychiatric disorders, neurological, cardiovascular, respiratory, gastrointestinal, skin, musculoskeletal, urogenital diseases, and injuries (battle and non-battle). Detailed diagnoses of particular disease entities were analyzed in compliance with the same classification. The basis for calculating the intensity rate was the number of hospital admissions according to the diagnosed diseases and injuries as a numerator, and the total number of soldiers of the examined population in the analyzed period used as a denominator (n=5,000), multiplied by the coefficient $C=10^k$ (k=0,1,2,3..., in the statistical analysis k=3). The intensity rate was used to calculate the incidence of diseases and injuries per 1,000 persons in the study population. The statistical analyzes have been performed using the data analysis software system STATISTICA.PL.

Results

231 soldiers from the PMC Afghanistan were admitted to the Medical Support Group at FOB Ghazni within a 12-month period (January-December 2012); the most commonly treated patients were privates (48.9%), then non-commissioned officers (26.4%) and warrant officers (11.7%), mainly between the ages of 26-35 (60.2%) and 36-45 (22.1%). The distribution of age and rank among Polish soldiers hospitalized in the MSG reflected the general age and rank distribution in the entire population of Polish personnel deployed to Afghanistan in the analyzed period. A similar trend was observed as regards gender distribution; the numbers of hospitalized patients (228 males vs. 3 females) reflected the small percentage of women in the population of the PMC Afghanistan. Combat soldiers accounted for 73.2% of the hospitalized soldiers of Polish nationality, special forces soldiers accounted for 6.0% of the hospitalizations and training forces personnel of 4.8%. Military personnel serving in the PMC Afghanistan were mainly hospitalized due to battle injuries (30.8%, 1.44/1,000 persons), non-battle injuries (21.4%, 1.0/1,000 persons), non-infectious diseases of the digestive system (8.5%, 0.4/1,000 persons), and infectious diseases (8.1%, 0.38/1,000 persons) (Figure, Table 1). The analysis of morbidity in the population of Polish soldiers who were hospitalized in the MSG at FOB Ghazni revealed that 26.4% of battle-injured patients had to be medically evacuated to Poland, while 73.6% of individuals, who had sustained battle injuries were returned to duty in the theatre of operations.

Table 1. Prevalence of diseases and injuries among Polish soldiers (n=5,000), hospitalized in the Medical Support Group at FOB Ghazni (n=231) from January to December 2012
Tabela 1. Występowanie chorób i obrażeń ciała wśród polskich żołnierzy (n = 5000), hospitalizowanych w Grupie Zabezpieczenia Medycznego w FOB Ghazni (n = 231) w okresie od stycznia do grudnia 2012

Diseases and injuries	Polish soldiers - hospital treatment (number of patients n=231)		
	Number of cases	Structure rate [%]	Intensity rate (per 1,000 persons)
Battle injuries	72	30.8	1.44
Non-battle injuries	50	21.4	1.0
Non-infectious gastrointestinal diseases	20	8.5	0.4
Infectious diseases	19	8.1	0.38
Urogenital diseases	14	6.0	0.28
Skin diseases	13	5.6	0.26
Respiratory	12	5.1	0.24
Other	10	4.3	0.2
Neurological diseases	9	3.8	0.18
Psychiatric disorders	7	3.0	0.14
Musculoskeletal diseases	4	1.7	0.08
Cardiovascular diseases	4	1.7	0.08
Total	234	100.0	4.68

Source: PMC Afghanistan. Own study

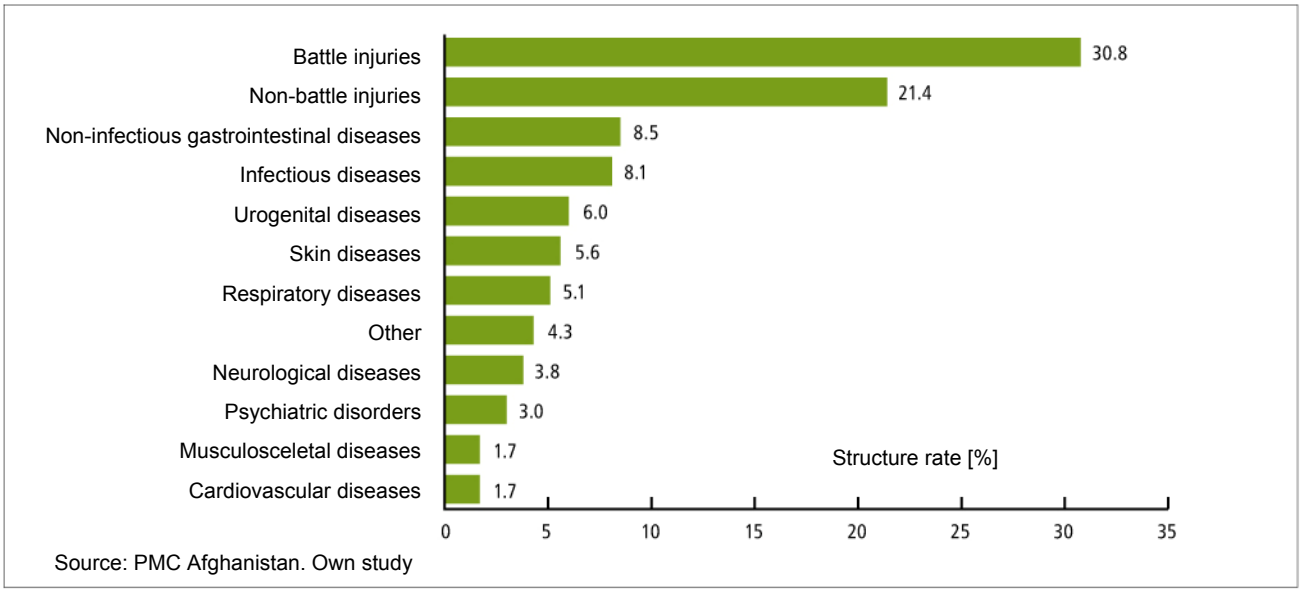

Figure. Prevalence of diseases and injuries among Polish soldiers (n = 5,000), hospitalized with the Medical Support Group at FOB Ghazni (n = 231) from January to December 2012

Rycina. Występowanie chorób i obrażeń ciała wśród polskich żołnierzy (n = 5000), hospitalizowanych w Grupie Zabezpieczenia Medycznego w FOB Ghazni (n = 231) w okresie od stycznia do grudnia 2012

As regards non-battle injuries, the rate was 50.0% vs. 50.0%, and as regards diseases 20.2% vs. 79.8% (Table 2). Out of the total number of 231 hospitalized members of the PMC Afghanistan, 66 persons (28.6%) were evacuated to Poland for medical reasons before the termination of their 6-month contracts, whereas 165 persons (71.4%) were returned to duty.

Table 3 demonstrates the number of Polish military personnel who were hospitalized or medically evacuated to Poland in each month of 2012. We have observed an increase in the number of hospital admissions during the summer months (May-August); these were mostly the result of battle injuries.

The most common disease entities which were diagnosed in the population of Polish soldiers hospitalized in the Medical Support Group at FOB Ghazni from January to December 2012 were: contusion of the musculoskeletal system, gunshot/shrapnel wound, sprain/dislocation of joint, fracture, infectious diarrhea (the etiological factor was *Escherichia coli* in 65% of the cases) (Table 4).

In 67% of the cases gunshot/shrapnel wounds were located on limbs (Table 5). Sprains and dislocations mainly affected the knee joint (63%), while the most common types of fractures were those of upper (44.5%) and lower (33.3%) limbs.

Table 2. Diseases and injuries among Polish soldiers hospitalized with the Medical Support Group at FOB Ghazni from January to December 2012 (n=231)

Tabela 2. Choroby i obrażenia ciała wśród polskich żołnierzy hospitalizowanych w Grupie Zabezpieczenia Medycznego w FOB Ghazni w okresie od stycznia do grudnia 2012 (n = 231)

Diseases and injuries	Polish soldiers - hospital treatment (n=231)					
	Number of patients	%	Medical evacuation	%	Return to duty	%
Battle injuries	72	100.0	19	26.4	53	73.6
Non-battle injuries	50	100.0	25	50.0	25	50.0
Diseases	109	100.0	22	20.2	87	79.8

Source: PMC Afghanistan. Own study

Table 3. Number of Polish soldiers hospitalized with the Medical Support Group at FOB Ghazni (n=231) and medically evacuated (n=66) in each month of 2012

Tabela 3. Liczba polskich żołnierzy hospitalizowanych w Grupie Zabezpieczenia Medycznego w FOB Ghazni (n = 231) oraz ewakuowanych medycznie do kraju (n = 66) w poszczególnych miesiącach 2012 roku

Month	Number of hospitalized patients				Number of medically evacuated patients			
	Battle injuries	Non-battle injuries	Diseases	Total	Battle injuries	Non-battle injuries	Diseases	Total
January	1	7	10	18	1	3	6	10
February	-	4	6	10	-	2	2	4
March	-	8	8	16	-	4	2	6
April	2	1	12	15	2	-	1	3
May	11	4	12	27	1	1	1	3
June	14	1	10	25	2	1	1	4
July	10	6	9	25	5	2	1	8
August	10	3	20	33	1	3	1	5
September	2	1	7	10	1	1	1	3
October	5	4	7	16	2	3	2	7
November	14	8	3	25	1	3	2	6
December	3	3	5	11	3	2	2	7
Total	72	50	109	231	19	25	22	66

Source: PMC Afghanistan. Own study

Table 4. The most common disease entities among Polish soldiers (n=5,000), hospitalized with the Medical Support Group at FOB Ghazni (n=231) from January to December 2012

Tabela 4. Najczęstsze jednostki chorobowe występujące wśród polskich żołnierzy (n = 5000), hospitalizowanych w Grupie Zabezpieczenia Medycznego w FOB Ghazni (n = 231) w okresie od stycznia do grudnia 2012

Disease entities	Polish soldiers-hospital treatment (number of patients n=231)		
	Number of cases	Structure rate [%]	Intensity rate (per 1,000 persons)
Contusion of musculoskeletal system	39	15.9	0.78
Gunshot/shrapnel wound	21	8.6	0.42
Sprain/dislocation of joint	19	7.7	0.38
Fracture	18	7.3	0.36
Infectious diarrhea	17	6.9	0.34
Urolithiasis	11	4.5	0.22
Acoustic trauma	10	4.1	0.2
Pneumonia/bronchitis	10	4.1	0.2
Non-infectious acute gastroenteritis	10	4.1	0.2
Head injury	8	3.3	0.16
Acute stress disorder	6	2.5	0.12
Other	76	31.0	1.52
Total	245	100.0	4.90

Source: PMC Afghanistan. Own study

Table 5. Location of gunshot and shrapnel wounds in Polish soldiers hospitalized with the Medical Support Group at FOB Ghazni (n=21) from January to December 2012

Tabela 5. Lokalizacja ran postrzałowych i odłamkowych u polskich żołnierzy hospitalizowanych w Grupie Zabezpieczenia Medycznego w FOB Ghazni (n = 21) w okresie od stycznia do grudnia 2012

Battle injury	Upper extremity	Lower extremity	Tutor, pelvis, spine	Head	Neck	Total
Gunshot wounds	4	7	2	1	2	16
Shrapnel wounds	1	2	2	-	-	5
Total	5	9	4	1	2	21

Source: PMC Afghanistan. Own study

Conclusions

The increased prevalence of health problems in the population of Polish soldiers hospitalized at the Medical Support Group in Afghanistan was closely associated with combat activities (battle injuries), injuries sustained on duty or injuries suffered while doing sports (non-battle injuries) as well as poor standards of sanitation and harsh environmental conditions (infectious and non-infectious diseases of the digestive system).

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Sleep disorders in Polish Military Contingent veterans

Zaburzenia snu u weteranów Polskich Kontyngentów Wojskowych

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Abstract. Introduction: Sleep disorders are among the frequent symptoms of mental disorders related to combat stress. Aim: Assessment of frequency of sleep disorders, such as sleep onset disorders, sleep maintenance or nightmares in the Polish Military Contingent veterans diagnosed with Posttraumatic Stress Disorder (PTSD) and other non-psychotic mental disorders. Material and methods: The study involved 31 veterans - patients of the Department of Psychiatry and Combat Stress (KPiSB), including 14 veterans diagnosed with PTSD, 8 with neurotic disorders, 5 with adjustment disorders, 2 with alcohol dependence syndrome, and 2 with personality disorders. Sleep Quality Questionnaire and individual interviews were used to assess sleep disorders. Results: Nightmares occurred in 27 patients (87%), including 20 patients with its intensified form (65%). Problems with sleep onset and sleep maintenance were found in 29 (94%) subjects. Nightmares and sleep onset and maintenance problems appeared both in the subjects with PTSD and other diagnoses. Conclusion: Sleep disorders were found to be a frequent problem in the veteran population and there was no significant difference between the study groups.
Key words: nightmares, posttraumatic stress disorder, sleep disorders, veterans of the Polish Military Contingents

Streszczenie. Wstęp: Zaburzenia snu należą do częstych objawów zaburzeń psychicznych związanych ze stresem bojowym. Cel pracy: Ocena częstości występowania zaburzeń snu w postaci trudności w zasypianiu, utrzymaniu snu oraz koszmarów sennych u weteranów Polskich Kontyngentów Wojskowych z rozpoznaniem zaburzeń stresowych pourazowych (PTSD) oraz innymi niepsychotycznymi zaburzeniami psychicznymi. Materiał i metody: Badaniem objęto 31 weteranów hospitalizowanych w Klinice Psychiatrii i Stresu Bojowego, w tym 14 z rozpoznaniem PTSD, 8 z zaburzeniami nerwicowymi, 5 z zaburzeniami adaptacyjnymi, 2 z uzależnieniem od alkoholu, 2 z zaburzeniem osobowości. Do oceny występowania zaburzeń snu zastosowano wywiad indywidualny oraz Kwestionariusz Jakości Snu. Wyniki: Sny koszmarne wystąpiły u 27 pacjentów (87%), w tym w postaci nasilonej u 20 (65%). Trudności w zasypianiu i utrzymaniu snu miało 29 badanych (94%). Sny koszmarne oraz trudności w zasypianiu i utrzymaniu snu mieli zarówno badani z PTSD, jak i z innym rozpoznaniem. Wnioski: Potwierdzono, że zaburzenia snu są częstym problemem u weteranów, nie stwierdzono różnic w częstości ich występowania między badanymi grupami.
Słowa kluczowe: koszmary senne, weterani Polskich Kontyngentów Wojskowych, zaburzenia snu, zaburzenia stresowe pourazowe

Received: 27.06.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 14-18

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Introduction

Sleep disorders are a common effect of psychological trauma. The literature shows numerous reports on their occurrence both as an acute stress disorder (ASD) and in conditions involving the remote effects of traumatic experiences, including posttraumatic stress disorder (PTSD), [1-3]. Participants of military operations in war zones often develop difficulties with sleep onset and sleep maintenance [4-6]. The subject of studies in veterans diagnosed with PTSD was also the occurrence of nightmares [5-8]. Nightmare is a parasomnia defined as a dream causing anxiety or other unpleasant emotions that wakes up the sleeper [9,10]. There are two types of nightmares: idiopathic and posttraumatic. A posttraumatic nightmare is a dream that results from a traumatic event: recurrent, with content associated with the trauma, causing negative emotional reactions [2].

Nightmares may occur with varying frequency. Mild nightmares occur not more often than once a week, moderate - more often than once a week, and severe – many times during a night [9].

Difficulties in initiating and maintaining sleep (insomnia) are classified as dyssomnias. Persistent insomnia after the cessation of a stressful stimulus is a symptom of endogenous sleep disorders, more precisely, of psychophysiological insomnia [9,11]. This includes complaints about insufficient sleep associated with impaired daytime well-being.

Aim

The aim of the study was: 1) to assess the prevalence of sleep disorders in psychiatrically hospitalized PMC veterans, 2) to compare the prevalence of nightmares in veterans diagnosed with PTSD and in those with other non-psychotic mental disorders, as well as 3) to compare the prevalence of sleep onset and maintenance problems in both groups.

Material and methods

The study included 31 veterans (males) hospitalized in the 24-hour Department of Psychiatry and Combat Stress from May 2010 to August 2011. They were admitted to the Department on the basis of a referral issued by their military unit's physician or a psychiatrist in the place of residence. Some of the veterans were admitted to the Department directly after medical evacuation from the mission. The age of the participants ranged from 22 to 51 years (x_{mean} = 35). They participated in 1 to 6 missions (x_{mean} = 2.5) in Iraq and Afghanistan, while others had also participated in previous missions. All of them had post-primary education, i.e. - vocational, secondary or higher education. The participants were divided into two groups. The first group included 14 individuals diagnosed with PTSD. The other group consisted of 17 males with other diagnosis (non-PTSD), including: 8 with adjustment disorders, 5 with neurotic disorders, 2 with personality disorders and 2 with alcohol dependence syndrome. Neither group significantly differed in terms of age, number of completed missions and education. The Sleep Quality Questionnaire, based on the criteria adapted by Rutkowski for the evaluation of posttraumatic sleep disorders, was used to assess the occurrence of sleep disorders in both groups [2]. It consists of two parts: Part A includes questions on symptoms of sleep disorders, subjective complaints about the course of sleep and trauma-related nightmares, including their frequency. Part B refers to remembering dreams, their relation to the mission or not, and nightmares with content unrelated to the mission. The participants completed the questionnaire on their own. Subsequently, in order to evaluate the content of dreams (mission-related or non-mission-related) and the level of accompanying distress (whether they caused fear or anxiety) in more detail, individual interviews were conducted.

The obtained information on the occurrence of nightmares was organized based on the frequency and content criteria. The frequency of nightmares was analyzed in two categories: no nightmares at all and the presence of nightmares. In addition, an increased intensity of nightmare occurrence was considered, where the occurrence of nightmares more often than once a week was used as a criterion (moderate nightmare disorder and severe nightmare disorder) In terms of content, the nightmares were divided into those with a mission-related content and idiopathic ones (without mission-related content). Difficulties in falling asleep and sleep maintenance were analyzed in four categories: nocturnal awakening, early morning awakening with inability to return to sleep and the feeling of shortened nocturnal sleep duration.

In order to assess the statistical significance of the differences between the compared variables, the x^2 test with Yates's correction for small samples was used.

Results

Sleep disorders were found in 14 (100.0%) participants from the PTSD group and 15 (88.2%) from the non-PTSD group, that is, 29% of all studied veterans (Tab. 1).

Nightmares of various content and frequency, including mild, moderate and severe forms, occurred in 27 participants (87.1% of all participants). In the PTSD group, nightmares occurred in 12 individuals (85.7%), and in the non-PTSD group in 15 individuals (88.2%) (Tab. 2).

Moderate nightmares (occurring more often than once a week) occurred in 20 individuals (64.5% of all participants). In the PTSD group, they occurred in 8 individuals (57.1%), and in the non-PTSD group in 12 individuals (70.6%) (Tab. 3). Also in this case, no significant difference was found between either group regarding the frequency of intensified nightmares.

Table 1. Prevalence of sleep disorders in the compared PTSD and non-PTSD groups of veterans
Tabela 1. Występowanie zaburzeń snu w porównywanych grupach weteranów z PTSD i non-PTSD

sleep disorders	diagnosis		total
	PTSD	non-PTSD	
	n (%)		
nightmares	14 (100.0)	15 (88.2)	29 (93.5)
no nightmares	0	2 (11.8)	2 (6.5)
total	14 (100.0)	17 (100.0)	31 (100.0)

Nightmares with mission-related content (of various frequency) were reported by 24 individuals (77.4%): 12 (85.7%) in the PTSD group and 12 (70.6%) in the non-PTSD group. The differences were not statistically significant (Tab. 4).

Moderate nightmares with mission-related content (occurring more often than once a week) occurred in 18 individuals (58.1% of all participants). In the first group, moderate nightmares occurred in 18 individuals (57.1%), and in the second group in 10 (58.8%). Also in this case, there was no significant difference between the examined groups (Tab. 5).

Table 2. Prevalence of nightmares in the compared PTSD and non-PTSD groups of veterans
Tabela 2. Występowanie koszmarów sennych w porównywanych grupach weteranów z PTSD i non-PTSD

nightmares	diagnosis		total
	PTSD	non-PTSD	
	n (%)		
nightmares	12 (85.7)	15 (88.2)	27 (87.1)
no nightmares	2 (14.3)	2 (11.8)	4 (12.9)
total	14 (100.0)	15 (100.0)	31 (100.0)

X^2 with Yates's correction: $x^2 = 0.11$; p = NS (not statistically significant)

Table 3. Prevalence of intensified nightmares in the compared PTSD and non-PTSD groups of veterans
Tabela 3. Występowanie nasilonych koszmarów sennych w porównywanych grupach weteranów z PTSD i non-PTSD

intensified nightmares	diagnosis		total
	PTSD	non-PTSD	
	n		
nightmares	8 (57.1)	12 (70.6)	20 (64.5)
no nightmares	6 (42.9)	5 (29.4)	11 (35.5)
total	14 (100.0)	17 (100.0)	31 (100.0)

X^2 with Yates's correction: $x^2 = 0.16$; p = NS

Table 4. Prevalence of nightmares with content associated with the mission in the compared PTSD and non-PTSD groups of veterans
Tabela 4. Występowanie koszmarów sennych o treści związanej z misją w porównywanych grupach weteranów z PTSD i non-PTSD

nightmares with mission-related content	diagnosis		total
	PTSD	non-PTSD	
	n (%)		
nightmares	12 (85.7)	12 (70.6)	24 (77.4)
no nightmares	2 (14.3)	5 (29.4)	7 (22.6)
total	14 (100.0)	17 (100.0)	31 (100.0)

X^2 with Yates's correction: $x^2 = 0.33$; p = NS

Nightmares with mission-related content only were reported by 11 (78.67%) individuals diagnosed with PTSD and 9 (52.9%) from the non-PTSD group. Nightmares of both types: those related to deployment and unrelated ones occurred in 1 (7.1%) and 3 (17.6%), and with non-mission-related content in 2 (14.3%) and 3 individuals (17.6%), respectively. The prevalence of nightmares with regard to their content is presented in Table 6.

Various types of sleep disorders were reported by a total of 29 (93.5%) individuals. Difficulties in falling asleep were experienced by 25 individuals (80.6%), nocturnal awakenings occurred in 26 individuals (83.9%), early morning awakenings with inability to return to sleep in 20 (64.5%), and the feeling of shortened nocturnal sleep duration in 22 (70.9%). These symptoms were reported by both veterans diagnosed with PTSD and veterans with other diagnoses (Tab. 7). The differences between the compared groups were not statistically significant.

Table 5. Prevalence of intensified nightmares with content associated with the mission in the compared PTSD and non-PTSD groups of veterans
Tabela 5. Występowanie nasilonych koszmarów o treści związanej z misją w porównywanych grupach weteranów z PTSD i non-PTSD

intensified nightmares with mission-related content	diagnosis		total
	PTSD	non-PTSD	
	n (%)		
nightmares	8 (57.1)	10 (58.8)	18 (58.1)
no nightmares	6 (42.9)	7 (41.2)	13 (41.9)
total	14 (100.0)	17 (100.0)	31 (100.0)

X^2 with Yates's correction: $x^2 = 0.07$; p = NS

Table 6. Content of nightmares in the compared PTSD and non-PTSD groups of veterans
Tabela 6. Treść koszmarów sennych w porównywanych grupach weteranów z PTSD i non-PTSD

types of nightmares	diagnosis		total
	PTSD	non-PTSD	
	n (%)		
mission-related	11 (78.6)	9 (52.9)	20 (64.5)
mission- and non mission-related	1 (7.1)	3 (17.6)	4 (12.9)
non mission-related	2 (14.3)	3 (17.6)	5 (16.1)
no nightmares	0	2 (11.8)	2 (6.5)
total	14 (100.0)	17 (100.0)	31 (100.0)

Discussion

The obtained results indicate a high percentage of individuals experiencing nightmares in the study sample (87.1%). Publications of other authors show that the prevalence of nightmares in the general adolescent population is 1% in their mild form [9], about 24% in addicted subjects [12] and about 57% in subjects with dissociative disorder [13]. The review of studies by Wittman et al. [14] indicates that in the case of PTSD, the percentage of subjects experiencing nightmares is 70%. However, studies on a Vietnam veteran group showed that 52% of individuals with PTSD experienced nightmares [6]. The results in our study group are higher than those in the mentioned studies. The percentage was still higher when the individuals were divided into groups with regard to their diagnoses: 86% in the case of PTSD and 88% in the case of other diagnoses.

No statistically significant difference was found between the occurrence of nightmares in veterans diagnosed with PTSD and that in veterans with other diagnoses. Interesting is the fact that, similarly, no difference was found in the case of nightmares with mission-related content. The occurrence of nightmares in veterans diagnosed with PTSD results from the characteristics of the disorder itself (nightmares with trauma-related content are one of the diagnostic criteria). Therefore, it is not surprising that this type of dream occurred in most participants with PTSD. Interesting is also the fact that the occurrence of military-related nightmares was also reported by a considerable number of veterans with non-PTSD diagnoses.

In the study group, as part of the mission-related nightmares, traumatic situations were reconstructed in detail, and in the other part of dreams they underwent modification. In further studies, an analysis of the content of dreams could be helpful in terms of the reconstruction level of deployment situations or their distortion in dreams of veterans diagnosed with PTSD and veterans with other diagnoses.

In our study group, as many as 93.5% of veterans reported sleep disorders in the form of sleep-onset and sleep maintenance problems. Insomnia that manifests itself in difficulties in falling asleep and maintaining sleep, negatively affecting daytime functioning, occurs in about 30% of the general adolescent population [15]. In subjects with depression, it occurs in 60-90% of cases, and in anxiety disorders in 50-70% [15]. The results of studies on veterans vary - from 5.5% to as many as 90% with regard to insomnia, including in studied subjects without PTSD [4-6]. The division into the PTSD group and non-PTSD group indicates that there is no significant difference between the examined groups in the case of those symptoms.

Some authors studied posttraumatic sleep disorders independently of the occurrence of PTSD itself [1, 5]. These disorders included psychophysiological insomnia (PPI) and chronic nightmare disorder (CND), described in the International Classification of Sleep Disorders (ICSD) [9]. In studies by Krakow et al., 76% of studied trauma victims demonstrated symptoms of PPI, and 79% the symptoms of CND [1]. In veterans of military missions, various types of sleep disorders may occur to a greater extent than just in veterans diagnosed with PTSD. This is indicated by the results of the studies on 152 Australian veterans from Vietnam: sleep disorders were found in all participants diagnosed with PTSD. However, also 90% of studied veterans without PTSD had clinically significant sleep difficulties [5]. In turn, a poll conducted among 886 American veterans has indicated that 41.7% of participants suffered from insomnia, while a PTSD diagnosis was confirmed in less than 5% of them [4]. Also studies on American veterans from Iraq showed that along with PTSD, other factors such as head injury with loss of consciousness or alcohol abuse are associated with the occurrence of nightmares and sleep onset and sleep maintenance problems [16].

Table 7. Comparison of prevalence of insomnia symptoms in the PTSD and non-PTSD groups
Tabela 7. Porównanie występowania objawów bezsenności w grupie PTSD i non-PTSD

type of sleep disorder	diagnosis		Total	x^2 value with Yates's correction	P
	PTSD	non-PTSD			
	n (%)				
sleep onset difficulties	11 (78.6)	14 (82.3)	25 (80.6)	0.04	p = NS
nocturnal awakenings	11 (78.6)	15 (88.2)	26 (83.9)	0.06	p = NS
early morning awakenings	9 (64.3)	11 (64.7)	20 (64.5)	0.12	p = NS
shortened sleep duration	7 (50.0)	15 (88.2)	22 (70.9)	3.75	p = NS
insomnia symptoms in total	12 (85.7)	17 (100.0)	29 (93.5)	0.77	p = NS

It should be considered that the high prevalence of symptoms of sleep disorders in the form of nightmares and difficulties in falling asleep and maintaining sleep in the studied veterans may result from the fact that the group included only hospitalized individuals, while part of the above-mentioned results of the studies referred to the general population of veterans. Therefore, it is worth continuing the studies, including in PMC veterans who do not visit health care centers.

The above differences in the approach to posttraumatic sleep disorders and in the presented results indicate the need for further studies on the occurrence of sleep disorders in soldiers after their return from deployment.

Conclusions

1. Sleep disorders in the form of sleep onset and sleep maintenance difficulties occurred in 93.5% of the studied soldiers.
2. No statistically significant difference was found between the occurrence of nightmares in veterans diagnosed with PTSD and that in veterans with other nonpsychotic mental disorders.
3. Also no statistically significant difference was found between the compared groups of veterans in terms of the occurrence of sleep onset and sleep maintenance difficulties.

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Anxiety level in Polish ISAF soldiers participating in stress inoculation training enhanced with controlled exposure to virtual combat stressors

Poziom lęku u żołnierzy ISAF uczestniczących w treningu uodparniania na stres z kontrolowaną ekspozycją na wirtualne stresory wojenne

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Abstract. Introduction: This paper presents the results of VR-enhanced Stress Inoculation Training (SIT) as a method of tension reduction for ISAF soldiers preparing for deployment in Afghanistan. Aim: The aim of this study was to evaluate the influence of SIT on ISAF soldiers' pre-deployment anxiety levels. Material and methods: 118 soldiers were assigned to two groups: experimental (E) and control (C). During 5 days, soldiers from group E took part in 10 VR-enhanced SIT sessions. The anxiety level was evaluated after SIT and after the soldiers returned home. Results: After SIT both values of anxiety-state and anxiety-trait variables decreased in group E ($p = 0.04$). After 5 days, the value of anxiety-trait variable decreased in group C ($p = 0.01$). After deployment the decrease of anxiety-state and anxiety-trait was observed in both groups compared to values before the training ($p < 0.05$). Conclusions: The training was a short-term effective method of tension reduction. The results obtained in the long-term perspective do not allow the confirmation of the effectiveness of the training, which indicates a need for further study.
Key words: Afghanistan, ISAF, military psychiatry, stress inoculation training (SIT), STAI

Streszczenie. Wstęp: Praca przedstawia przebieg i rezultaty treningu uodparniania na stres [stress inoculation training -SIT) wzbogaconego o wirtualną rzeczywistość jako metodę redukcji poziomu napięcia u żołnierzy przygotowujących się do misji w Afganistanie (ISAF). Cel pracy: Celem badania była ocena wpływu SIT na poziom lęku u tych żołnierzy. Materiał i metody: W badaniu wzięło udział 118 żołnierzy podzielonych na dwie grupy eksperymentalną (E) i kontrolną (K). W ciągu 5 dni żołnierze z grupy E uczestniczyli w 10 sesjach SIT wzbogaconego o wirtualną rzeczywistość. Poziom lęku oceniono po treningu oraz po powrocie żołnierzy z misji do kraju. Wyniki: Po treningu SIT spadły wartości lęku-stanu i lęku-cechy w grupie E ($p = 0,04$). W grupie K, po 5 dniach, spadły wartości lęku-cechy ($p = 0,01$). Po zakończeniu misji w obydwu grupach odnotowano spadek wartości lęku-stanu i lęku-cechy w porównaniu do wartości sprzed treningu ($p < 0,05$). Wnioski: Trening okazał się krótkoterminowo skuteczną metodą obniżania napięcia. Uzyskane wyniki w perspektywie długoterminowej nie pozwalają na jednoznaczne potwierdzenie skuteczności treningu, co wskazuje na konieczność dalszych badań.
Słowa kluczowe: Afganistan ISAF, psychiatria wojskowa, STAI, trening uodparniania na stres (SIT)

Received: 21.10.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 19-25

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Introduction

American studies indicate that 18.5-42.7% (depending on the study) of soldiers and veterans returning from deployment in Iraq and Afghanistan have mental health problems [1]. The most common mental disorders include posttraumatic stress disorder (PTSD), which affects 12-18% of veterans [2]. Since 2003, about 35,000 soldiers and civilians of the Polish Armed Forces have been engaged in Operation Iraqi Freedom and Operation Enduring Freedom, some of them several times. During these operations, 59 soldiers were killed and about 400 were injured, including 200 wounded in combat action. Due to mental disorders associated with stress, 50 soldiers were prematurely evacuated home, which accounts for 0.014% of the army personnel. However, it is estimated that 5-10% of veterans of the Polish Military Contingent (PMC) have demonstrated PTSD symptoms. About 300 veterans were psychiatrically hospitalized, with one in ten hospitalized several times. Therefore, it seems very important to find a method to minimize the risk of developing mental disorders in deployed soldiers.

Before leaving on deployment, all Polish soldiers undergo standard, specialist medical and psychological tests. They participate in lectures and practical exercises to prepare for coping with combat stress. The classes are conducted by psychologists of contingent military units. The last phase of preparation for deployment also involves psychologists and psychiatrists from the Department of Psychiatry and Combat Stress of the Military Medical Institute in Warsaw, Poland.

In order to adapt the training to the needs of deployed soldiers, the schedule of the classes delivered by specialists from the Department of Psychiatry and Combat Stress experimentally included stress inoculation training (SIT). A review of the references indicates that SIT is an effective method to prepare soldiers for military deployments [3-5]. Stress inoculation training allows a course to be adapted flexibly to suit individual needs and is based on the assumptions of the cognitive-behavioral approach [6]. Its aim is to reduce tension and prepare participants to cope with difficult situations by gradual and controlled exposure to an anxiety-triggering stimulus. The training has been enhanced with virtual reality allowing the therapist to fully control stressors. Virtual reality exposure is regarded as the most promising alternative to imaginal exposure [7]. The VR Computer-Assisted SIT method was used, developed by the Virtual Reality Medical Center of San Diego (VRMC), with whom the Military Medical Institute (MMI) concluded a long-term cooperation agreement in 2008. This method allows for simultaneous exposure and measurement of physiological responses. Participants obtain feedback on their actual arousal level during a stressful situation, which enables them to learn how to control and reduce tension [8-12].

The project was carried out in autumn 2010 in the Polish 10th Armored Cavalry Brigade in Świętoszów, who sent about 2,000 soldiers to a 2,600-strong contingent of the International Security Assistance Force (ISAF), relocated to Afghanistan between October 2010 and April 2011.

Aim

The aim of the experiment was to answer the following questions: What was the anxiety level in SIT participants before the training? What changes in the anxiety level were observed in the SIT participants of the training directly after completion? What was the anxiety level in veterans from the Polish Military Contingent ISAF 19 months after SIT and 12 months after they returned home? What was the veterans' opinion on the usefulness of SIT during deployment?

The effects of the experiment were evaluated using a statistical analysis of anxiety level measurements of SIT participants and soldiers from the control group who did not participate in the training, as well as on the basis of interviews conducted with the individuals.

Material and methods

Participants

118 soldiers were selected randomly from the 1,500-strong contingent that took part in the study. The age of the participants ranged from 21 to 44 years. There were 112 males and 6 females who had been in service from 8 months to 19 years and 3 months. 95 soldiers had not been deployed outside of Poland before, 16 had been deployed once, 5 deployed twice and one deployed three times. The soldiers were assigned to two equivalent groups: control (C) and experimental (E). Subsequently, the experimental group was divided into three 15-strong subgroups and one 14-strong subgroup. During SIT, 4 individuals actively participated in the training, being able to affect the virtual reality and having their physiological indicators monitored, while the others observed the actions and physiological indicators of the active participant projected by a beamer (55 participants).

After their return from deployment, 19 months after the training and one year after completion of the deployment, the soldiers were examined again. The re-examination covered 84 individuals: 80 males and 4 females, aged 21 to 44 years, 45 from the experimental group and 39 from the control group.

All participants had been previously qualified for deployment by the Military Medical Commission.

Procedure

First, the soldiers from both the experimental and control group listened to a 90-minute lecture on stress symptoms and ways to cope with stress. After the lecture, both groups filled in the following test questionnaires: State-Trait Anxiety Inventory (STAI), PTSD Checklist - Military Version (PCL-M), Beck Depression Inventory (BDI), Coping Inventory for Stressful Situations (CISS), Formal Characteristics of Behavior - Temperament Inventory (FCB-TI), NEO Personality Inventory - Revised (NEO-PI-R) and Tellegen Absorption Scale (TAS). Before the training, the soldiers from group E additionally filled in the Immersive Tendencies Questionnaire (ITQ). Soldiers from group E, divided into 15-strong subgroups, were participating for five successive days in 10 SIT sessions according to the methodology of the Virtual Reality Medical Center, San Diego. In each of the experimental subgroups, one person actively participated in the training, i.e. the active participant's physiological indicators were monitored and he or she was able to affect the virtual reality. The others observed the actions of the active participant projected by a beamer. At the beginning and at the end of the training, the Behavioral Avoidance Test (measurement of physiological parameters: respiration, heart rate, skin conductance, and finger temperature) was conducted. While the experimental group participated in the training, soldiers from the control group attended routine training activities in the barracks area. On the last day of the study, groups C and E filled in the STAI test questionnaire and group E additionally filled in the Immersion Scale (IS), the Simulator Sickness Questionnaire (SSQ) and the Presence Questionnaire Revised (PQR). After completion of the deployment in Afghanistan and return home - 19 months after the stress inoculation training - the soldiers underwent the examination again, filling in the STAI and PCL-M questionnaires and responding to questions in a standardized interview.

All participants were informed about the aims of the study.

Equipment

Three computers, software enabling audio-video presentation and sensors allowing for measurement of physical parameters were used for the training.

The first computer provided exposure to virtual reality via VR goggles, headset and a joystick, allowing the participant to move and perform actions in the virtual world.

Another computer was used for supporting the software used to monitor the physiological parameters and the feedback system. Devices for measurement of physiological indicators: respiration, heart rate, skin conductance and finger temperature were connected to that computer.

Both computers were connected with a projector allowing the other participants to watch both the virtual reality and variations in physiological parameters of the active participants. Sounds were reproduced in parallel through the headset for the active participant and through loudspeakers for the other training participants.

By means of the third computer, the trainer operated the control panel and menu that provided the possibility of introducing visual and audio stimuli to the active participant.

The active participant was seated on a rotary chair enabling those movements reflected in the virtual reality. By means of the joystick he or she was able to control his or her figure in the virtual environment by selecting both direction of movement and turning in the vehicle or shooting, depending on the scenario selected.

The hardware used in the tests consisted of two Dell Inspiron M1710 computers with Intel Core 2CPV 2GHz processors, 2G RAM and the nVIDIA GeForce Go 7900 GS graphic card (supporting VR images and sounds). The Dell Inspiron MXC 061 computer with the Intel Core 2CPV 1.99 GHz processor and 2G RAM was used to measure physiological parameters. The following software was used to support the virtual reality: Afghan Kabul, Iraq Convoy, Main PTSD, Convoy PTSD, Enchanted Forest (made available by the Virtual Reality Medical Center, San Diego).

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (STAI) was used in the study. It is a tool designed for the examination of anxiety understood as the transitional and situation-dependent state of an individual and anxiety understood as a relatively permanent personality trait. STAI has two subscales. The first subscale (X-1) is used to measure the anxiety-state, while the other (X-2) is used to measure the anxiety-trait.

Anxiety as a trait (anxiety-trait) is defined as a permanent, acquired behavioral disposition that makes a given person perceive objectively harmless situations as harmful ones and respond to them with an increase in arousal and a state of anxiety which is disproportionate to the objective situation. Individuals with a high level of anxiety-trait, when compared to those with a low level of this feature, will not necessarily respond permanently with a high level of anxiety-state, they would rather respond with anxiety in threatening situations. The relation between the level of anxiety-state and that of anxiety-trait depends on the characteristics of the threat and it is lower in a physical threat situation.

On the other hand, the anxiety-state is a subjective feeling of tension and fear that results in activation or arousal of the nervous system [13].

Training

Stress inoculation training, underwent by the participants, was a form of training in which the trainees acquired skills by gradual use of virtual reality. The training allowed for simultaneous immersion in a stress experience and controlled increase of the number of threatening stimuli. The soldiers participated in 10 sessions, two sessions a day (in the morning and in the afternoon) for 5 successive days. Each session had a structure and a specified course.

During the first session, the Behavioral Avoidance Test (BAT) was conducted by writing a profile of a single selected person. The first measurement of the baseline physiological parameters, conducted prior to the exposure, took 5 minutes. Subsequently, the physiological indicators were measured during their exposure in the Iraq Convoy program for the next 3 minutes. During the first exposure in the virtual reality, the subject remained in a vehicle and could only look around. Other participants observed his actions on the beamer screen. The last measurement of that session concerned recovery after exposure and lasted 5 minutes. The BAT profile created was discussed in detail with all participants of the training (the results were displayed on the beamer screen), explanations of the meaning of the obtained data were also presented. At the end of the session, all participants underwent deep-diaphragmatic breathing training and the active participant also obtained precise measurements of his or her physiological indicators during the training. At the end of the sessions, the participants were encouraged to train deep-diaphragmatic breathing between the sessions. They were given a CD with recorded instructions for personal training to facilitate that task.

The second session was focused on the training for tension reduction during imaginary exposure to stress. The active participant also obtained feedback on his or her physiological parameters. Other participants could observe these indicators on the beamer screen. This session also covered psychoeducation regarding control of thoughts and emotions.

The third session was similar to the first one. The initial baseline measurement was conducted and then virtual reality exposure was applied, using the Enchanted Forest software (scenario without military stimuli), in which the active participant could move while the other participants observed his actions on the beamer screen. The exposure time was 20 minutes.

The next six sessions had a similar structure, i.e. baseline measurement - VR exposure - recovery, the only variable was the use of military-type scenarios with an increasing intensity of stressors.

The last session was designed for re-measurement of the BAT profile and discussion of the entire training.

During all sessions, the active participant was asked to rate his/her subjectively felt stress level on a scale from 1 to 100.

Results

A statistical analysis was conducted in order to examine whether the training sessions have a statistically significant effect on the variables: the state and trait in the STAI questionnaire examination.

The analysis started with a comparison of the experimental and the control group before the training, after completion of the training and after the return from deployment. The results are presented in Table 1.

In terms of state and trait, there were no statistically significant differences between either group before the training, which shows that the participants selected for the control group represented a set suitable for comparisons with the experimental group. At the same time, the results of the statistical analysis allow the assumption that there were no statistically significant differences between the experimental group and the control group for state and trait variables after completion of the training.

Table 1. Differences in intensity of anxiety as the state and trait in the experimental and control groups before the training, after completion of the training and after return from the deployment (Mann-Whitney U-test)
Tabela 1. Różnice w nasileniu lęku jako stan i cecha w grupie eksperymentalnej i w grupie kontrolnej przed treningiem, po zakończeniu treningu i po powrocie z misji (test U Manna i Whitneya)

STAI results	Experimental group	Control group			
	Sum of ranks	Sum of ranks	Z	U	P
before training					
anxiety-state	3215	2890	0.31	1459	0.76
anxiety-trait	3361.5	3193.5	0.47	1540	0.64
after training					
anxiety-state	2717.5	2742.5	-0.08	1339.5	0.94
anxiety-trait	2802.5	2553.5	1.33	1122.5	0.18
after return from deployment					
anxiety-state	1881	1689	-0.28	846	0.78
anxiety-trait	2026	1544	1.01	764	0.31

This outcome may result from the conditions in which the test was conducted (e.g. conditions of service independent of the experiment). Similarly, no statistically significant differences between groups C and E were found after the return from deployment. This might result from both the time from the training and time of completion of the deployment.

Additionally, a statistical analysis, using the Wilcoxon matched-pairs-rank test, was carried out to examine whether the training provided had any impact on group E. Statistically significant differences before and after the training were observed at the significance level p = 0.04 for state and trait variables (p = 0.04). After the training, a declining trend was observed for both variables. The results are presented in Table 2.

Another statistical analysis was conducted to examine whether the learning and memorizing time or process, and effect of "everyday" life had influenced group C. Again, the Wilcoxon matched-pairs-rank test was used for this analysis (Table 3).

No statistically significant differences were found for the state variable (p = 0.12), while there was a statistically significant difference at the significance level p = 0.01 for the trait variable, where a declining trend at the level of 5% was observed.

Additionally, a statistical analysis was conducted to investigate whether there is a significant difference between the STAI test results prior to deployment (both before and after the training) and the STAI test results after the deployment. The Wilcoxon matched-pairs-rank test was used for this purpose once more.

The statistical analysis, without dividing into groups, showed that there was a statistically significant difference for all variables of the STAI test. A reduction in each variable of the test after return from the deployment is visible. The results are presented in Table 4.

Statistically significant differences for individual variables of the test with the corresponding significance levels presented in Table 5 were observed in group E. The only exceptions are the results of the STAI anxiety-state after the training in relation to the anxiety-state measured after return from the deployment: no statistically significant differences between the variables were found. A reduction in values for all variables was observed after return from the deployment. Again the Wilcoxon matched-pairs-rank test was used for the analysis (Table 5).

A similar analysis for the control group showed statistically significant differences for individual variables of the test with the corresponding significance levels presented in the Table. The only exceptions are the results of the STAI anxiety-state after the training in relation to the anxiety-state measured after return from the deployment: Similarly to group E, there are no statistically significant differences between the variables. Similarly to group E, a reduction in values for all variables was observed after return from the deployment. The results are presented in Table 6.

Table 2. Differences in intensity of anxiety as state and trait in the experimental group before and after completion of the training
Tabela 2. Różnice w nasileniu lęku jako stan i cecha w grupie eksperymentalnej przed treningiem i po zakończeniu treningu

pair of variables	N	T	Z	P
anxiety-trait before and after training	46	352	2.06	0.04
anxiety-trait before and after training	45	336	2.05	0.04

Table 3. Differences in intensity of anxiety as state and trait in the control group before and after completion of the training
Tabela 3. Różnice w nasileniu lęku jako stan i cecha w grupie kontrolnej przed treningiem i po zakończeniu treningu

pair of variables	N	T	Z	P
anxiety-state before and after the training	44	361	1.56	0.12
anxiety-trait before and after the training	46	303	2.59	0.01

Table 4. Differences in intensity of anxiety as state and trait before the training, after completion of the training and after return from the deployment (Wilcoxon matched-pairs rank test)
Tabela 4. Różnice w nasileniu lęku jako stan i cecha przed treningiem, po zakończeniu treningu i po powrocie z misji (test kolejności par Wilcoxona)

pair of variables	N	T	Z	P
anxiety-state before training and after return from deployment	73	619	4.02	0.00
anxiety-trait before training and after return from deployment	76	43	7.35	0.00
anxiety-state after training and after return from deployment	67	734.5	2.53	0.01
anxiety-trait after training and after return from deployment	69	162.5	6.25	0.00

After their return from Afghanistan, the participants of the SIT training were asked whether during the deployment they used the skills acquired during the training. One in ten of them responded that he had exercised breathing, which had helped him in difficult moments. The same number of soldiers responded that breathing control had helped them a little when they had experienced lower levels of stress, while at higher levels of stress it had been difficult to concentrate on breathing. Eight out of ten responded that they remembered little from the training and they had used ways to cope with stress that they had acquired previously.

Table 5. Differences in the intensity of anxiety as state and trait in the experimental group before the training, after completion of the training and after return from the deployment (Wilcoxon matched-pairs rank test)
Tabela 5. Różnice w nasileniu lęku jako stan i cecha w grupie eksperymentalnej przed treningiem, po zakończeniu treningu i po powrocie z misji (test kolejności par Wilcoxona)

pair of variables	N	T	Z	P
anxiety-state before training and after return from deployment	40	205	2.75	0.01
anxiety-trait before training and after return from deployment	41	0	5.58	0.00
anxiety-state after training and after return from deployment	38	242	1.86	0.06
anxiety-trait after training and after return from deployment	35	28	4.70	0.00

Table 6. Differences in the intensity of anxiety as state and trait in the control group before the training, after completion of the training and after return from the deployment (Wilcoxon matched-pairs rank test)
Tabela 6. Różnice w nasileniu lęku jako stan i cecha w grupie kontrolnej przed treningiem, po zakończeniu treningu i po powrocie z misji (test kolejności par Wilcoxona)

pair of variables	N	T	Z	P
anxiety-state before training and after return from deployment	33	118	2.90	0.00
anxiety-trait before training and after return from deployment	35	20	4.83	0.00
anxiety-state after training and after return from deployment	29	134.5	1.79	0.07
anxiety-trait after training and after return from deployment	34	53	4.18	0.00

Conclusions

The analysis of the results leads to the conclusion that VR SIT turned out to be effective in the short-term for anxiety reduction in the studied soldiers. During the training, the participants experienced stressful situations, analogous to those that may occur during the actual deployment. Controlled exposition to anxiety-triggering stimuli allowed training participants to acquire and exercise tension reduction skills. The participants' arousal level after the training was lower than that before the training, which confirms the hypothesis that VR SIT is an effective method for learning anxiety reduction techniques.

However, the obtained results do not lead to the clear conclusion that the VR SIT method was effective in the long-term for reducing anxiety in the studied soldiers. In the case of the decrease in the anxiety-state values observed in both groups examined after return from the deployment, it may be hypothesized that the decrease in these values resulted from other factors, e.g. from a safe return from deployment, rather than from participation in stress inoculation training.

The obtained results might have been also influenced by other factors, such as individual differences. The training was a high stress intensity situation. Therefore, temperamental differences are of particular importance. In particular, in the group participating in VR SIT, the structure of temperament had an impact on the anxiety level and effectiveness of the training. The more balanced the structure of temperament of the participants, the more effective the training was [14-16].

The obtained results indicate a decrease in intensity of anxiety-trait (in groups C and E, both after the training and after the return from deployment), which was described by the author of the STAI questionnaire as relatively constant and resistant to easy change. This decrease may be explained by the studies on the Spanish version of the questionnaire that showed that it measures rather the intensity of the negative affect than anxiety-trait [17]. Acknowledging this theoretical construct, further hypotheses may be put forward on the importance of the psychoeducation provided to both groups in the first phase of the study as the cause of the decrease in intensity of the negative affect as well as on the effect of a safe return home on the intensity of the negative affect during the second phase of the study.

Comparing the presented results with findings of other similar studies in which SIT participants more often claimed the usefulness of the acquired anxiety control skill in combat situations and the limited conditions in which the experiment was conducted should be taken into consideration. The lack of technical possibility for individual training and limited training duration did not allow the participants to fully develop a conviction concerning the superiority of the proposed method for coping with stress over their own methods.

The conclusions presented above are hypothetical in nature and need to be verified in further studies.

Acknowledgements
The authors would like to thank: Monika Filarowska, Piotr Murawski and Ewelina Opałko-Piotrkiewicz from the Military Medical Institute as well as Dorota Bożętka from the Polish 10th Armored Cavalry Brigade in Świętoszów for their help in performing this research project.

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Mental and somatic disorders in veterans and people oppressed in the years 1940-1956

Zaburzenia psychiczne i somatyczne u kombatantów i osób represjonowanych w latach 1940-1956

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Abstract. Aim: The aim of the study was to assess the state of mental and somatic condition of veterans and oppressed people in the years 1940-1956. Material and methods: A group of 58 people from seven veterans' organizations of the Lodz voivodeship was involved in this study. Two groups emerged in the study: group I consisting of 25 people (43%) who had previously received psychiatric treatment, and group II of 33 people (57%) who had not used psychiatric advice before. The following methods were used in the work: psychiatric examination including Beck Depression Inventory, Athens Insomnia Scale and sociodemographic-medical questionnaire. Results and conclusions: Posttraumatic stress disorder (PTSD) and the disorders of extreme stress not otherwise specified (DESNOS) have often occurred in the group of veterans and people oppressed people who undertook the psychiatric treatment. Increased incidence of mood disorders, anxiety and sleep disorders, as well as problems with cardiovascular, osteoarticular, and digestive system were found in the study group. The authors have attempted to explain the surprising test results.
Key words: mental and somatic condition of veterans, oppressed people, PTSD

Streszczenie. Cel pracy: Celem pracy była ocena stanu psychicznego i somatycznego kombatantów i osób represjonowanych w latach 1940-1956. Materiał i metody: Badaniami objęto grupę 58 osób z siedmiu organizacji kombatanckich województwa łódzkiego. Badania wyłoniły dwie grupy: I - liczącą 25 osób (43%), która podjęła wcześniej leczenie psychiatryczne oraz II - 33 osoby (57%) niekorzystające z porad psychiatrycznych. Metodami wykorzystanymi w pracy były: badanie psychiatryczne, w tym skalą depresji Becka i bezsenności (Ateńska) oraz kwestionariusz socjodemograficzno-medyczny. Wyniki i wnioski: W grupie kombatantów i osób represjonowanych, która podjęła leczenie psychiatryczne częściej występowały objawy postraumatyczne (PTSD) oraz złożonego zespołu stresu pourazowego (DESNOS). W omawianej grupie stwierdzono również zwiększoną zachorowalność na zaburzenia nastroju, lękowe i snu oraz schorzenia układu krążenia, kostno-stawowego oraz przewodu pokarmowego. Autorzy podjęli próbę wyjaśnienia zaskakujących wyników badań.
Słowa kluczowe: osoby represjonowane, PTSD, stan psychiczny i somatyczny kombatantów

Received: 19.12.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 26-33

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Introduction

Although 70 years have passed since the war's end, many Polish and foreign authors still discuss the issue of the prevalence of mental disorders in the population of people who participated in active combat or were victims of these actions. A considerable part of this population includes victims of political or ethnic persecution. Czaja and Gierowski [1] discuss the issue of disorders of interpersonal functioning as well as assess the level of anxiety, depression and aggression in people politically persecuted in Poland in the years 1944-1956. Also Heitzman and Rutkowski [2] carried out studies on the current mental condition of people politically persecuted in Poland in the years 1944-1955. They concluded that symptoms of various mental disorders occurred in almost the entire study group. Lis-Turlejska et al. [3] presented results of studies concerning the level of posttraumatic stress disorder (PTSD) as well as depression in people who were children at the time of the Second World War.

The history of PTSD is associated with the origin of disorders of extreme stress not otherwise specified (DESNOS). Many studies on traumatic stress showed that diagnostic criteria for PTSD do not cover all mental problems in people who experienced long-term trauma. Alterations in the functioning of individuals exposed to such trauma are included in the concept of DESNOS. These alterations affect six areas: emotional sphere, consciousness, self-perception, perception of perpetrator, system of meaning and beliefs and relations with others. The ICD-10 classification defines disorders characteristic of DESNOS as "enduring personality change after catastrophic experience (having experienced an extreme event)" [4]. Other authors have analyzed symptoms that were non-specific for particular armed conflicts and affected the entire group of veterans and civilians exposed to combat-related traumatic stress. They reported the following symptoms: fatigue, headache, memory and concentration disorders as well as sleep and mood disorders [5,6]. Authors of many studies proved that veterans also have an increased risk of cardiovascular diseases. They indicated the occurrence of stress reaction resulting from traumatic experiences that led to serum lipid balance disorders, and as a result, to the onset of ischemic heart disease, hypertension and sudden cardiac death [7-10]. Considering current ongoing armed conflicts, similar disorders should be expected in both veterans and victims of these conflicts.

Aim

The essential purpose of the study was to assess the mental and somatic condition of veterans and people oppressed in the years 1940–1956.

Material and methods

The study involved 58 veterans from the following organizations: Association of the Underground Polish Army, World Association of Home Army Soldiers - District Board in Łódź, Polish Association of War Disabled, Association of Former Political Prisoners of the Stalin Era 1939-1956 - Branch in Łódź, Association of Siberian Deportees, Association of Polish Children Germanized by the Nazi Regime and the group Children of the Holocaust. All participants had experienced traumatic events during their stay in a Stalinist prison, concentration camp, ghetto, labor camp or in forced labor.

Approval for the study was obtained from the Bioethical Committee of the Medical University in Łódź, No. RNN/383/09/KB of 12.05.2009.

The study was conducted based on the following methods:

- Routine psychiatric examination (at the participant's home) using the Beck Depression Inventory and Athens Insomnia Scale.
- Sociodemographic-Medical Questionnaire (developed by the authors) - consisting of questions on basic information about the participant: age, gender, education, descent, marital status, general health condition. A detailed analysis covered traumatic events in the years 1940-1956. The questionnaire also includes questions to assess the participant's mental condition and criteria for posttraumatic stress syndrome (PTSD) and disorders of extreme stress not otherwise specified (DESNOS).
- x^2 test of independence and Pearson's correlation coefficient.

Results

Based on the obtained data, the study population was divided into two basic groups:

- Group I (study group) with psychiatrically treated subjects - 25 individuals (43%);
- Group II (control group) involved subjects who have not been psychiatrically treated or consulted before - 33 individuals (57%).

Participants from both groups were subjected to various forms of repressions, e.g. a single person was a concentration camp prisoner, participated in forced labor or was imprisoned during the Stalin era. Due to this, it is not possible to separate a homogeneous group on the basis of a single criterion related to a particular veteran's type.

The mean age was 80.36 years in group I, and 82.69 years in group II. The group of psychiatrically treated subjects (I) involved 16 males (64%) and 9 females (36%), and the non–treated group involved 18 males (54.5%) and 15 females (45.4%). Both in groups I and II, the largest number of subjects lived in a city. In the psychiatrically treated group (I), 60% of the participants had secondary education -15, while in the non-treated group (II) 48% had higher education - 16 (Tab. 1 and 2).

The data presented in Table 3 show a variable suggesting that the duration of repression had an effect on the initiation of psychiatric treatment. Subjects repressed for more than 49 months more often undertook psychiatric treatment. This refers to Stalin's prisoners and Holocaust child survivors. Of subjects who had participated in forced labor for 12 months, 12% individuals (6.2% of subjects not treated in the Mental Health Center [MHC]) undertook psychiatric treatment, after 24 months of repression, 16% subjects received treatment in the MHC (3.1%), and 12% after 49 months or longer (6.2%).

Table 1. Sociodemographic data of group I
Tabela 1. Dane socjodemograficzne grupy I

Sociodemographic data	Group treated in the MHC	
	number	%
place of residence: city	22	88
married	14	56
primary education	2	8
vocational education	2	8
secondary education	15	60
higher education	6	24

Table 2. Sociodemographic data of group II
Tabela 2. Dane socjodemograficzne grupy II

Sociodemographic data	Group not treated in the MHC	
	number	%
place of residence: city	32	96
married	13	39.3
primary education	6	18.1
vocational education	2	6.0
secondary education	9	27.2
higher education	16	48

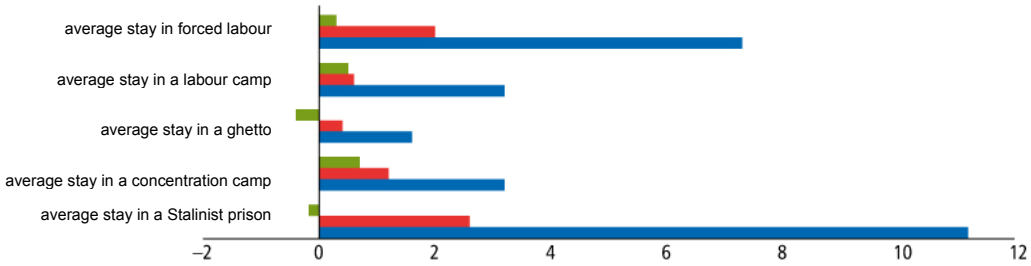
There is a statistically significant relationship in terms of time spent in the Stalinist prison in the study groups (x^2 = 14.867, df = 4, p <0.01). There is also a statistically significant relationship in terms of time spent in forced labor in the study groups (x^2 = 11.523, df = 4, p <0.05). However, in terms of the period of time spent in the concentration camp, no one in the studied groups stayed at the camp for less than 48 months). Comparing the obtained results after ignoring this period of time, a statistically significant relationship in the study groups was observed ($\%^2$ = 12.085, df = 3, p <0.01). There is a similar situation in terms of: the period of time spent in the ghetto (no repression was observed in either group lasting up to 37 months and up to 48 months). After ignoring these periods of time, a statistically significant relationship in the study groups was observed (x^2 = 14.200, df = 2, p <0.001). In terms of: the period of time spent in the labor camp, a duration of repression no longer than 24 months was observed in both study groups. Comparing the obtained results, a statistically significant relationship in the study groups was observed (x^2 = 6.800, df = 1, p <0.01).

Figure 1 compares the average duration of repression in the study groups. In the psychiatrically treated group, the average stay in the Stalinist prison was the longest (11.2 months). The average stay in forced labor was 7.33 months, and in the labor camp and concentration camp - 3.2 months. The shortest duration of repression in the group of subjects treated in the MHC was the one in the ghetto (1.6 months). Also in the group of subjects not treated in the MHC, the longest average duration of repression related to the stay in the Stalinist prison (2.6 months) and in forced labor (2.0 months). The shortest duration of repression in the group of subjects not treated in the MHC was also the one in the ghetto (0.4 months).

The Pearson's correlation coefficient indicates a statistical relationship in the study groups.

Table 3. Structure of respondents by duration of repression
Tabela 3. Struktura osób badanych według czasu trwania represji

Duration of repression	in a Stalinist prison		in a concentration camp		in a ghetto		in a labor camp		in forced labor	
	Group treated in the MHC %	Group not treated in the MHC %	Group treated in the MHC %	Group not treated in the MHC %	Group treated in the MHC %	Group not treated in the MHC %	Group treated in the MHC %	Group not treated in the MHC %	Group treated in the MHC %	Group not treated in the MHC %
12 months	12	18.7	8	12.5	4	0	8	9.3	12	6.2
24 months	4	12.5	4	0	0	6.2	8	0	16	3.1
37 months	4	3.1	4	0	0	0	0	0	4	6.2
48 months	20	9.3	0	0	0	0	0	0	0	3.1
49 months and longer	12	3.1	0	3.1	4	0	0	0	12	6.2
X^2	df = 4 14.867		df = 3 12.085		df = 2 14.200		df = 1 6.800		df = 4 11.523	



	average stay in a Stalinist prison	average stay in a concentration camp	average stay in a ghetto	average stay in a labour camp	average stay in forced labour
Pearson's correlation coefficient	-0.184637236	0.7167132	-0.40824829	0.612372436	0.299812676
group not treated in the MHC	2.6	1.2	0.4	0.6	2
group treated in the MHC	11.2	3.2	1.6	3.2	7.33

Figure 1. Comparison of average duration of repression (months) in the study groups

Rycina 1. Porównanie średniego czasu trwania represji (w miesiącach) w badanych grupach

Figure 2 compares the data on the prevalence of mental diseases and disorders in the group of veterans and repressed people who undertook psychiatric treatment (I) with the group of those whose were not treated (II). The most common disorders treated in the MHC were sleep disorders (76%), anxiety disorders (64%) and mood disorders (52%). A smaller percentage of subjects were treated due to psychotic disorders (12%) and sexual disorders (12%). In the non-psychiatrically treated group, those disorders occurred with a correspondingly lower frequency: sleep disorders (52%), anxiety disorders (16%), mood disorders (4%), psychotic disorders (0%) and sexual disorders (4%).

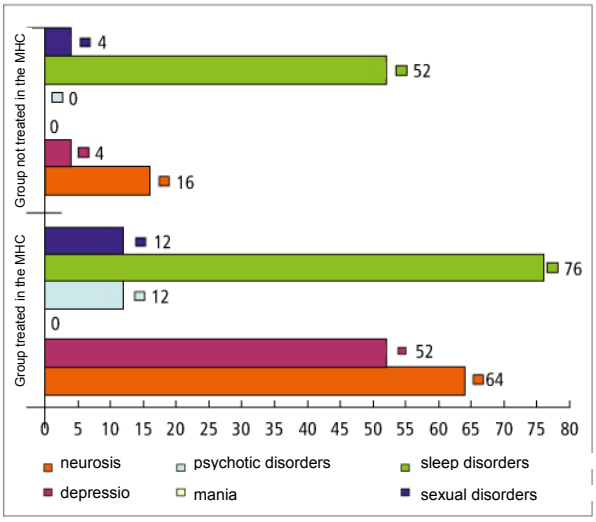


Figure 2. Psychiatric morbidity in the study population

Rycina 2. Zachorowalność psychiatryczna w badanej populacji

The largest difference was observed in the prevalence of anxiety and mood disorders in both groups.

Comparing the obtained results concerning the psychiatric morbidity in the study groups after ignoring the data on mania (0%), a statistically significant relationship in the examined groups was observed (x^2 = 30.280, df = 4, p <0.001).

Figure 3 provides a comparison of depressive symptoms in veterans and oppressed people in the study groups. In the psychiatrically treated group (I), sleep disorders (68%) (in the non-treated group (28%)), lowered mood (60%) (12%), negative view of the future (52%) (8%) and early morning awakenings (28%) (8%) were most often reported. Low self-assessment and impaired concentration and attention were reported by 24% individuals from the treated group. These complaints were not reported in the psychiatrically untreated group. Other symptoms: loss of interest and pleasure as well as loss of appetite were reported by 20% individuals of the treated group. In the psychiatrically untreated group (II), the following symptoms occurred: 8% showed a loss of interest and 4% showed anhedonia. There was no recorded loss of appetite.

Comparing the obtained results concerning depressive morbidity, a statistically significant relationship in the study groups was found (x^2 = 58.047, df = 8, p <0.01).

Figure 4 presents the data on somatic morbidity in veterans and oppressed people in both study groups.

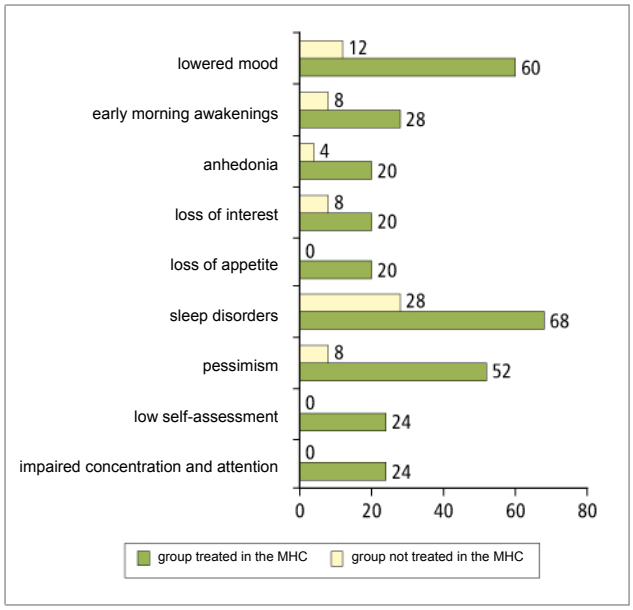


Figure 3. Occurrence of depressive symptoms in the study population
Rycina 3. Występowanie objawów depresyjnych w badanej populacji

The most often reported somatic complaints in the treated group (I) were associated with the cardiovascular system (92%), osteoarticular system (88%) and digestive system (60%). This group also more often reported diseases of the nervous system (48%), hearing loss (44%), and diseases of the respiratory system (40%).

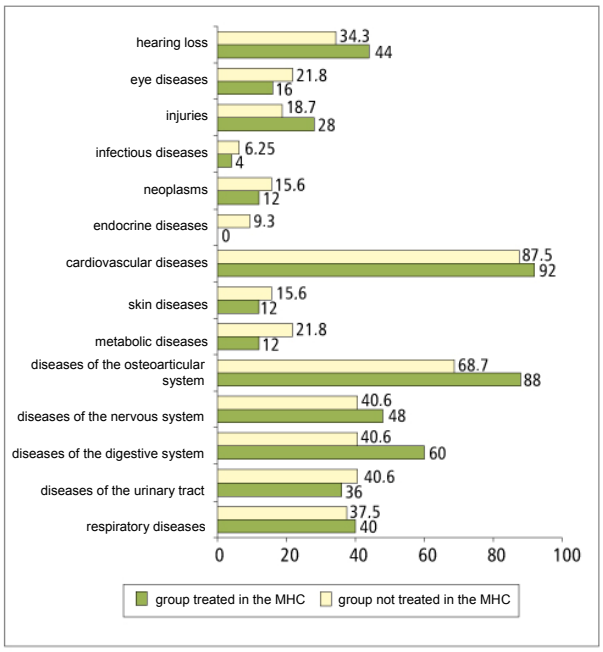


Figure 4. Somatic morbidity in the study population

Rycina 4. Zachorowalność somatyczna w badanej populacji

This group had more often experienced trauma (28%). Also in the psychiatrically untreated group (II), diseases of the cardiovascular system (87.50%) and osteoarticular system (68.70%) occurred most often. A higher percentage of subjects in this group, when compared to the psychiatrically treated group, reported diseases of the urinary tract (40.60%), metabolic diseases (21.80%), eye diseases (21.80%), neoplasms (15.6%), skin diseases (15.6%), endocrine diseases (9.30%) and infectious diseases (6.25%).

Comparing the obtained results concerning somatic morbidity, a statistically significant relationship in the study groups was observed (x^2 = 238.423, df = 13, p <0.01).

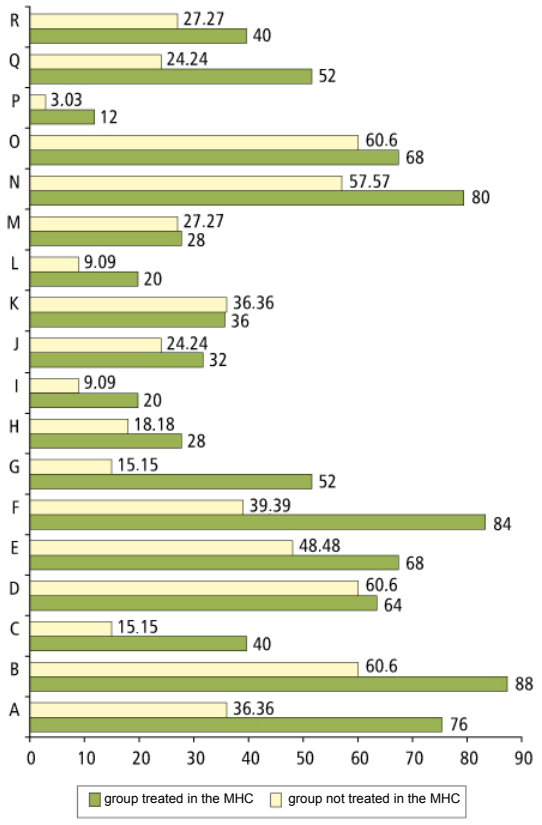
Figure 5 shows that the most frequent symptoms of PTSD in group I were: recurrent troublesome dreams related to a traumatic event (88%), avoiding thoughts, feelings and conversations about the trauma (84%) and difficulty falling or staying asleep (80%). Difficulty concentrating was the least frequent symptom (12%). Whereas in group II: recurrent troublesome dreams related to the event (60.6%), physiological sensitivity to internal and external stimuli reminiscent of the event (60.6%), irritability and outbursts of anger (60.6%). Similarly to group I, difficulty concentrating was the least frequent symptom (3.03%). A Pearson's correlation coefficient of 0.8291 indicates a strong positive correlation in the study groups.

Figure 6 shows that the most frequent symptoms of DESNOS in Groups I and II were: intense emotional reactions inadequate to a situation (68%; 60.6%), problems with expression and modulation of anger (60%; 48.48%) and feeling of helplessness and powerlessness (56.0%; 18.18%). The least frequent symptom in the treated group was compulsiveness or extreme sexual inhibition (4.0%), whereas in the psychiatrically untreated group: enduring feeling of being threatened without external cause, permanent lack of trust, sexual disorders and loss of sustaining faith (3.03%).

A Pearson's correlation coefficient of 0.8924 indicates a strong positive correlation in the study groups.

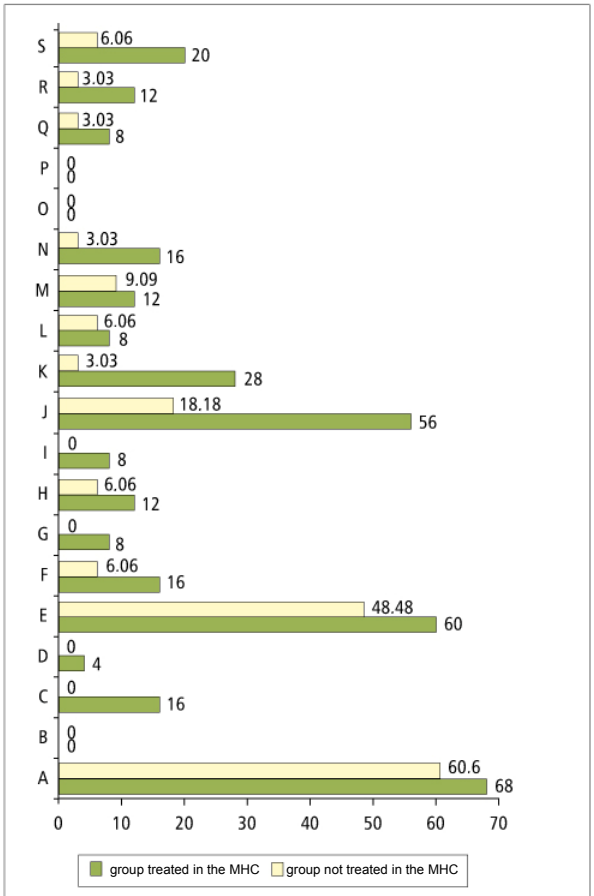
Discussion

Many studies show the relationship between traumatic events experienced in the past and current social functioning or distrustful attitude towards people [11]. Researchers studying "survivor syndrome" indicate personality changes in the form of withdrawal, isolation, feeling of loneliness, mistrust, lack of trust in others, irritability and indifference [12]. According to the ICD-10 classification, enduring personality change after catastrophic experience (having experienced an extreme event) is characterized by a hostile and distrustful attitude towards the world, social withdrawal, feeling of emptiness or



Key:
A - recurrent and intrusive distressing recollections of the event
B - recurrent and intrusive distressing dreams of the event
C - feeling as if the traumatic event were "reviving", illusions, and hallucinations
D - physiological reactivity on exposure to internal or external cues that resemble the traumatic event
E - intense physiological distress at exposure to internal or external cues that resemble the traumatic event
F - efforts to avoid thoughts, feelings or conversations associated with the trauma
G - efforts to avoid activities, places or people that arouse recollections of the trauma
H - inability to recall an important aspect of the trauma
I - markedly diminished interest and participation in significant activities
J - feeling of being rejected by others
K - hostile and distrustful attitude towards the world and people
L - restricted range of affect
M - feeling of a lack of future prospects
N - difficulty falling or staying asleep
O - irritability, outbursts of anger
P - difficulty concentrating
Q- hypervigilance
R - exaggerated startle response

Figure 5. Comparison of diagnostic criteria for post-traumatic stress disorder (PTSD) in the study groups
Rycina 5. Porównanie kryteriów diagnostycznych zespołu stresu pourazowego (PTSD) w badanych grupach



Key:
A - intense emotional reactions inadequate to a situation
B - self-destructive behaviors: eating disorders, self-harm
C - suicidal thoughts
D - compulsiveness or extreme sexual inhibition
E - problems with expression and modulation of anger
F - amnesia or hypermnesia associated with traumatic experiences
G - changes in self-perception
H - negative self-image
I - feeling of being changed or different from others
J - feeling of helplessness and powerlessness
K- enduring feeling of being threatened without external cause
L - shame, feeling of guilt and self-blame
M - feeling of defilement or stigma (stigmatization)
N - persistent lack of trust
O - revictimization (becoming a victim again)
P - victimization of others (reducing others to victims)
Q - sexual disorders
R - loss of sustaining faith
S - feeling of hopelessness and despair

Figure 6. Comparison of diagnostic criteria for disorders of extreme stress not otherwise specified (DESNOS) in the study groups
Rycina 6. Porównanie kryteriów diagnostycznych złożonego zespołu stresu pourazowego (DESNOS) w badanych grupach

helplessness, chronic feeling of "being on the edge" as if constantly feeling threatened, and estrangement. The conducted studies indicate that PTSD and DESNOS more often occurred in the group of veterans and people oppressed in the years 1940-1956 who undertook psychiatric treatment. PTSD commonly co-occurs with symptoms or a group of symptoms that are not included in diagnostic criteria for this syndrome but they are a part of the clinical picture of PTSD. Those include: anxiety disorders, depression, addiction, somatization and impulsive disorders [13, 14]. The obtained results show that in terms of mental health in the group of veterans and oppressed people who undertook psychiatric treatment, sleep disorders (76%), anxiety disorders (64%) and mood disorders (52%) occurred most frequently. This corresponds with results obtained by Peterson, Prout and Schwarz [13]. The data concerning the prevalence of depressive disorders in the population unaffected by repressions in a broad sense, associated with hostilities, show that 15-30% of patients aged over 65 years see their general practitioners about depression. In more than 30%, unspecified mood disorders are found, referred to as: minor depression, dysthymia, depressive neurosis, not full-blown depression that do not fulfil criteria for major depression [15]. Czaja and Gierowski [1] confirmed in their studies that a higher level of anxiety occurred in people who had been politically persecuted in Poland in the years 1944–1956, when compared to the control group. It was proved that symptoms correlate with each other and have a significant effect on social functioning of oppressed people. Heitzman and Rutkowski [2], in their study on the mental condition of people politically oppressed in Poland in the years 1944-1956, found symptoms of various mental disorders in almost the entire study group. PTSD was found in 71% of study subjects. Depressive symptoms were present in a total of 85%, anxiety symptoms in 8%, somatization symptoms in 2%, and dementia in 5%.

The conducted studies also indicate that the comorbidity related to diseases of the cardiovascular, osteoarticular and digestive systems in the psychiatrically treated group (I) was higher when compared to the untreated group (II) [7-10]. The results of the obtained studies show that subjects from the psychiatrically treated group (I) present a significantly higher intensity of examined psychopathological and somatic parameters when compared to the non-treated group (II). Hypothetic exacerbation, intensification or consolidation of posttraumatic disorders and chronic somatic diseases may result from the phenomenon of the so-called revival of stress during medical appointments or meetings of veteran organizations or from an inadequately conducted therapy. The references discuss the issue of a negative effect of some forms of psychotherapy, e.g. debriefing, on exacerbation of posttraumatic disorders [16-18].

Conclusions

1. In the study population of 58 members of seven veterans' organizations of the Lodz voivodeship, 43% were chronically psychiatrically treated, and 57% did not seek any psychological-psychiatric advice. Mental disorders related to traumatic experiences in the years 1940-1956 and chronic somatic disorders were found in all subjects.
2. Mental disorders in the form of a presentation of posttraumatic stress disorders (PTSD), disorders of extreme stress not otherwise specified (DESNOS) and depressive disorders, as well as somatic disease of: the cardiovascular, osteoarticular and digestive systems more often occurred in the psychiatrically treated group.
3. Duration (time) of traumatic events was a significant reason for the decision to initiate and continue psychiatric treatment.
4. The authors suggest that exacerbation and consolidation of posttraumatic disorders and chronic somatic diseases may result from the phenomenon of the revival of stress during meetings of veteran's organizations or from inadequate therapy.

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Temperament and effects of stress inoculation training - the example of Polish ISAF soldiers

Temperament a wyniki treningu zaszczepiania stresem na przykładzie polskich żołnierzy ISAF

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Abstract. Aim: The aim of this study was to assess relationship of temperamental traits and structure with the results of Virtual Reality Stress Inoculation Training (VR SIT) in 4 soldiers preparing for their first mission in Afghanistan (ISAF). Method: The soldiers took part in 10 SIT sessions. The initial and final arousal/relaxation in response to VR exposition were assessed using Heart Rate Variability: Very Low Frequency (VLF) and Low Frequency (LF) ratio as an indicator of relaxation/arousal. The temperament traits and structure were assessed using the Formal Characteristics of Behavior - Temperament Inventory. Results: The analysis of VLF and LF graphs showed that 3 soldiers achieved better results in reducing their arousal during final session when compared to the initial session. Their temperament structure was found more harmonized than the soldier who has achieved weaker results in training. Moreover, soldiers with better results of training were characterized by high Sensory Sensitivity. Conclusions: We found a connection between the results of the training and soldiers' temperamental structure as well as their Sensory Sensitivity. Due to the preliminary nature of our findings, replication is necessary on a larger group.
Key words: ISAF Afghanistan, military psychiatry, stress inoculation training (SIT), temperament

Streszczenie. Cel pracy: Celem pracy była ocena związku cech i struktury temperamentu z wynikami treningu zaszczepiania stresem z zastosowaniem wirtualnej rzeczywistości *[Virtual Reality Stress Inoculation Training-MR* SIT) u 4 żołnierzy przygotowujących się do misji w Afganistanie (ISAF). Metoda: Żołnierze wzięli udział w 10 sesjach SIT. Początkowe i końcowe pobudzenie/zrelaksowanie w odpowiedzi na ekspozycję VR oceniano na podstawie zmienności rytmu serca *[heart rate variability*-HRV): *very low frequency* (VLF) ¥ *low frequency* (LF) jako wskaźników zrelaksowania/pobudzenia. Cechy oraz strukturę temperamentu oceniano z zastosowaniem kwestionariusza Formalna Charakterystyka Zachowania - Kwestionariusz Temperamentu. Wyniki: Analiza wykresów VLF i LF wykazała, że 3 żołnierzy było w stanie skuteczniej obniżyć poziom pobudzenia podczas ostatniej sesji w porównaniu z sesją pierwszą. Ich struktura temperamentu okazała się bardziej zharmonizowana niż u żołnierza, który uzyskał słabsze efekty treningu. Ponadto badani z lepszymi wynikami treningu cechowali się wysoką wrażliwością sensoryczną. Wnioski: Zauważono związek wyników treningu ze strukturą temperamentu oraz wrażliwością sensoryczną. W związku ze wstępnym charakterem powyższych wyników konieczna jest replikacja badania na większej grupie.
Słowa kluczowe: ISAF Afganistan, psychiatria wojskowa, temperament, trening zaszczepiania stresem (SIT)

Received: 04.11.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 34-40

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Introduction

Performing one's duty under combat conditions may lead to stress-related disorders [1, 2]. One of the methods for reducing the risk of these disorders is the use of stress inoculation training (SIT) [3]. It has been found that cognitive-behavioral techniques combined with VR exposure (Virtual Reality Exposure Therapy), effective in the treatment of posttraumatic stress disorder (PTSD), may also be used to develop skills to perform tasks in stressful situations and to prevent the effects of stress exposure [4-11]. A review of existing studies on stress inoculation training supported by virtual reality (Virtual Reality Stress Inoculation Training - VR SIT) indicates the usefulness of this method [12-14].

The study described is a part of the *Stress Inoculation Training for Polish ISAF Soldiers* project carried out by the authors of this paper and described in more detail in other materials [15]. The VR SIT method used was developed in the Virtual Reality Medical Center (San Diego) [6]. It is designed to improve the ability to reduce arousal in combat stress situations. Physiological parameters allow the determination of the effectiveness of arousal reduction.

The aim of this study was to examine whether there was any relationship between the participant's temperamental traits and structure and the results of the training. It has been found that temperament traits have an effect on individual resistance to stress, which means that they determine the effectiveness of action and the seriousness of emotional consequences in situations concerning a particular stimulation value. Depending on temperament, individuals develop various styles of action [16, 17]. Therefore, we wanted to investigate whether there is any connection between temperamental traits and structure and the effectiveness of the VR SIT method used by the participants.

Material and Method

Participants

The case described concerns the use of SIT (according to the methodology of the Virtual Reality Medical Center, San Diego) within the research project involving soldiers preparing for deployment to Afghanistan within the Polish Military Contingent (Rotation 8). VR SIT involved 4 soldiers. The participants volunteered from a 60-strong group of soldiers participating in preparatory training.

The males were of similar age (27, 28, 28 and 30 years), with secondary education (2 individuals) and vocational education (2 individuals). All of them were privates, on contract and in service for 3 to 7 years. Two of them were married with children, and another two were single without children. All participants were deployed for the first time. They had been qualified for deployment outside of Poland by the Military Medical Commission.

Procedure

After agreeing to participate in the study, all VR SIT participants were informed of the conditions and purpose of the training. After filling in a personal questionnaire and the Formal Characteristics of Behavior – Temperament Inventory (FCB-TI), the soldiers took part in 10 VR SIT sessions with physiological monitoring.

At the beginning and at the end of the training, the Behavioural Avoidance Test (BAT) was conducted by measuring the following physiological parameters: heart rate variability (HRV), respiratory rate, body temperature and skin conductance/resistance. Both the initial and final measurements were taken during 5-minute baseline and recovery sessions separated by a 3-minute VR exposure to stimuli related to taking part in a military convoy.

The HRV indicators: Very Low Frequency (VLF) and Low Frequency (LF) were used to compare changes in the arousal state in the participants. A decrease in arousal state was observed when the LF value was higher than the VLF value.

The obtained values of physiological parameters were analyzed in relation to temperamental traits that are determined by inborn neurobiological mechanisms. Also the State-Trait Anxiety Inventory (STAI), Coping Inventory for Stressful Situations (CISS) and NEO Personality Inventory - Revised (NEO-PI-R), which measure the level of anxiety, styles of coping with stress and personality traits, were used during the study. This analysis focused on those temperament structures that undergo changes in time to the slightest extent and play a significant role in the adaptation of an individual to environmental requirements.

Equipment

Three portable computers with software supporting virtual reality, allowing the simultaneous monitoring of physiological indicators, were used for the training. The following programs were used: Afghan Kabul, Iraq Convoy, Main PTSD, Convoy PTSD, and Enchanted Forest. They were made available by the Virtual Reality Medical Center, San Diego.

The first computer, via VR goggles and headset, enabled exposure in the virtual environment, in which the participant moved by means of a joystick.

Another computer was used by the trainer to control VR exposure parameters.

The third computer, via connected sensors, monitored physiological parameters (respiration, heart rate, skin conductance/resistance and body temperature) and controlled the feedback system.

Formal Characteristics of the Behavior - Temperament Inventory

The FCB-TI questionnaire was used in the study. It is designed for diagnosis of the basic, primarily biologically determined dimensions of personality referred to as temperament [18, 19]. Temperament traits are examined at two levels.

The first is the energy level of behavior, i.e. mechanisms responsible for accumulating and releasing energy. Energy traits of temperament examined by means of the FCB-TI are as follows [18]:

- Emotional Reactivity (ER) - a tendency to react intensely to stimuli, manifesting itself in high emotional sensitivity and low resilience. I
- Endurance (EN) - an ability to react adequately to strong stimulation and to manage situations involving long-term activity. I
- Activity (AC) - a tendency to undertake strongly stimulating behaviors or to seek external stimulation. I
- Sensory Sensitivity (SS) - an ability to react to weak sensory stimuli

The second level are temporal characteristics of behavior that determine the course of reaction in time [18]. These are:

- Briskness (BR) - a tendency to react quickly, to maintain a high tempo in performing actions and to change behavior easily in response to changes in the surroundings.
- Perseveration (PE): a tendency to continue and to repeat an action after cessation of the stimulus that evoked it.

What is important for the functioning of an individual is not only the level of particular traits but also their balance. Control effectiveness is connected with the equilibrium between stimulation input and its relief. In addition to this, there should be also a balance between the possibility of stimulation processing and the seeking or avoiding of it. Depending on the balance of temperament traits, there is a differentiation between harmonized and non-harmonized temperament structure.

In order to determine the balance of temperament traits in the studied soldiers, the relationship between the most important energy and temporal traits were examined: between Activity and Endurance, Activity and Emotional Reactivity and between Briskness and Perseverance.

Training

The training consisted of 10 sessions, 2 sessions a day - one in the morning and one in the afternoon. Each session was conducted by a psychologist-trainer who worked directly with the participant and by a psychologist-assistant who monitored the measurements of the physiological indicators.

The first session included measuring and recording the BAT profile. The initial measurement of the baseline physiological indicators took 5 minutes and was performed prior to exposure. Subsequently, the physiological indicators were measured during the exposure within the VR program for the next 3 minutes. The last measurement concerned recovery after exposure and lasted for 5 minutes.

After the BAT training was created, the participants underwent deep-diaphragmatic breathing training and obtained feedback on their physiological parameters with elements of education. At the end of the session, the participants were encouraged to train deep-diaphragmatic breathing between the training sessions. The second session included the training of arousal reduction during imaginal exposure to stress with feedback on physiological parameters. The third session again consisted of the sequence: baseline - VR exposure - recovery. For the exposure, an animated environment without combat stimuli was used. The next 6 training sessions (from 4 to 9) were also conducted according to the scheme: baseline - VR exposure - recovery. In the following sessions, programs for exposure to a combat environment were used with an increasing possibility of exposure to stress. During these sessions the participants learned how to reduce their arousal.

The last session was designed for a comparative record of the BAT profile, in the same form as during the first session. Also the effects of the training were summarized.

During each training session, the participants evaluated their subjectively felt stress level (from 1 to 100) by means of the Subjective Units of Distress Scale (SUDS) for baseline, exposure and recovery.

Results

LF and VLF Indicators

LF and VLF values from the first and last session were compared in order to assess the participants' initial and final arousal state.

The graphs of Participant 1's results show a significant reduction in arousal in the final baseline and recovery when compared to the first session (LF value is higher than VLF value). No improvement was found during the final exposure when compared to the initial one. However, a surprising reduction in arousal was observed during the exposure in the initial session (Fig. 1).

The graphs of Participant 2's results show reduction in arousal in all 3 parts of the final session when compared to the initial one. The decrease in arousal is visible in the baseline, exposure and recovery (Fig. 2).

The graphs of Participant 3's results in the final session show a significant reduction in arousal only during the baseline, i.e. prior to exposure to stressors. In the other parts of the final session, the participant did not manage to relax. However, it is noticeable that the arousal in the final recovery is lower than during the recovery in the first session. A comparison of the graphs is presented in Figure 3.

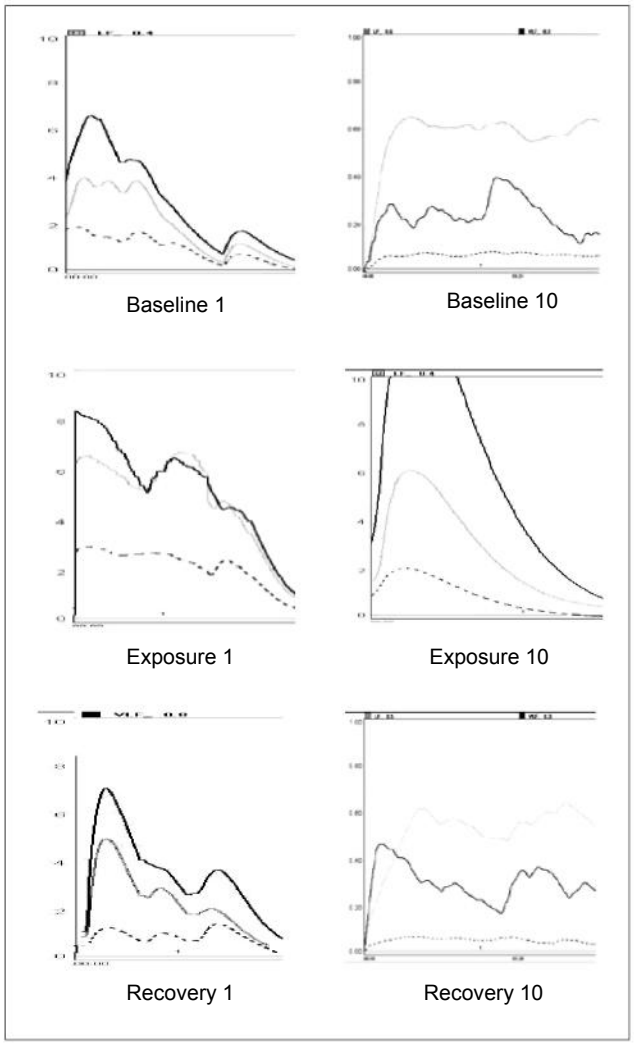

Figure 1. Comparison of session 1 and 10 for Participant 1 gray line - LF; black line - VLF; dashed line - HR
Rycina 1. Porównanie wykresów sesji 1 i 10 badanego 1 linia szara - low frequency (LF); linia czarna - very low frequency (VLF); linia przerywana - heart rate (HR)

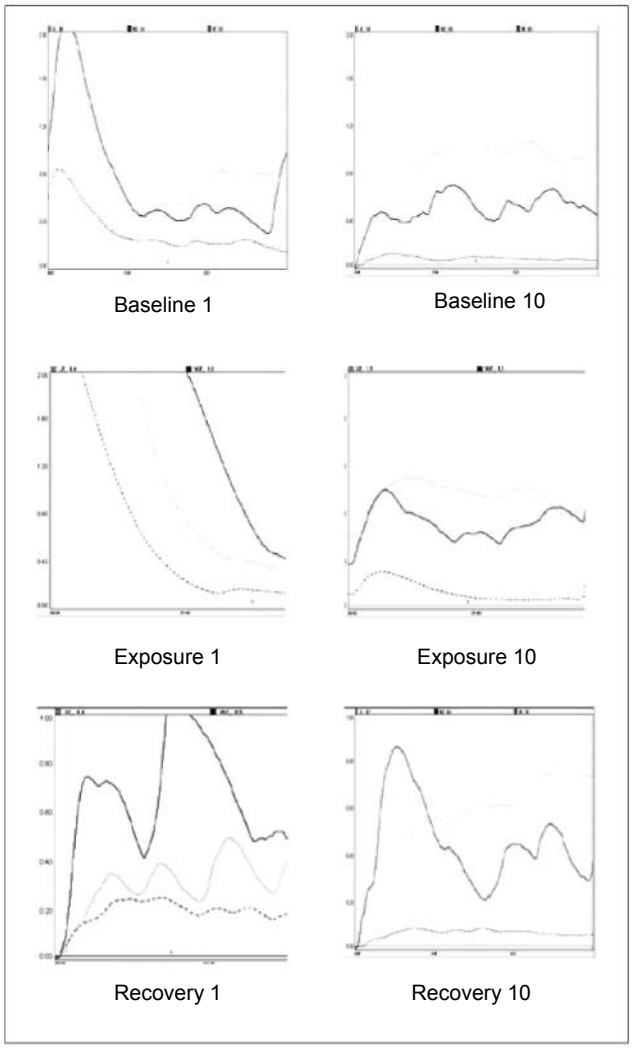

Figure 2. Comparison of session 1 and 10 for Participant 2 gray line - LF; black line - VLF; dashed line – HR
Rycina 2. Porównanie wykresów sesji 1 i 10 badanego 2 linia szara - LF; linia czarna - VLF; linia przerywana - HR Figure

The graphs of Participant 4's results show a significant reduction in arousal in the final baseline, exposure and recovery when compared to the initial session, which allows to conclude improvement in arousal reduction skills. A comparison of the graphs is presented in Figure 4.

The comparison of the indicator values from the first and the last session allows to find a clear improvement of arousal reduction skills in three out of four participants (Participants 1, 2 and 4).

Subjective Stress Assessment

The analysis of the SUDS in the 1 to 100 scale done by the participants indicates their great difficulties in adequate assessment of their arousal state. Both at the beginning and during the training, the participants often assessed their stress intensity inconsistently with the values of the physiological parameters.

During exposure in the last session, Participant 2 and Participant 4 assessed that they were aroused, while the measurement of their physiological parameters showed a state of relaxation. Participant 2 assessed the SUDS as 40, and Participant 4 as 50. Similarly, Participant 1 and Participant 3 assessed that they were completely or almost completely relaxed at moments when arousal occurred. Participant 1 assessed the SUDS as 0, and Participant 3 as 5. At the same time, those participants who overestimated their arousal (Participant 2 and Participant 4) were able to relax more effectively.

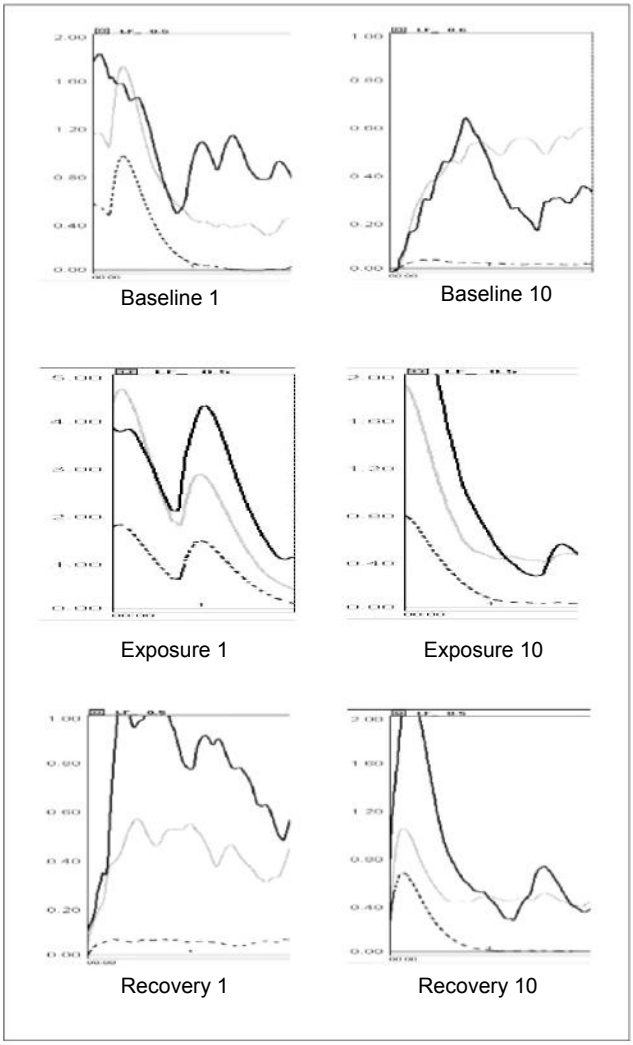

Figure 3. Comparison of session 1 and 10 for Participant 3 gray line - LF; black line - VLF; dashed Line – HR
Rycina 3. Porównanie wykresów sesji 1 i 10 badanego 3 linia szara - LF; linia czarna - VLF; linia przerywana – HR

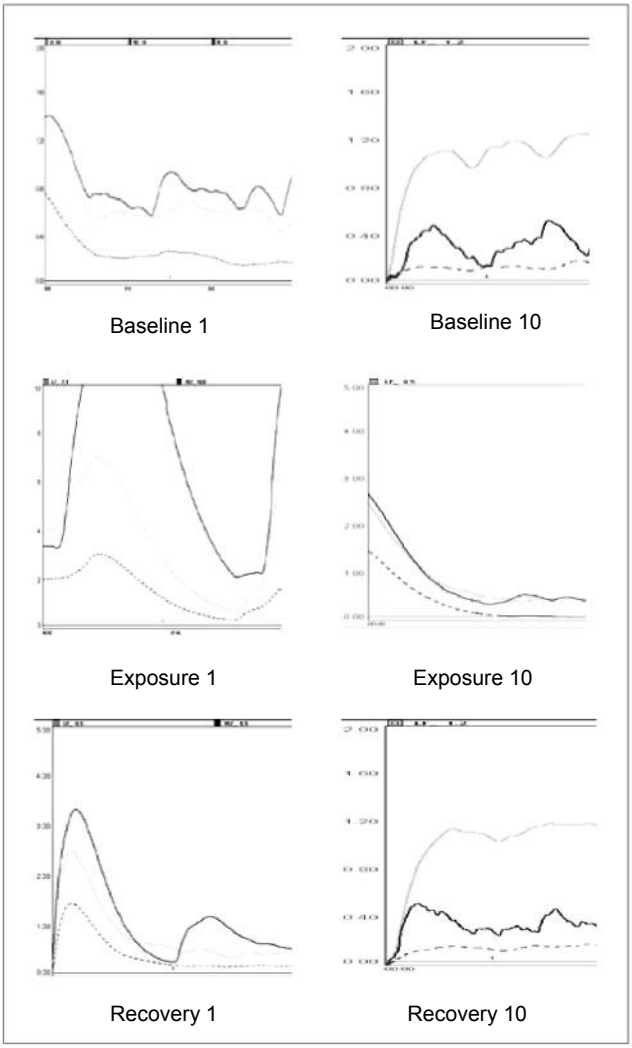

Figure 4. Comparison of session 1 and 10 for Participant 4 gray line - LF; black line - VLF; dashed line – HR
Rycina 4. Porównanie wykresów sesji 1 i 10 badanego 4 linia szara - LF; linia czarna - VLF; linia przerywana - HR

Temperament Structure

Results of the study obtained by means of the FCB-TI questionnaire indicate differentiation in the temperament structure in the participants. Individual results were interpreted by comparing the results of the scales that measure both energy and temporal temperament dimensions (AC - BR, AC- ER, BR- PE), recoding the PE and ER scales and adopting a confidence level of 95% (result of difference of stanines ± 3 stanines). The results for individual scales after recoding PE and ER are presented in the table.

In the case of energy characteristics of behavior in Participant 1, the result in the ER and the result in the AC scale are balanced. The value obtained in the EN scale is close to the result in the AC scale. Therefore, it can be concluded that the level of stimulation-seeking is harmonized with stimulation processing. At the level of temporal characteristics of behavior, the results in the BR and PE scales are balanced. The structure of the Participant 1's temperament traits is the closest to a harmonized structure with large potential for stimulation processing.

In the case of Participant 2, the results for energy features show a balance between EN and AC as well as ER and AC. At the level of temporal temperament traits, PE and BR are balanced.

Table. Results of FCB-TI scales in stanines, after re-coding of PE and RE
Tabela. Wyniki skal FCZ-KT w staninach po zrekodowaniu PE i RE

	ER	EN	AC	SS	BR	PE
Participant 1	8	6	7	9	1	4
Participant 2	6	4	3	8	7	6
Participant 3	4	6	2	5	4	7
Participant 4	7	8	7	7	2	1

Abbreviations: AC - Activity, FCB-TI - Formal Characteristics of Behavior – Temperament Inventory, PE - Perseveration, ER - Emotional Reactivity, SS - Sensory Sensitivity, EN - Endurance, BR - Briskness

For Participant 3, ER and AC (in terms of energy characteristics) as well as PE and BR (temporal characteristics) are balanced. However, there is no balance between AC and BR, which indicates that the participant's abilities in stimulation processing are larger than the level of stimulation-seeking.

Participant 4 is characterized by the most balanced temperament structure. Both energy and temporal traits are balanced. The results show the constellation of traits characteristic for a harmonized structure with high abilities in stimulation processing.

The analysis of the results obtained by means of the FCB-TI questionnaire allows one to conclude that the temperament structures of Participants 1, 2 and 4 are more balanced than the temperament structure of Participant 3.

In addition to this, it was observed that Participants 1, 2 and 4 achieved high results in the sensory sensitivity scale.

Balance of Temperament Traits and Training Effectiveness

Based on the analysis of the LF and VLF graphs, an improvement in the results for arousal reduction was observed in Participants 1, 2 and 4. It was also noticed that temperament traits of these participants were more balanced than those of Participants 3, who achieved the worst results in arousal reduction. The participants who achieved better training results are also characterized by a high level of sensory sensitivity.

Discussion

The VR SIT method turned out to be effective in acquiring arousal reduction skills by the studied soldiers. Three out of four participants achieved clearly better results in the last session when compared to the beginning of the training.

On the basis of the data collected, it was found that participants with a more balanced temperament structure achieved better training effects. Therefore, it can be initially concluded that temperamental conditioning can facilitate the acquisition of arousal reduction skills during the VR SIT training.

Interesting are the high results in the sensory sensitivity scale in participants who learned how to effectively reduce their arousal. The results of studies on temperament indicate that this trait may have a different adaptive significance than the other temperament characteristics. Sensory sensitivity is defined as a trait between temperament and ability, and may have a different physiological background than the other characteristics [17,20]. This trait is specified as an indicator of the body's effectiveness in controlling stimulation and the arousal state of the nervous system, which seems to be consistent with the results obtained from the participants.

According to the results of studies [8,14], acquiring new skills in a situation in which a stressor occurs had an effect on using these skills in a new environment in a more effective way. The study results presented here allow one to assume that also learning arousal reduction skills in VR SIT, during which the soldiers were exposed to stressful factors, can help them to better control stress during military operations.

However, the obtained results need to be verified in deferred studies (investigating the effectiveness of the training both in and after a real stressful situation). Due to the preliminary nature of the study and the small number of participants, a study on a larger group is needed.

Conclusions

1. Soldiers with a more balanced temperament structure achieved better results in the training.
2. Soldiers who achieved better results in the training were characterized by high sensory sensitivity.
3. Due to the preliminary nature of the data presented above, replication of the study is needed on a larger group.

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Chronic sun-damaged skin in a patient with psoriasis: a case report

Przewlekłe posłoneczne uszkodzenia skóry u pacjenta z łuszczycą – opis przypadku

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Abstract. The paper presents a case of chronically sun-damaged skin in a 74-year-old patient with psoriasis due to many years' exposure to solar radiation, which is a form of electromagnetic radiation. Solar radiation includes ultraviolet light UVA (320-400 nm waves), UVB (280-320 nm waves) and UVC (200-280 nm waves). The UV light can cause damage to the epidermal DNA.
The symptoms of chronically photodamaged skin include hypo- and hyper-pigmentations, stellate pseudoscars, teleangiectasias, photoaging, actinic dermatitis, cutis rhomboidalis nuchae, lentigo, melanoma, squamous cell carcinoma, and basal cell carcinoma.
Key words: chronically sun-damaged skin, psoriasis, ultraviolet light

Streszczenie. W pracy przedstawiono przypadek przewlekłego posłonecznego uszkodzenia skóry u 74-letniego pacjenta z łuszczycą zwykłą, po wieloletniej ekspozycji na promieniowanie słoneczne, będące rodzajem promieniowania elektromagnetycznego. Zalicza się do niego promieniowanie ultrafioletowe UVA o długości fali 320-400 nm, UVB o długości fali 280-320 nm i UVC o długości fali 200-280 nm. Działanie niepożądane promieniowania ultrafioletowego sprowadza się do uszkodzenia DNA komórek naskórka. Do objawów przewlekłego fotouszkodzenia skóry należą, m.in. hipo-i hiperpigmentacja, rzekome blizny gwiaździste, teleangiektazje, posłoneczne starzenie skóry, rogowacenie słoneczne, skóra rombowata karku, plamy soczewicowate, czerniak, rak kolczystokomórkowy i podstawnokomórkowy skóry.
Słowa kluczowe: łuszczyca, promieniowanie ultrafioletowe, przewlekłe posłoneczne uszkodzenie skóry

Received: 11.06.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 41-45

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Introduction

Phototherapy has been used in medicine for many years. In dermatology, it is an important supplementary treatment for many skin diseases. The therapy uses full-spectrum light or - depending on dermatoses - individual parts of the spectrum [1]. Solar radiation is an electromagnetic radiation which includes infrared radiation, visible light and ultraviolet radiation (UV): UVA (320–400 nm waves), UVB (280–320 nm waves) and UVC (200–280 nm waves). In dermatology, the most commonly used types of radiation are UVA and UVB [2]. UVB phototherapy (290-320 nm), along with birch tar baths and cygnoline ointments, is one of the oldest methods of treating psoriasis, according to Goeckerman (1930) and Ingram (1953) [3].

Apart from the therapeutic effect on the skin, UV radiation may also cause skin damage, consequently leading to pathological changes, including skin cancers. UVA has a major effect on skin damage, penetrates deep into the reticular layer of the dermis. UVB and UVC rays have shorter wavelengths than UVA rays and reach the epidermal layers only. UV light can cause damage to the DNA of the epidermal cells, resulting in acute and/or chronic sun-damaged skin [4]. Symptoms of chronic sun-damaged skin occur in sun-exposed body areas (face, cleavage, neck, ears, forearms, and hands).

Diseases associated with chronic sun-damaged skin inflammation include: hypo- and hyperpigmentations, stellate pseudoscars, teleangiectasias, photoaging, actinic dermatitis, cutis rhomboidalis nuchae and lentigo. These diseases are sometimes accompanied by melanoma, squamous cell carcinoma or basal cell carcinoma [5].

The paper presents a clinical case of chronically sun-damaged skin in a patient with psoriasis due to many years' exposure to solar radiation.

Case report

A 74-year male was admitted to the Department of Dermatology, Central Clinical Hospital of the Ministry of National Defence, Military Institute of Medicine, Warsaw, Poland, in January 2012, due to exacerbation of psoriasis, for a check-up and treatment modification. The patient has had psoriasis vulgaris since early childhood. Based on the data collected during the medical interview, it was found that in the past, the patient had used local medications only (cygnoline, birch tar, corticosteroids) as well as PUVA phototherapy (psoralen + UVA) and UVB (311 nm). For about 15 years, the patient had chronically used substances that increase skin sensitivity to ultraviolet radiation - psoralens, without medical advice. The patient had exposed his skin to solar radiation, without using sunscreen, including in the anogenital area. Family anamnesis for skin diseases and neoplasms was negative. The patient negated other chronic medical conditions and the use of other medications.

On admission to the Department of Dermatology, erythematous foci covered with a silvery-white scale of moderate severity were found on the smooth skin and hairy skin of the patient's head. The most severe psoriatic lesions were observed on the trunk and lower extremities (Fig. 1). On the chest skin in the sternum area, a focus of alleged vitiligo was observed, most probably after treatment of psoriatic lesions (Fig. 2). On the admission to the Department, the severity and extent of psoriatic lesions according to PASI (psoriasis area severity index) was 4% of the involved skin area, and 27.5% according to BSA (body surface area). In addition to this, non-uniform hyperkeratotic foci strictly adjacent to the skin were observed on the skin of the forehead, ears and hands. Also multiple brown flat patches with a diameter of 2-5 mm were found on the skin of the entire body, also in the anogenital area (Fig. 3).

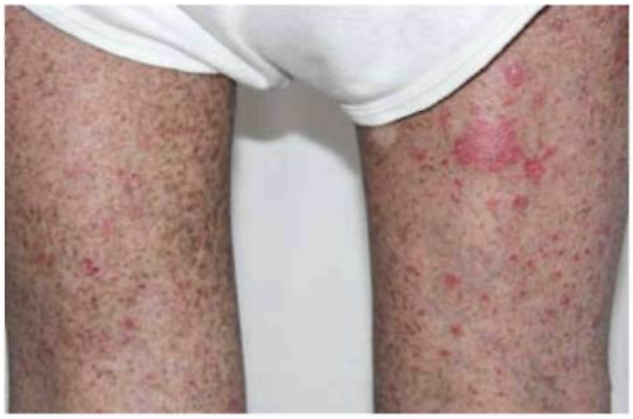

Figure 1. Psoriasis
Rycina 1. Łuszczyca

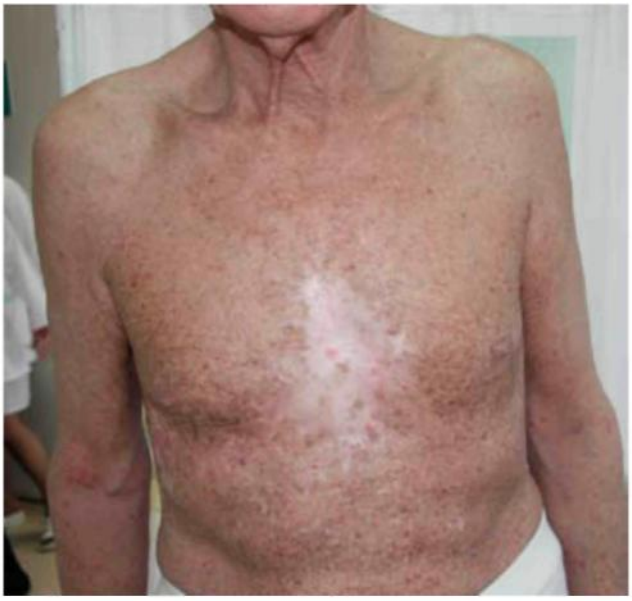

Figure 2. Alegged vitiligo
Rycina 2. Bielactwo rzekome

On the back of the neck, rough, dry, furrowed skin with rhomboid configurations was observed (Fig. 4). On the skin in the parietal region, a separated erythematous infiltrative focus with a visible disintegration, clearly separated base and raised edge was found (Fig. 5). Lymph nodes were not enlarged on palpation. No changes in the oral mucosae were identified. Basic laboratory tests (complete blood count, erythrocyte sedimentation rate, acute-phase proteins, electrolytes, renal and hepatic profiles, lipid profile, and urinalysis) showed no abnormalities. Additional laboratory tests (anti-nuclear antibodies, porphyrin concentration, proteinogram, total IgE concentration, thyroid profile), chest radiograph and abdominal ultrasound showed no abnormalities. For topical treatment of psoriasis vulgaris

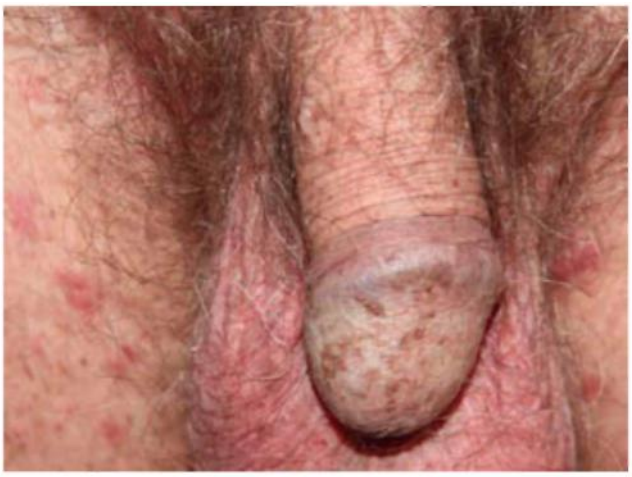

Figure 3. Lentigo
Rycina 3. Plamy soczewicowate

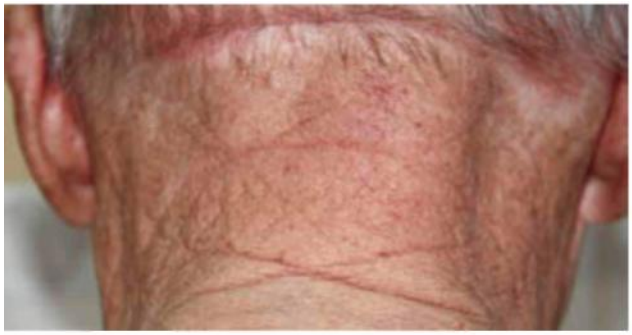

Figure 4. Cutis rhomboidalis nuchae
Rycina 4. Skóra romboidalna karku

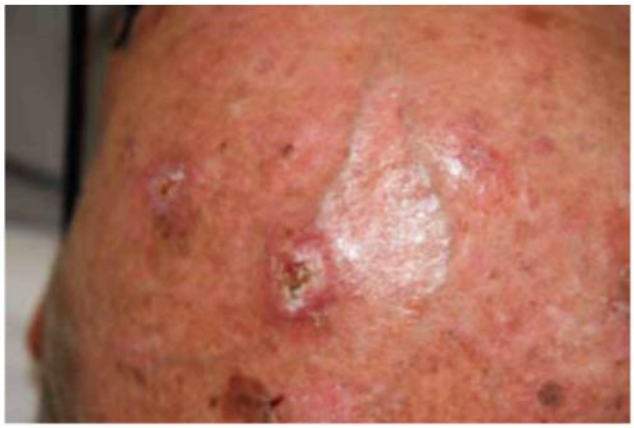

Figure 5. Basal cell carcinoma
Rycina 5. Rak podstawnokomórkowy

5% salicylic acid and sulfur ointment, birch tar preparations, 1% hydrocortisone cream, 5% urea ointment and emollients were used. No phototherapy was used. In addition, during the hospitalization, erythematous infiltrative change in the parietal region was removed under local anesthesia and with a margin of 1 cm of macroscopically normal skin. Histopathological examination of the removed tissue showed basal cell carcinoma *in situ*, not crossing the basement membrane. Based on the entire clinical picture, features of chronic sun-damaged skin such as lentigo, actinic dermatitis, cutis rhomboidalis nuchae, vitiligo, and basal cell carcinoma of the parietal region were diagnosed in the patient.

Discussion

Photodamaged skin mostly occurs in patients with skin type I and II (fair complexion) according to the Fitzpatrick scale (1975). Patients with phototype I and II are more likely to develop chronic UV light damaged skin, including basal cell carcinoma, squamous cell carcinoma and melanoma [5]. Carcinogenic effect of solar radiation is mostly associated with photoimmunosuppression and DNA mutations in keratinocytes. The formation of cyclo-butanic crosslinks between pyrimidine bases in the DNA is one of the types of damage. A damaged fragment is repaired by resection of the damaged sequence of base pairs by enzyme systems. The most effective type is NER (nucleotide excision repair). When the repair factors are not effective, mutations take place within the DNA, which consequently leads to photocarcinogenic processes [6]. Chronic sun-damaged skin is a manifestation of the UV light effect on the epidermis, melanocytes and elements of the dermis. Damage to keratinocytes leads to actinic dermatitis, damage to melanocytes causes lentigo, and the most common lesions result from damage to fibroblasts, which consequently damage the collagen, elastin and the extracellular matrix. This leads to the formation of yellow papules, small patches, deep furrows, stellate scars and teleangiectasias [5].

In the presented patient with psoriasis, almost all of the adverse effects associated with many years of non-controlled phototherapy have occurred. Diffuse hyperkeratotic foci, multiple flat brown red patches on the skin of the whole body (also in the anogenital area) and cutis rhomboidalis nuchae were observed. The presented case is clinical proof that patients with psoriasis who overuse phototherapy may develop chronic sun-damaged skin. Characteristic foci of actinic dermatitis, hyperkeratosis and thickening of the stratum corneum are one of the symptoms of skin photo-adaptation in the sun-exposed body areas of the elderly.

There is no clear proof that the surgically removed basal cell carcinoma is the result of adverse effects of UV radiation because the patient was not able to determine when he had noticed the lesion for the first time. However, it is known that repeated skin exposure to solar radiation causes skin damage which may often be the cause of skin cancers as mutagenic and carcinogenic effect of UV radiation [4]. An important aspect is to avoid additional solar radiation during PUVA therapy as a method for cancer prevention [7].

Research conducted in America has shown that there is an increased risk of non-melanoma skin cancer (NMSC) which lasts as long as 15 years after discontinuation of PUVA therapy [8]. These data were also confirmed by French research reports from 2012, which evaluated the risk of skin cancer in patients with psoriasis during PUVA therapy. Papers published after 1990 confirmed an increased risk of NMSC in patients during PUVA therapy, also after the completion of the treatment. The risk of melanoma during PUVA therapy was also assessed. Two American publications confirmed a more than twofold increased risk of both invasive cancers and melanoma *in situ* in patients receiving at least 200 PUVA procedures. Three other European publications did not confirm this relationship [8].

Conclusions

Chronically sun-damaged skin is an important dermatological problem, especially in patients undergoing phototherapy. In the spring and summer, physicians should remind their patients about photoprotection. Patients with psoriasis should be cautioned that lesions of this type occur as a result of non-controlled use of artificial UV sources in beauty salons or during home phototherapy. It often happens that patients with psoriasis use additional phototherapeutic procedures in sanatoria, without specialist control.

It should be emphasized that patients with psoriasis should be educated to use phototherapy in moderation, not to conceal the documentation on the number of treatments received and to remember that even apparently mildly photodamaged skin may be a sign of the onset of pre- and carcinogenic conditions.

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Mesenteric cysts: a case report

Torbiel krezki jelita cienkiego - opis przypadku

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Abstract. Mesenteric cysts are rare, their incidence is about 1/100 000 hospital admissions. Their clinical symptoms are unspecific and cysts are diagnosed during the examination of other conditions of the abdominal cavity. Complications intensify the condition. Imaging (USG/CT) of abdominal cavity is helpful in differential diagnosis, and in some doubtful cases fine needle aspiration biopsy, laparoscopy or exploratory laparotomy is necessary. The treatment of choice is the cyst excision, and the prognosis is good.
Keywords: diagnosis, mesenteric cyst, treatment

Streszczenie. Torbiel krezki jelita cienkiego występuje z częstością 1/100 000 hospitalizacji. Objawy są mato specyficzne, a torbiel rozpoznawana jest w trakcie diagnostyki innych schorzeń jamy brzusznej. Dolegliwości się nasilają, gdy występują powikłania. W diagnostyce różnicowej pomocne są badania obrazowe (USG i TK) jamy brzusznej, a także w wątpliwych przypadkach biopsja aspiracyjna cienkoigtowa przez powłoki, laparoskopia i laparotomia zwiadowcza. Leczeniem z wyboru jest resekcja torbieli, rokowanie jest dobre.
Słowa kluczowe: diagnostyka, leczenie, torbiel krezki

Received: 13.06.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 45-47

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Introduction

The mesenteric cyst is a rare pathology. It was first described in 1507 by Benevieni. In 1880, the first successful resection of a mesenteric cyst was performed (Tillaux). And in 1883, Pean performed marsupialization of a mesenteric cyst [1,2]. Its incidence is estimated to be about 1 in 100,000 hospital admissions, usually in the fifth decade of life, twice as likely in women. The clinical symptoms are non-specific and the cyst itself is often diagnosed during exploratory laparotomy or during imaging diagnostics for other conditions of the abdominal cavity. The treatment of choice is cyst excision, and the prognosis in the case of benign lesions is good [3].

Case report

On 18th January 2013, a 34-year male was admitted to the Department of Thoracic Surgery, General and Oncological Surgery, in emergency mode due to severe right lower abdominal pain radiating to the back, persisting with varying intensity for about a week. In addition to this, the patient reported nausea and vomiting. The patient had been not chronically treated and had not taken any medications on a permanent basis. He did not have coagulation disorders or allergy to medications. On admission, the patient's blood pressure was 130/70 mm Hg, pulse 78/min.

Physical examination revealed a soft abdomen, slight pain in the right lower abdomen, no peritoneal signs and normal peristalsis. A per-rectal examination revealed no pain in the Douglas pouch.

In the anamnesis, appendectomy in October 2012 (according to the medical documentation, there had been no features of pathological mass in the abdominal cavity).

A computed-tomography of the abdomen, performed in the emergency department, revealed a considerably enlarged liver displacing the spleen and stomach. In the pelvis, above the urinary bladder, slightly on the right side, a well-marginated, dense fluid collection, with a thick, smooth wall with a diameter of 7.5 cm and without infiltration of other organs was observed (Fig.).

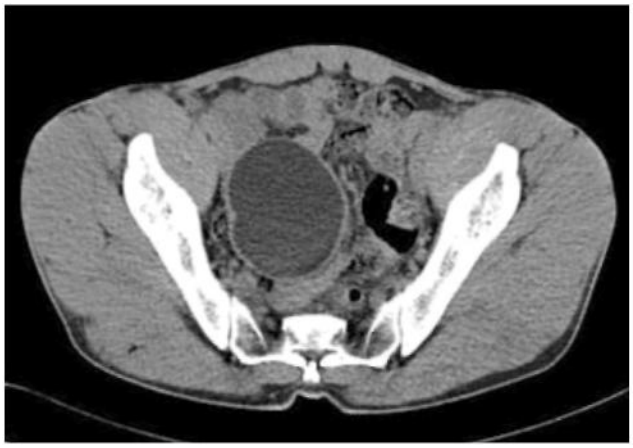

Figure. Mesenteric cyst
Rycina. Torbiel krezki jelita cienkiego

Laboratory examinations of peripheral blood and urinalysis revealed no significant abnormalities or signs of inflammation. Hepatitis B was also ruled out.

The initial decision was to use conservative treatment, implement pharmacotherapy (antispasmodic and analgesic drugs) and discontinue oral nutrition, thus achieving an improvement of the general condition. After two days, an aggravation of the clinical condition was observed, and the patient was qualified for exploratory laparoscopy.

The abdominal cavity was opened using a midline incision. During the surgical procedure, a large tumor the size of two fists, surrounded by a smooth whitish capsule, partly pulling the intestinal wall, was found within the mesentery of the ileum. The tumor mass was detected in a surficial adhesion coming from the peritoneum in the region of the urinary bladder. A few enlarged lymph nodes in the mesentery of the ileum were found, while the peritoneal organs demonstrated no macroscopically visible pathologies.

The adhesions of the tumor of the mesentery with the parietal peritoneum were freed. It was decided to perform a sectional resection of the small intestine with the tumor. By means of the LigaSure knife, the mesentery in the area of the resection of the small intestine was devascularized (a section of about 25 cm long). The fragment of the intestine with the mesenteric tumor and changed lymph nodes was removed and sent for histopathological examination. Manual two-level "side-to-side" anastomosis of the stumps of the ileum was performed by applying a continuous Ethibond 3/0 suture. The edges of the mesentery below the anastomosis were provided with single type Z stitches. Control of hemostasis. Layered reconstruction of the abdominal wall.

The tissue material was subjected to histopathological examination. The 30 cm length of small intestine with the mesentery of 8 cm in width was submitted for examination. The mesenteric tumor had a diameter of 7 cm, not connected with the intestinal wall. The cut section revealed a thick-walled cyst filled with amorphous masses. The wall was made of fibrous connective tissue with multiple lymphatic papules. In the lumen, foam cells adjacent to the lumen of the cyst. Small intestine without pathological changes. Apart from hyperemia and massive edema, no pathological changes were found in the mesenteric lymph nodes.

The tissue material was also subjected to microbiological examination, with a negative result.

The patient endured the operation well, with an uncomplicated postoperative course. On day 5, the patient was discharged home in good general and local condition with a recommendation for daily postoperative wound care and a check-up in the Surgical Outpatient Clinic 7 days later.

Discussion

The literature includes few reports on mesentery cysts. These usually are non-neoplastic lesions, although sometimes malignant lesions (e.g. lymphangiosarcoma, sarcoma, or adenocarcinoma). Mesentery cysts mostly occur in the small intestine (60%) and in the mesentery of the large intestine (40%), especially in the ascending colon [1,2,4].

In the described case, the cyst was a benign lesion in the mesentery of the small intestine.

The clinical symptoms are non-specific and not helpful in differential diagnosis. They usually include diffuse abdominal pain of slight severity, nausea and vomiting. Severe peritoneal signs occur in the case of such complications as: ongoing inflammation in the cyst, torsion, perforation, bleeding inside the cyst, compression of the adjacent organs (intestine, ureter) [1,5-7]. Children mostly develop symptoms of "acute abdomen", which may simulate acute appendicitis. The most common symptoms in adults are pain (82%), nausea and vomiting (45%), constipation (27%) and diarrhea (6%). In addition, a pathological mass in the abdominal cavity is palpable in most cases (61%) [1,8].

The patient reported pain of varying severity for a week, which he did not associate with meals, time of day or physical activity. In addition to this, the patient reported simultaneous nausea and vomiting, and did not have fever.

Additional examinations that are especially helpful in the diagnostics include imaging examinations such as computed tomography and ultrasound of the abdomen. Based on these examinations, it can be determined whether the pathological mass is a solid tumor or a cystic lesion, as well as detailed data on its location and spatial relations. In addition, the presence of a septum, calcifications and fluid density, being a sign of possible bleeding into the cyst, is helpful in differential diagnosis.

In doubtful cases, ultrasound-guided fine needle aspiration can be performed to differentiate the lesion from pancreatic pseudocyst, lymphangioma and benign mesothelioma [1,4,9].

Due to diagnostic difficulties in the described case it was decided to perform a CT, which revealed a fluid lesion with a diameter of 7.5 cm and a well-marginated, thick wall.

The treatment of choice for mesenteric cyst is resection. The type of the cyst depends on its size, spatial relations and histopathological type (neoplastic transformation). Enucleation is usually performed when the cyst is benign and not connected with other abdominal organs. Resection of the mesentery with intestinal fragments or with fragments of other organs is used if the lesion is cancerous or infiltrates adjacent organs. In some medical centers, laparoscopic resection has been performed [10].

The prognosis in a non-neoplastic cyst is good, no recurrence of the disease is observed, and surgical resection is sufficient. However, mesothelioma and lymphangioma tend to recur [1,2,6].

Due to the additionally enlarged lymph nodes, it was decided to resect a fragment of the small intestine with the tumor. The postoperative course was uneventful, the patient was under constant care in the hospital out-patient clinic. A check-up abdominal ultrasound performed 3 months after the surgical procedure revealed no pathologies apart from an enlarged liver that extended approximately 5 cm beyond the costal arch - the patient was referred to the liver out-patient clinic for further diagnostics and possible treatment for hepatomegaly.

Summary

Mesenteric cyst is rare and has non-specific symptoms. The treatment of choice is complete resection of the lesion. The prognosis in the case of benign lesions is good.

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Small intestine bleeding: a case report

Krwawienie z jelita cienkiego - opis przypadku

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Abstract. A treatment algorithm concerning bleeding from the small intestine in a 42-year-old male with acute gastrointestinal bleeding was presented. Capsule endoscopy identified the site of bleeding, and single balloon enteroscopy identified a bleeding jejunal tumor. Due to the nature of the lesion, endoscopic polypectomy was not possible. The patient was qualified for surgery, and the tumor was removed. The histopathological examination showed a gastrointestinal stromal tumor.
Key words: capsule endoscopy, double balloon enteroscopy, GIST, single balloon enteroscopy, small intestine bleeding

Streszczenie. Przedstawiono algorytm postępowania w krwawieniu z jelita cienkiego na podstawie przypadku 42-letniego mężczyzny z ostrym krwotokiem z przewodu pokarmowego. Endoskopia kapsutkowa wskazała miejsce krwawienia, a zastosowanie enteroskopii jednobalonowej pozwoliło na stwierdzenie krwawiącego guza jelita czczego. Zmiana nie kwalifikowała się do endoskopowej polipektomii. Chorego zakwalifikowano do leczenia operacyjnego, w trakcie którego usunięto guz. W materiale histopatologicznym stwierdzono guz stromalny jelita czczego.
Słowa kluczowe: endoskopia kapsutkowa, enteroskopia dwubalonowa, enteroskopia jednobalonowa, guz stromalny jelita czczego (GIST), krwawienie z jelita cienkiego

Received: 29.05.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 48-51

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Introduction

With the introduction of new imaging techniques for the small intestine, such as capsule endoscopy and enteroscopy, this section of the gastrointestinal tract has become available for endoscopists. Whereas there are usually no difficulties in localizing the source of bleeding in a patient with upper or lower gastrointestinal bleeding, bleeding from the small intestine is usually difficult to identify. Therefore, it is necessary to carry out imaging examinations of the upper and lower gastrointestinal tract earlier, using gastroscopy and colonoscopy. If the source of bleeding is not revealed by these examinations, it is indicated that capsule endoscopy or enteroscopy be performed in order to evaluate the small intestine. Enteroscopy makes it also possible to perform a procedure that stops the bleeding and to take samples for histopathological examination.

Capsule endoscopy is a minimally invasive diagnostic technique to identify bleeding in the small intestine. It allows the source of bleeding to be located in about 95.5% of cases. Disadvantages of this method are: lack of possibility to take biopsy specimens for histopathological examination or to perform a procedure to stop the bleeding as well as high costs that are not refundable on the basis of diagnosis-related groups (DRG). However, taking into account the hospitalization period of the patient with small intestine bleeding, a prompt diagnosis can shorten this period significantly, thus reducing the costs of treatment.

Another examination that also allows the evaluation of the small intestine is enteroscopy. During this examination, a long (about 200 cm), thin endoscope attached to an overtube (about 140 cm long) is inserted into the small bowel. The procedure can be performed using an oral or anal approach. When the origin of bleeding is not localized then the method of choice is the oral approach. During the examination, the intestine is threaded over the endoscope by means of the overtube with a balloon attached to its end. Depending on the type of enteroscopy, the endoscopist uses only a balloon attached to the overtube (single balloon enteroscopy) or, additionally, a balloon fixed to the end of the endoscope (double balloon enteroscopy) [1].

As American studies show, the use of both types of approach does not always allow the examination of the entire small intestine. The disadvantages are: long duration of the examination, need for endotracheal anesthesia (if the duration of the examination is expected to be more than 40 min.) and larger invasiveness than in the case of capsule endoscopy. The advantages include the therapeutic capabilities of the procedure, such as coagulation of a bleeding lesion, use of hemostatic clips, possibility of polypectomy, placement of a tattoo, taking samples for histopathological examination or balloon dilatation of stenosis. It seems that double balloon enteroscopy is superior to single balloon enteroscopy in terms of duration and intubation depth. However, both techniques can be used interchangeably, depending on the experience of the medical center.

In our center, single balloon enteroscopy is performed. In cases where small intestine bleeding (increasingly referred to as "mid-gastrointestinal bleeding") is suspected after ruling out bleeding from the upper and lower gastrointestinal tract, capsule directed single balloon enteroscopy is used. The procedure involves the performance of capsule endoscopy prior to enteroscopy in order to determine optimal approach to the small intestine (from the mouth or from the back passage, through the ileocecal valve [Bauhin's valve]) [2]. Such procedure enables the patient's hospitalization period to be shortened as well as a reduction in the number of blood products needed to treat hypovolemic shock caused by bleeding. Capsule endoscopy should be performed immediately after bleeding from the upper and lower gastrointestinal tract is ruled out. This enables enteroscopy to be performed on the next day of hospitalization and shorten the period of hospitalization, and, as a result, the length of sedation used during the procedure.

In 80% of mid-gastrointestinal bleedings, lesions in the form of vascular malformations are found. These can be successfully treated by endoscopy using, for example, argon plasma coagulation (APC). There are also cases in which endoscopic treatment is not possible. One of these cases is discussed in this article.

Case report

A 42-year male without chronic diseases was admitted to the Department of Gastroenterology, Central Clinical Hospital of the Ministry of National Defence, Military Institute of Medicine, due to collapse resulting from severe gastrointestinal bleeding. The symptoms occurred after taking nonsteroidal anti-inflammatory drugs due to osteoarticular pain.

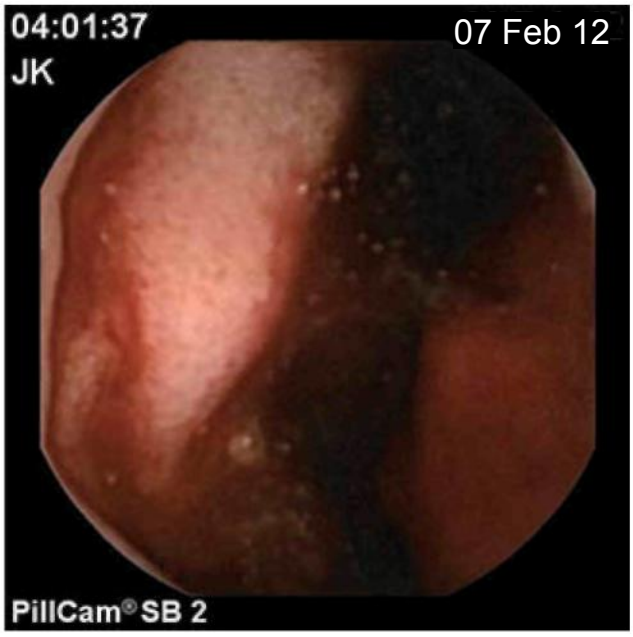

Figure 1. Jejunal active bleeding during capsule endoscopy
Rycina 1. Aktywne krwawienie w jelicie czczym stwierdzone w czasie endoskopii kapsułkowej

In anamnesis - four-time severe gastrointestinal bleedings requiring transfusions of packed red blood cells.

During previous hospitalizations in other medical centers, gastroscopy and colonoscopy was performed each time. One of the examinations had revealed a vascular lesion in the cecum with features of angiodysplasia, which had been endoscopically treated with APC.

At the admission, patient in severe general condition, conscious, with symptoms of hypovolemic shock, HR 110/min, RR 85/50 mm Hg. Laboratory tests revealed normocytic anemia: HGB 7.0 g/dl, HCT 22%, MCV 84 fl, PLT 180 K, coagulation profile and biochemical parameters were normal. Abdominal ultrasound and chest X-ray showed no abnormalities. The patient required transfusion of 4 units of packed red blood cells. After hemodynamic stabilization of the patient, gastroscopy and colonoscopy were performed, which failed to reveal the source of bleeding.

It was decided to perform capsule endoscopy, which showed bleeding ulceration about 30 minutes after the capsule passed into the duodenum (Fig. 1). In order to achieve hemostasis, it was decided to perform single balloon enteroscopy under intravenous anesthesia. This procedure was justified by the fact that the possible source of bleeding was found to be quite "shallow" in the jejunum.

In the examination, a 5-cm submucosal tumor of the small intestine was found at a distance of about 150 cm from the pylorus.

At the time of the examination, no signs of active bleeding were observed (Fig. 2). The lesion was not indicated for endoscopic polypectomia. The tumor site was marked with a submucosal injection of ink in front of and behind the tumor.

The patient was indicated for laparoscopic tumor resection at the 1st Department of Surgery, Military Institute of Medicine.

During laparoscopy, the lesion was found. However, the operating surgeon made a decision to convert to laparotomy and classic resection of the lesion (Fig. 3 and 4).

A histopathological examination revealed a gastrointestinal stromal tumor of the jejunum (GIST). The patient was discharged home in good general condition and with a recommendation for further medical care in an oncological outpatient department.

Summary

Since the invention of capsule endoscopy (approved by the FDA in 2001) and enteroscopy (2001), the small intestine is not a barrier in the endoscopic diagnostics of gastrointestinal bleedings any more (before the first use of the diagnostic techniques described above, a complete endoscopic evaluation of the small intestine was possible only with intraoperative enteroscopy). The detection of the source of mid-gastrointestinal bleeding remains a diagnostic challenge for endoscopists.

The diagnostics entails considerable costs of treatment and is only possible in medical centers which perform capsule endoscopy or balloon enteroscopy (preferably both). However, there are still not a lot of such centers. While a single episode of small intestine bleeding does not require the endoscopic diagnostics as in most cases the bleeding does not reoccur, the recurrence of bleeding or another episode is the indication for further diagnostics.

In many cases, the source of bleeding is mistaken as vascular lesions detected during gastroscopy or colonoscopy. The most common source of small intestine bleeding are vascular lesions in about 80% of cases, subsequently, damage after nonsteroidal anti-inflammatory drugs, and tumors of the small intestine in 6-8% of cases), as well as, less commonly, varices of the small intestine in about 1% of cases [3]. Detecting the source of bleeding during endoscopy often allows an effective endoscopic treatment. However, this is not possible in most tumors of the small intestine. Then, during enteroscopy the lesion is marked with a tattoo in order to be easily found during a surgical procedure. The combination of both techniques allows for the determination of optimal approach for enteroscopy in order to perform a therapeutic procedure.

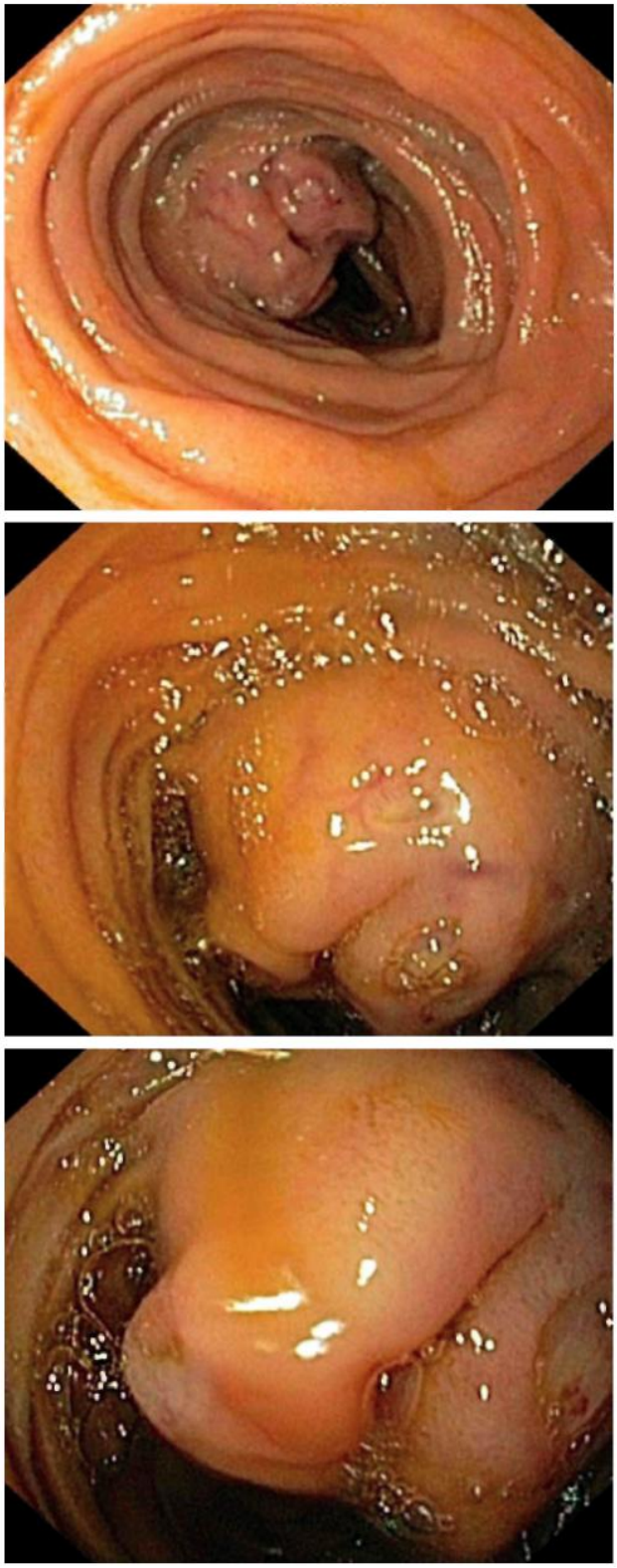

Figure 2. Jejunal tumor during single balloon enteroscopy
Rycina 2. Guz jelita czczego w stwierdzony w czasie enteroskopii jednobalonowej

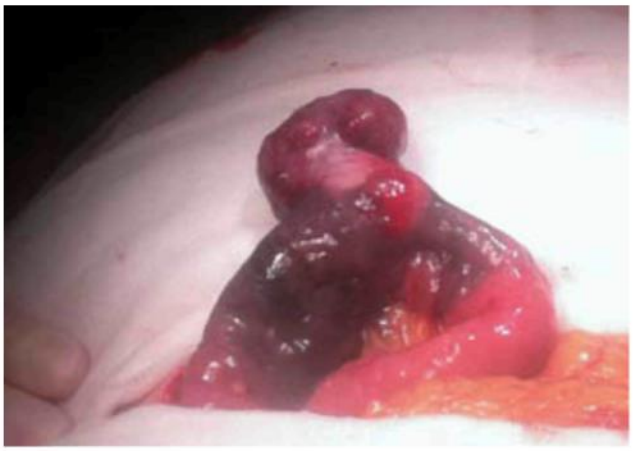

Figure 3. Small intestine tumor stained with ink. Intraoperative photo
Rycina 3. Jelito cienkie z guzem wybarwione tuszem. Zdjęcie śródoperacyjne

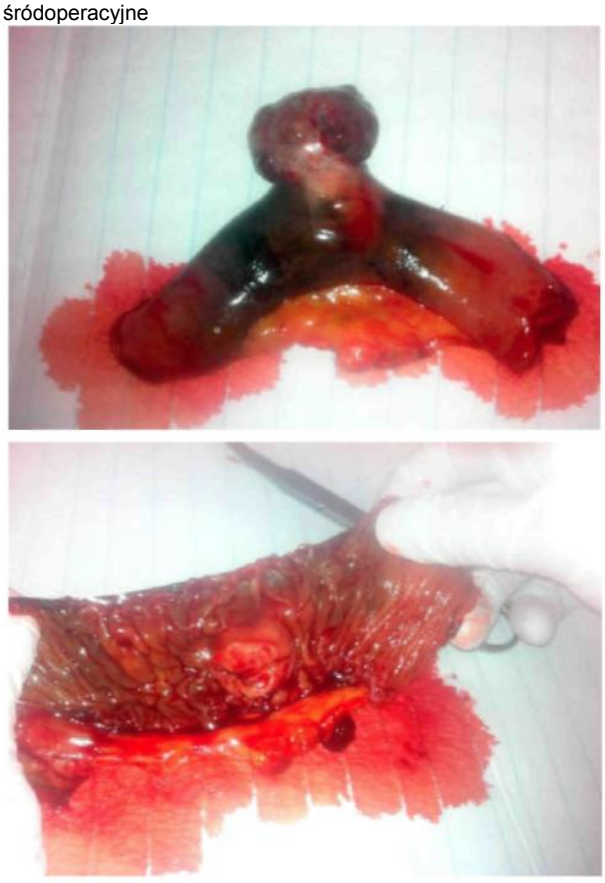

Figure 4. Tumor after resection
Rycina 4. Guz po usunięciu

If it is not possible to perform capsule endoscopy or in the case of massive bleeding, the method of choice is balloon enteroscopy with the oral approach [4].

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Difficulties in the diagnostics of perforations of the gastrointestinal tract within the abdominal cavity based on clinical cases

Trudności diagnostyczne w rozpoznawaniu perforacji przewodu pokarmowego w obrębie jamy brzusznej na podstawie przypadków klinicznych

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Abstract. Gastrointestinal perforation is a complete disruption of the gastrointestinal walls. It is a complication of both gastrointestinal diseases and injuries - including iatrogenic ones. Gastrointestinal perforation, and in consequence peritonitis, constitutes a life-threatening condition. The clinical picture is not always clear. Therefore, taking into account modern diagnostic capabilities, the most important is to choose the appropriate method, and, in case of any doubt about the clinical or diagnostic nature, verification of previously made diagnosis and extending the diagnostics. This paper will present three clinical cases that caused problems with diagnosis, especially at the pre-hospital stage. These cases show that the diagnosis of gastrointestinal perforation is not always easy, and the correct diagnosis is the effect of the medical examiner's knowledge, diligent interviewing and physical examination, as well as appropriate use of imaging techniques.
Key words: computed tomography, gastrointestinal perforation, ultrasound, X-ray

Streszczenie. Perforacja przewodu pokarmowego oznacza całkowite przerwanie ciągłości jego ścian. Jest powikłaniem zarówno chorób przewodu pokarmowego, jak i urazów - w tym jatrogennych. Perforacja przewodu pokarmowego, a w jej następstwie zapalenie otrzewnej, stanowi stan zagrożenia życia. Obraz kliniczny nie zawsze jest jednoznaczny. Dlatego też, biorąc pod uwagę współczesne możliwości diagnostyczne, kluczowy jest dobór odpowiedniej metody, a w przypadku jakichkolwiek wątpliwości klinicznych lub diagnostycznych, weryfikacja uprzednio stawianego rozpoznania i poszerzenie diagnostyki. W opracowaniu zaprezentowano trzy przypadki kliniczne, które sprawiły trudności diagnostyczne, zwłaszcza na etapie postępowania przedszpitalnego. Na ich podstawie można zauważyć, że rozpoznanie perforacji przewodu pokarmowego nie zawsze jest łatwe, a o poprawnym ustaleniu rozpoznania decyduje wiedza lekarza badającego, rzetelnie przeprowadzone badanie podmiotowe i przedmiotowe oraz właściwe wykorzystanie metod obrazowania.
Słowa kluczowe: perforacja przewodu pokarmowego, rentgenografia, tomografia komputerowa, ultrasonografia

Received: 05.11.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 52-58

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Introduction

Gastrointestinal perforation is a complete disruption of the wall of the gastrointestinal tract and constitutes a life-threatening condition. It is mostly a complication of gastrointestinal diseases such as gastric and duodenal ulcer disease, diverticulosis, enteritis, gastrointestinal cancers and mesenteric infarction [1].

Other possible causes include endoscopic procedures, blunt and penetrating abdominal injuries, foreign body ingestion and dislocated prosthesis e.g. from the biliary tract [2]. Gastrointestinal perforation results in gastrointestinal contents and gas flowing into the peritoneal cavity or the retroperitoneal space. The presence of gas in the peritoneal cavity (pneumoperitoneum) may be also caused by air entering from the thoracic cavity - through the esophageal hiatus of the diaphragm or through a ruptured diaphragm. Perforation may occur in other parts of the gastrointestinal tract, e.g. in the pharynx, esophagus or gallbladder. In the natural course of the disease, perforation within the abdominal cavity results in diffuse or localized peritonitis [3] or retroperitonitis. In the case of perforation of the upper gastrointestinal tract, the content leaking into the body cavities contains digestive enzymes and hydrochloric acid and stimulates the formation of abscesses [4]. The patient's death occurs as a result of septic shock.

The severity of the clinical symptoms depends on the level of perforation, its extent and amount and type of the content which entered the body cavities. Its leading symptom is strong abdominal pain. It should be always taken into consideration that retroperitoneal perforation causing "non-abdominal" and misleading clinical symptoms is possible.

Taking into account modern diagnostic capabilities, it is crucial to choose the appropriate method, and in case of any doubt of clinical or diagnostic nature to verify a previously made diagnosis and extend the diagnostics. This paper presents three clinical cases that caused diagnostic problems, especially at the pre-hospital stage.

Case 1

A 53-year male was admitted to the hospital due to ongoing pain in the right lumbar region, radiating to the pubic symphysis, accompanied by fever of 39.2 degrees Celsius for two weeks. The patient had been treated on an outpatient basis due to a urinary tract infection, no diagnostics had been performed, and the diagnosis had been determined by a physical examination. Because of the lack of improvement and progressing pain, the patient visited the emergency department. Physical examination at the admission revealed moderate pain in the right lower abdomen. Costovertebral angle tenderness was positive on the right side and peritoneal signs were negative.

Within the imaging diagnostics, abdominal ultrasonography was performed and revealed a lesion with morphological features of an abscess in the right lumbar region, most probably in the retroperitoneal space. Within the lesion, multiple reflections from air bubbles were seen, which supported the diagnosis.

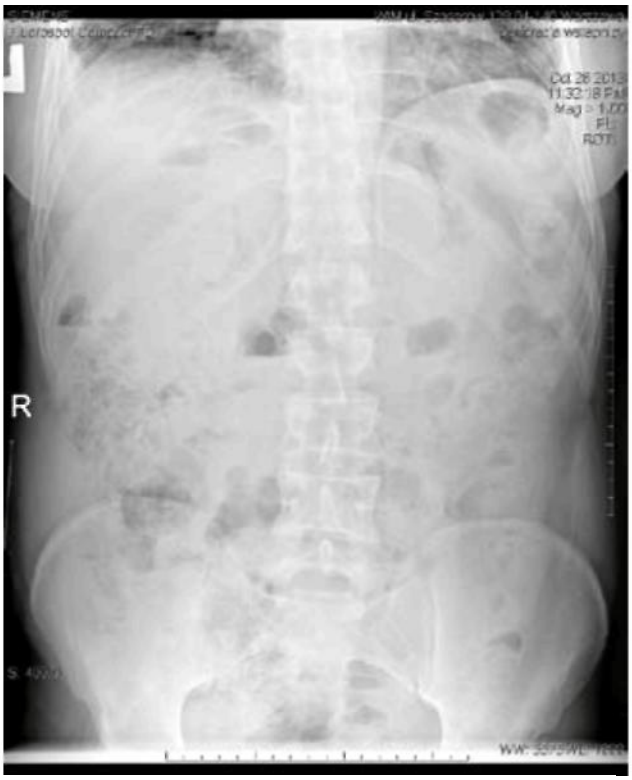

Figure 1. X-ray. Retroperitoneal perforation of the ascending colon

Rycina 1. RTG przeglądowe jamy brzusznej. Zaotrzewnowa perforacja okrężnicy wstępującej

Abdominal X-ray revealed tiny patchy areas of decreased density in the right lower and middle abdomen (Fig. 1), which, along with the results of the abdominal ultrasound examination, supported the diagnosis of air bubbles in the large abscess. No subphrenic free air and no air-fluid levels in the intestines were found. Based on the medical interview and physical examination, the initial diagnosis of an abscess in the retroperitoneal space was made. For further diagnostics, abdominal computed tomography was performed to confirm the presence of the large abscess in the retroperitoneal space on the right side and revealed air and inflammatory infiltration along the wall of the ascending colon (Fig. 2), which supported the diagnosis of ascending colon perforation. No free air in the peritoneal cavity was found. The diagnosis of perforation of the ascending colon was made.

The patient underwent urgent surgery. Intraoperatively, extensive infiltration with perforation of the ascending colon with infiltration of the entire right half of the large intestine (colon) with gangrene of its back wall was found. In addition, about 1000 ml of purulent content with peritoneal fragments was evacuated. The abscess extended behind the liver, in the direction of the diaphragm.

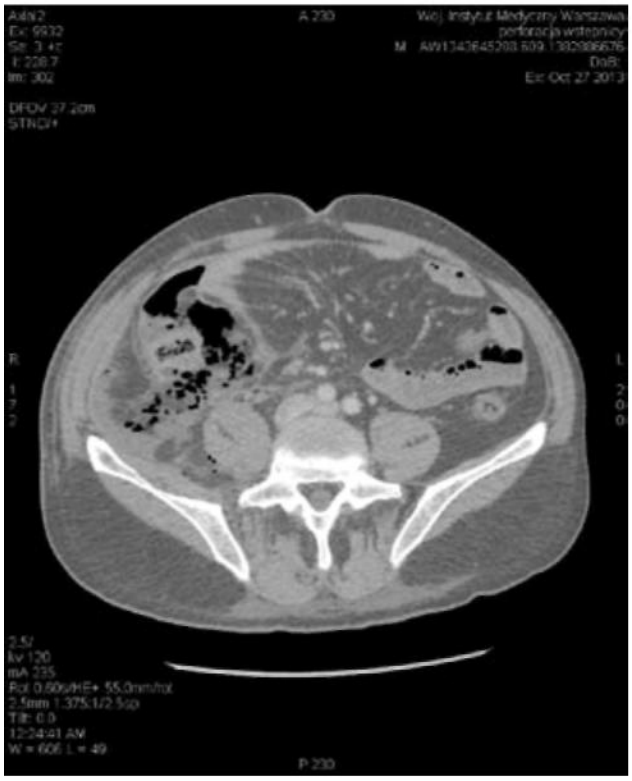

Figure 2. CT scan. Retroperitoneal perforation of the ascending colon
Rycina 2. Tomografia komputerowa. Zaotrzewnowa perforacja okrężnicy wstępującej

Right hemicolectomy was performed and a stoma was created from the transverse colon and ileum. Drainage of the peritoneal cavity as well as drainage and hemostatic packing of the abscess cavity were used. After several weeks' treatment and several reoperations, the patient was discharged from hospital.

Case 2

A 68-year male, in severe general condition, with symptoms of septic shock, was admitted to the hospital on an emergency basis due to cellulitis of the left lower limb. The patient had felt pain in the left leg, left inguinal region and buttocks for a few days. Physical examination at the admission revealed signs of inflammation of the subcutaneous tissue of the left lower limb - swollen leg, increased warmth and redness of the skin. In addition, subcutaneous crepitus was detected on palpation.

Due to suspected gas gangrene of the left lower limb, non-enhanced monophasic computed tomography was performed for complex evaluation of the thoracic and abdominal organs (additional examinations revealed features of renal insufficiency).

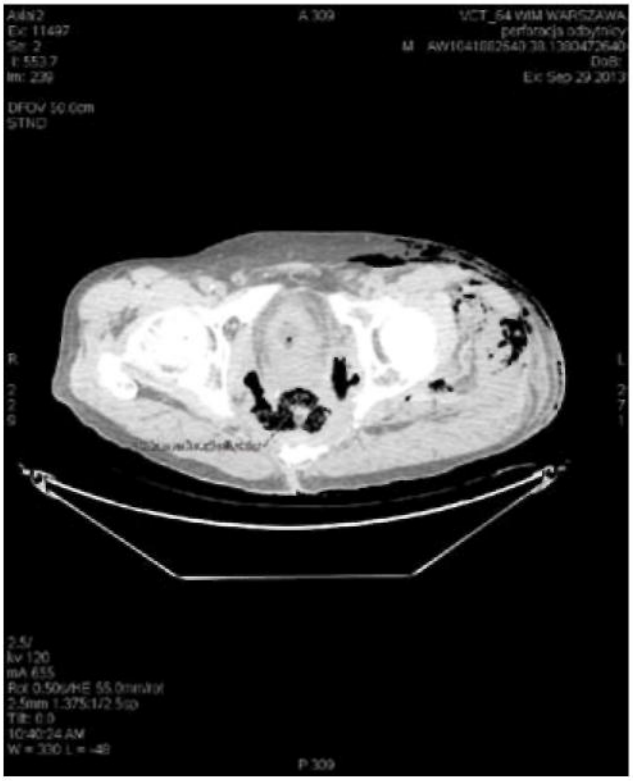

Figure 3. CT scan. Perforation of retroperitoneal part of the rectum
Rycina 3. Tomografia komputerowa. Perforacja zaotrzewnowej części odbytnicy

The performed examination revealed a wide defect in the wall of the middle portion of the rectum (Fig. 3) and air around the rectum, in the presacral space, piriformis muscles, obturator internus muscles and next to the levator ani muscle, as well as multiple air collections in the left gluteal muscles. In the lower limb were multiple subfascial and intramuscular air collections, as well as muscular and subcutaneous edema (Fig. 4).

Despite intensive pharmacological treatment, the patient died on the day of admission to the hospital, prior to surgery.

Case 3

A 49-year male was admitted to the hospital on an emergency basis due to pain in the entire abdominal cavity, loose stools (about 2 a day) and fever of up to 39 degrees Celsius unresponsive to antipyretics used on the outpatient basis. In addition, the patient reported persistent back pain for a few days. An abdominal ultrasound revealed features of ileus - fluid-filled dilated loops of the small intestine. An abdominal X-ray revealed the presence of air-fluid levels in the small intestine (Fig. 5).

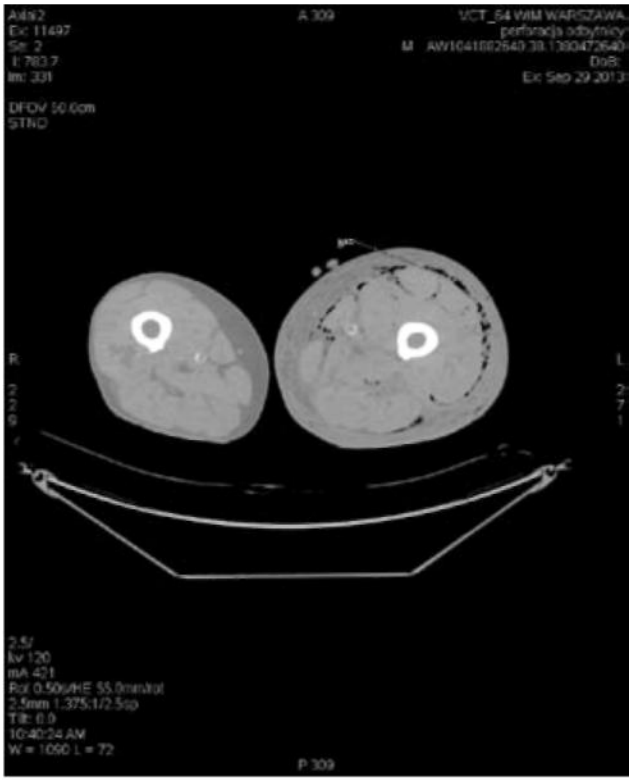

Figure 4. CT scan. Subfascial gas in left lower limb, related to perforation of the rectum
Rycina 4. Gaz podpowięziowo w kończynie dolnej lewej w przebiegu perforacji odbytnicy

No subphrenic free air was found. Because there was no clinical improvement after the symptomatic treatment, a check-up abdominal X-ray was performed which, apart from ileus found previously, revealed tiny air bubbles in the middle abdomen which were suggestive of gastrointestinal perforation. In order to verify the diagnosis and suspicion of enteritis, it was decided to perform abdominal CT with intravenous administration of a contrast agent (Fig. 6) which, apart from features of ileus (air-fluid levels in the ileum and jejunum), demonstrated a large amount of air in the middle abdomen between the mesenteric fat tissue and loops of the small intestine, as well as a lesion with morphological features of an abscess in the mesentery of the small intestine. The patient was operated on and intraoperatively an inflammatory tumor of the small intestine with its perforation and a mesenteric abscess were found. Based on the clinical picture and postoperative histopathological examination, Crohn's disease was diagnosed. The patient was discharged home in good general condition.

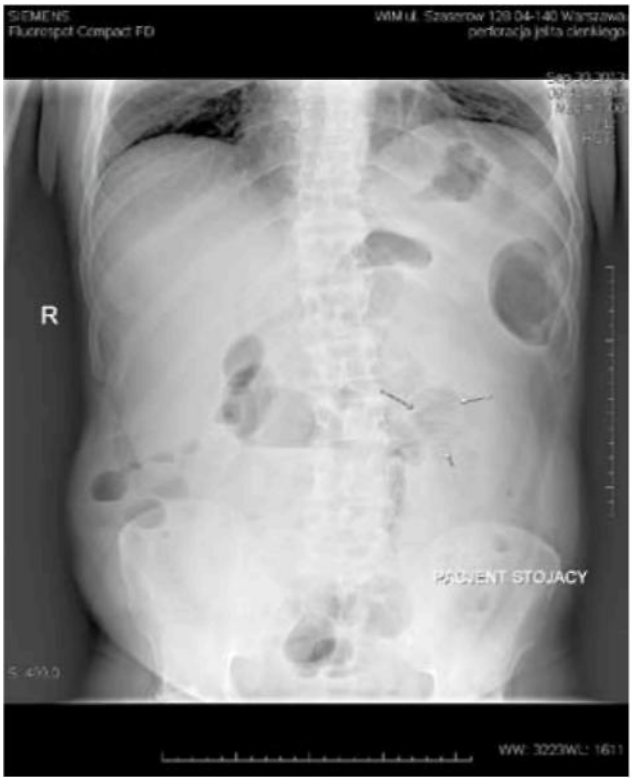

Figure 5. X-ray. Obstruction of the gastrointestinal tract. Limited perforation of the small intestine.
Rycina 5. RTG przeglądowe jamy brzusznej. Niedrożność przewodu pokarmowego. Ograniczona perforacja jelita cienkiego.

Discussion

In the case of patients presenting to emergency departments, it should be always remembered that, apart from the evaluation of the abdomen, a complete physical examination including the cardiovascular, respiratory and nervous systems should be performed. In patients in severe general condition, chronically ill, taking steroids or with long-term diabetes, the symptoms may be less pronounced. A detailed physical examination should never be abandoned. The use of a particular diagnostic method in a patient in whom acute abdominal condition is suspected depends, among other things, on the clinical diagnosis, technical capabilities of a given medical center and the experience and choice of the attending physician.

Basic anatomical knowledge is also very important to carry out the adequate diagnostic and therapeutic process. It should be remembered that the stomach, upper part of the duodenum, transverse colon, upper part of the rectum and gallbladder are intraperitoneal. The segments of the gastrointestinal tract located in the retroperitoneum are ascending and horizontal duodenum.

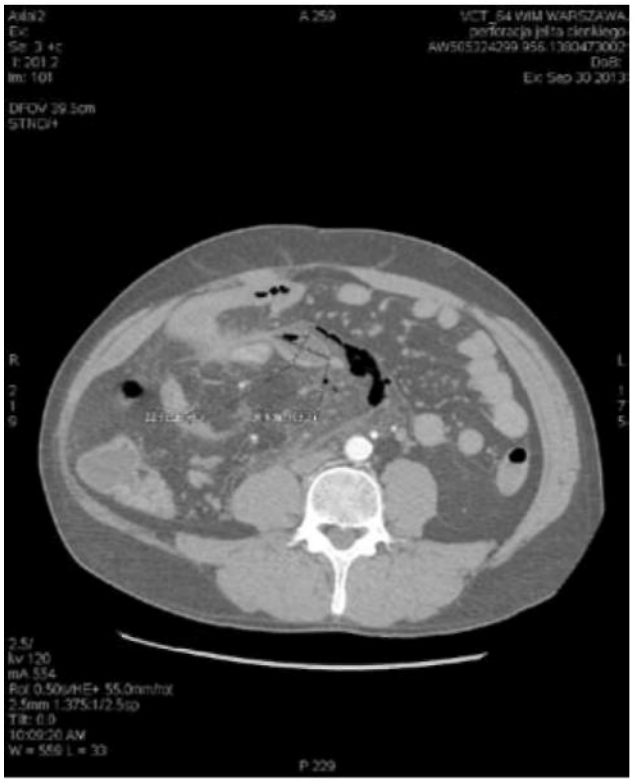

Figure 6. CT scan. Perforation of the small intestine. Intraperitoneal abscess
Rycina 6. Tomografia komputerowa. Perforacja jelita cienkiego. Ropień wewnątrzotrzewnowy

The ascending colon, descending colon and middle and lower part of the rectum are secondary retroperitoneal. The transverse colon and appendix are mostly intraperitoneal. It may also happen that the back wall of the cecum is fixed to the parietal peritoneum (*cecum fixum*), and the appendix is located retrocecal [5]. The location of the organs in relation to the peritoneum and extent of perforation determine the location of air and fluid. The examination usually performed as the first one when gastrointestinal perforation is suspected is abdominal X-ray. It is easily available, quick, burdens the patient with a small amount of ionizing radiation and is inexpensive. Other examination that can be performed in the diagnostics of the abdominal cavity and that uses X-ray imaging is fluoroscopy. The image projected on the monitor screen is created in real time and provides, among other things, information about gastrointestinal motility.

X-ray scans can be performed in a standing or supine position with a horizontal x-ray beam [6]. The way the examination is performed depends on the patient's clinical condition. In bedridden patients, the examination is performed using a horizontal x-ray beam in a supine position or on both sides. If the patient can be positioned upright, the examination is performed with the patient standing or, less often, in a sitting position. Free air always tends to collect in the uppermost spaces. The examination preferred by radiologists are those performed in a standing position - it is easier to detect subphrenic free air. The interpretation of examinations performed in a supine position is often hampered by skin folds (especially in obese patients), between which air collects, and the overlapping of shadows may erroneously suggests perforation. It is important that the examination (in each position) covers the diaphragmatic domes and the entire abdominal cavity. If the patient's anatomical conditions make it possible, the examination should be performed in two stages by visualizing the abdominal cavity on two images. X-ray examination can reveal the presence of air in the peritoneum in 70% of cases. The most difficult to diagnose are perforations where there is little air that collects locally, especially between the intestinal loops in the mesentery or in the limited and "tight" retroperitoneal space. The evaluation of radiograms should not focus on the assessment of the diaphragmatic domes only. The entire visible scope of the examination should be evaluated and air should be looked for outside of the gastrointestinal lumen. If gastrointestinal perforation is suspected, barite should not be used (barium sulfate) in imaging procedures. Barite is insoluble in water. If it enters the peritoneal cavity it causes mechanical irritation and chemical inflammation. It is acceptable to use water-soluble iodine agents.

In the case of gastrointestinal perforation and the presence of air in the peritoneum, an ultrasound examination performed in a supine position reveals an artifact with multiple ultrasound wave reflections from air, which is called "reverberation" (reverberation artifact). It is a physical phenomenon occurring at the boundary of highly reflective surfaces that are parallel to the transducer face and which strongly reflect ultrasound waves (e.g. air, bones). Echo reflecting from the highly reflective surface that is distant from the transducer surface by a distance equal to do in the near field, returns back to the transducer surface after passing a distance equal to 2 d. A part of the energy is absorbed and the other is reflected from the transducer surface and, acting on the same surfaces, returns to it once more. The phenomenon is repeated many times and appears in the image as a series of parallel, regularly spaced, uniform echoes of decreasing intensity of saturation in the grayscale, till they are completely attenuated. From the physical characteristics typical for the ultrasound wave, such as reflection between interfaces, attenuation (weakening) and refraction (scattering), the first two are of importance for multiple reflection artifacts [7,8]. Reverberations occurring due to free air in the peritoneum should be differentiated from those which occur due to intestinal gas. In the case of a large amount of free air in the peritoneal cavity, reverberations do not disappear after changing the imaging plane, do not change their appearance after transducer compression

They are imaged in a pure, unchanged and uniform form that usually obscures other abdominal organs. However, this manifestation is difficult to visualize if there is a small amount of free air in the peritoneal cavity [9]. Reverberations caused by intestinal gas reflect the shape and course of intestinal loops, can fade away after changing the imaging plane and rearrange due to transducer compression. They usually do not completely obscure other abdominal organs and not often occur in a pure form because in intestinal loops air is present in the form of multiple bubbles intermingled with fluid intestinal content and mostly causes other artifacts.

The first one is ring-down artifact - caused by the resonance of fluid trapped between air bubbles emitting a continuous acoustic wave back to the transducer face. In ultrasound, it is imaged as multiple, bright, densely "packed" uniform reflections, without changes in grayscale intensity caused by a change of the distance to the transducer face [4].

A more common artifact is the so-called "dirty acoustic shadow", which mostly occurs during imaging of intestinal loops. It is caused by multiple secondary reflections between the unchangeable air-tissue interface and surfaces to the front of this zone. The acoustic wave emitted by the transducer face undergoes reflection from the air-tissue interface, travels to the surface to the front of this zone. Then, it is reflected in the direction of the gas reflector where it is finally reflected from the air-tissue interface once more and returns back to the transducer face [10]. In all cases of the presence of fluid in the abdominal cavity, abscesses etc., both generalized and limited perforation should be considered.

In order to confirm results of ultrasound examination and determine a certain diagnosis, X-ray and CT examinations should be performed. Computed tomography is a more sensitive than classic radiography in the detection of small amounts of free air in the peritoneal cavity [4]. It provides an unambiguous (in most cases) confirmation of gastrointestinal perforation.

Diagnostic problems may arise due to very tiny air bubbles located directly next to the wall of the small intestine which may be mistakenly interpreted as intraintestinal gas. In CT, it is easier to evaluate examinations of obese patients in whom visceral fat is a natural "contrast agent" and causes separation of intestinal loops from parenchymal organs, which allows their easier evaluation and reduces the possibility of mistakes. The examination is performed using spiral technique. If there are no contraindications, an intravenous contrast agent should be used. Acquisitions performed in phases with post-contrast enhancement in the arterial and portal venous phases (less common in the delayed phase) provide considerably more information, e.g. for the evaluation of blood vessels, parenchymal organs, focal lesions, enhancement of the intestinal wall etc. However, in order to only confirm or rule out the presence of air in the abdominal cavity, a single-phase examination without a contrast agent is sufficient. Small air collections located in the region of intestinal loops can be considered a determinant of the degree of perforation. The most common cause of a large amount of free air in the peritoneal cavity is perforation of the stomach, upper part of the duodenum, small intestine and colon [4]. In the case of esophageal perforation, air enters the mediastinum. Subcutaneous emphysema may also occur.

Computed tomography is the best available method to diagnose perforation into the retroperitoneal space.

Before the admission to the hospital, a patient with perforation of the ascending colon had been treated on an outpatient basis due to diagnosed right renal colic for 10 days, without any additional examination performed, which may have delayed the diagnosis of the disease. Within the emergency diagnostics, an abdominal ultrasound was requested. The physician performing the ultrasound examination found a retroperitoneal abscess and recommended a CT examination. Apart from the retroperitoneal abscess, computed tomography revealed retroperitoneal perforation of the ascending colon.

In the patient with Crohn's disease, perforation of the small intestine occurred. The radiological manifestation of the disease on the X-ray image was initially undetectable (first examination). The examination performed on the next day revealed a small amount of air in the region of the left middle abdomen. However, the lesion was very difficult and ambiguous to interpret. In this case, there was no subphrenic free air. The obtained image aroused suspicion of perforation. Therefore, the abdominal CT scan was performed, which demonstrated air outside of the lumen of the gastrointestinal tract, limited by the mesenteric fat tissue. The CT examination was crucial for the diagnosis.

In the case of retroperitoneal perforation of the rectum, the basic manifestation of the disease was subcutaneous emphysema of the left lower limb and high fever. At first, the patient had been treated on an outpatient basis due to cellulitis (medical history provided by the patient was incomplete). The patient was brought to the hospital by ambulance in severe general condition, in septic shock, with symptoms of renal insufficiency. In order to find the source of infection/abscesses, chest and abdominal CT scans without a contrast agent were performed and revealed a defect of the wall of the lower part of the rectum, air and fluid in the lesser pelvis as well as inflammatory infiltration and gas in the subcutaneous tissue of the left lower limb. In this case, the CT examination was also crucial for the diagnosis.

The presented cases show that the diagnosis of gastrointestinal perforation is not always easy. The correct diagnosis is the effect of the examining physician's knowledge, thorough medical interview and physical examination, and appropriate use of imaging techniques. X-ray should be analyzed not only with a focus on the presence of subphrenic free air, but also on marginated, peri-intestinal air collections. Ultrasound as the first-line examination in patients with acute abdominal conditions may be also helpful in detecting perforation. However, it has limited sensitivity and specificity. The most sensitive and specific examination in the diagnostics of gastrointestinal perforation is computed tomography.

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Medical support of the Polish Military Contingent in Mali - own experiences

Zabezpieczenie medyczne Polskiego Kontyngentu Wojskowego w Mali -doświadczenia własne

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Abstract. The article presents the experiences of a member of Rotation 1 of the Polish Military Contingent (PMC) deployed to Mali, who, in 2013, fulfilled mandated tasks as a medical rescue worker. The author has paid particular attention to environmental threats in the area of the EU troops (EUTM, European Union Training Mission in Mali). The article can be used as a set of practical guidelines for medical personnel supporting successive rotations of the PMC in Mali. **Keywords:** EUTM, Mali, medical support

Streszczenie. W pracy przedstawiono doświadczenia własne uczestnika I zmiany Polskiego Kontyngentu Wojskowego (PKW) w Mali, który w 2013 roku wykonywał zadania mandatowe na stanowisku ratownika medycznego. Autor szczególną uwagę poświęcił zagrożeniom środowiskowym występującym w rejonie stacjonowania wojsk operacji Unii Europejskiej *[European Union Training Mission in Mali* - EUTM). Informacje zawarte w artykule mogą posłużyć jako wskazówki praktyczne do wykorzystania przez personel medyczny zabezpieczający kolejne zmiany rotacyjne PKW Mali.
Słowa kluczowe: EUTM, Mali, zabezpieczenie medyczne

Received: 21.11.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 59-64

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Introduction

At the beginning of 2013, the heads of diplomacy of the European Union member states appointed an EUTM (European Union Training Mission) in Mali. The mission was intended to operate simultaneously with SERVAL, a French military operation, whose aim was to defeat Islamic rebel forces that proclaimed the country of Aza-wad on the conquered territory of northern Mali. The task of EUTM is to help in military training and reorganization of the Malian army, as well as in restoring the trust of international public opinion to the newly elected legal authorities of Mali. International forces forming EUTM included also a small unit from Poland (functioning as the Polish Military Contingent [PMC]), consisting of 19 military instructors and an interpreter. This is the third military operation on the African continent over the last decade (after Democratic Republic of Congo and Chad) involving Polish soldiers (Fig. 1).

Training activity at PMC in Mali

The main tasks of soldiers of Rotation 1 of PMC in Mali involved a 10-week logistic and military training of two companies of the Malian army. The author of this article, a medical rescue worker participating in Rotation 1 of PMC, was responsible for medical training of Malian soldiers, medical support of shooting training and military convoys. The tasks of the medical rescue worker included the adaptation of the training program provided by the EUTM command to current needs, possibilities, and skills of the Malian soldiers undergoing training.

Figure 1. Off-road desert close to the Niger River near the town of Koulikoro
Rycina 1. Pustynne bezdroża niedaleko rzeki Niger w okolicach miasta Koulikoro

Figure 2. Malian soldiers during the first aid exercises
Rycina 2. Żołnierze Malijscy podczas ćwiczeń z udzielania pierwszej pomocy

Figure 3. Malian soldiers practicing evacuation of the wounded
Rycina 3. Żołnierze Malijscy podczas ćwiczeń z ewakuacji rannych

The predetermined training program included the teaching of resuscitation and TCCC (Tactical Combat Casualty Care). The local army comprised soldiers of different nationalities, cultures and religions using different languages. They were subjects with little professional experience, and were often illiterate (Fig. 2) [1].

Some of the soldiers undergoing training, despite a lack of education, had extensive military experience gained in various theatres of war, e.g. in Libya, Sierra Leone, Rwanda and Nigeria. This experience could be seen not only during military training, but also medical training, when the trainees were giving specific examples of behavior in life- and health-threatening situations, e.g. after a gunshot to the chest or an extremity. The official language in Mali is French but some soldiers communicated only in languages of African ethnic groups, e.g. Bambara, which was a serious communication problem in the training process. It was pointless to explain complex issues on resuscitation or TCCC. Amendments to the predetermined training program became a necessity. The program had to be transformed in such a way that an illiterate soldier could effectively and quickly acquire basic knowledge on first aid and evacuation from the battlefield. The modified training schedule focused on the following elements: first aid for massive bleeding, musculoskeletal, chest and head injuries as well as evacuation from the battlefield (Fig. 3).

A very good idea practiced during the training was to undress a soldier to their underwear and draw on his body the heart, main arteries and veins in order to explain to the other soldiers how blood circulates in the human body. Only then could most of the soldiers understand why they should place a tourniquet above the wound heartward on the extremity, and not the other way round. By means of the same method, the author of the article taught the trainees about fractures, chest and head injuries, using a drawn skeleton instead (Fig. 4).

Drawing schemes on the trainees' bodies did not show real anatomical structures but it appealed to the Malian soldiers a lot and allowed them to understand basic processes occurring in the human body. European training schedules also did not appeal to the soldiers; they preferred simple and practical activities. An effective method of teaching was to make comparisons to animals that the soldiers fed on, since by killing them they knew their visceral anatomy. In the course of training, the soldiers tended to explain to one another the discussed issues in a very vivid way, often making gestures and shouting in the language that only they could understand.

Sometimes this turned into wild yelling, which meant a heated discussion. Despite the fears of some EUTM instructors concerning safety, the author never experienced any signs of hostility or unfriendliness from the soldiers undergoing training or civilians. On the contrary, friendliness could be seen everywhere, and it became customary to invite people to a meal or a cup of tea. It could be observed that the trainees wanted to gain as much information and knowledge from the instructors as possible. They perfectly understood that the knowledge would prove useful when they moved to the war area in the northern Mali and they would have to count only on themselves. Despite initial mutual distrust between the EUTM instructors and Malian soldiers, they managed to build a line of communication and trust in a relatively short time. The nightmare of instructors from previous military operations in Afghanistan and Iraq, the so called green-on-blue attack, did not repeat itself on the African continent (Fig. 5) [2].

Training of Malian soldiers was conducted mainly in open areas, in harsh climatic conditions. Between the noon and 4 p.m. in the dry season, strong sun exposure and high temperatures made it impossible to perform any work by local people, not to mention European soldiers, representatives of a moderate climatic zone. The training could only be performed in the morning hours, late in the afternoon or at night. Each trip to an open area required taking a large amount of drinking water. For one hour of marching at a moderate pace in the bush and carrying a 10-kg weight, the author had to use 1.5 liters of drinking water. The highest recorded temperature in the dry season in the area where the Polish soldiers were located was 44°C, with no air movement whatsoever. The climate of Sub-Saharan Africa, even during the rainy season, is a real challenge for people from Europe. Sunny weather can change within a few minutes into a tropical storm, and dry beds of seasonal rivers turn into torrents. Due to strong wind, rain can even fall horizontally.

EUTM medical support

At the Koulikoro training camp, several dozen kilometers from the capital of the country, Bamako, at the location of instructors from Europe, a German field hospital with a landing zone for medical evacuation helicopters (MEDEVAC) was established. The hospital personnel, mainly German (but also Austrian and Hungarian), organized cyclic training for medical personnel from other countries participating in EUTM. The training involved malaria chemoprophylactics and first aid for venomous snake bites, stopping massive hemorrhages, preparing a landing place for a MEDEVAC helicopter.

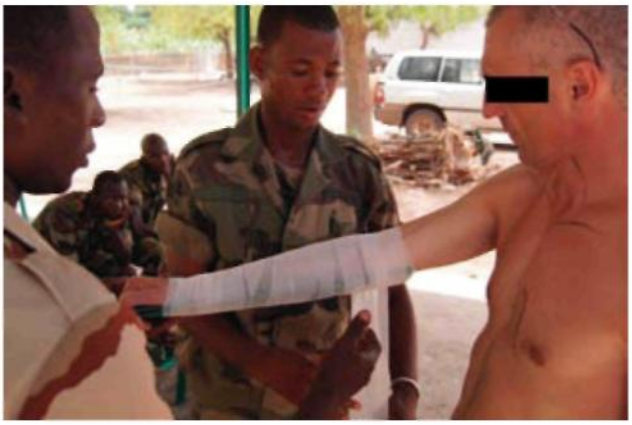

Figure 4. Malian soldiers practicing immobilization of fractures. Note the circulatory system drawn on the body
Rycina 4. Żołnierze Malijscy podczas ćwiczeń z unieruchamiania złamań, na ciele narysowany układ krążenia

Figure 5. Commemorative photo at the end of training
Rycina 5. Pamiątkowe zdjęcia na koniec szkolenia

Figure 6. First aid point of the Malian army
Rycina 6. Punkt pierwszej pomocy Armii Malijskiej

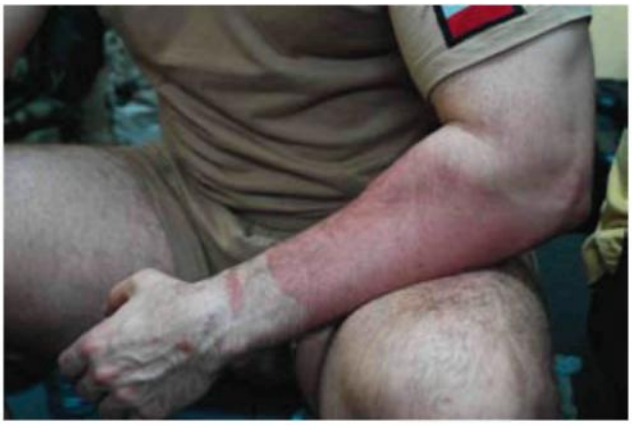

Figure 7. The effect of too long exposure to the sun in Africa
Rycina 7. Efekt zbyt długiego przebywania w afrykańskim słońcu

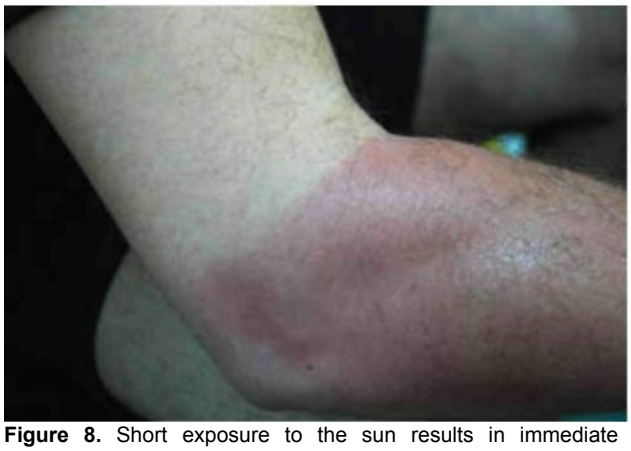

Figure 8. Short exposure to the sun results in immediate sunburn
Rycina 8. Krótka ekspozycja na pełne słońce powodująca od razu oparzenie skóry

Figure 9. Prickly plant encountered in the Malian bush
Rycina 9. Kolczasta roślina napotkana w Malijskim buszu

Medical support during training outside the base in Koulikoro was provided by paramedics from particular contingents supported by a MEDEVAC helicopter and vehicles from the field hospital. Additionally, during the shooting practice in which Malian soldiers participated, the medical support of the mission was strengthened by a Malian military ambulance with two physicians (Fig. 6).

Environmental threats in the area of PMC in Mali

The area where PMC soldiers were located in Mali was not threatened by extremist groups or rebels from the north of the country. A significant threat, however, was posed by the hot climate and the local flora and fauna. Due to intense sun exposure it was necessary to wear sunglasses with a UV filter. Walking without head protection and with rolled up sleeves during the hours of the strongest sunlight posed the threat of a stroke or sunburn. The sun at the zenith did not give a suntan, but sunburn (Fig. 7).

Using sunscreen with filters produced poor results. High temperature and air humidity resulted in heavy perspiration, which in turn caused each sunscreen to be removed along with the perspiration. For the same reason, using repellents against the pervasive mosquitoes at peak sunlight did not provide protection. However, permanently wet underwear constituted a certain barrier between skin and the environment, which prevented the organism from losing water and provided thermal comfort (natural cooling). Polish soldiers were equipped with airy, cotton boxers and vests, which were perfect protection as far as clothing hygiene was concerned. Long sleeves, an airy uniform jacket, a hat, long trousers with trouser legs tucked inside boots, sunglasses and a bottle of water formed basic equipment for each soldier (Fig. 8).

A common problem in the tropical climate of Sub-Saharan Africa is dehydration of the organism, which may lead to heat injuries, additionally increased by acute diarrheas frequent among EUTM soldiers. Long sleeves and trouser legs tucked inside boots are important elements in preventing sunburn as well as transmissible diseases, especially malaria (mosquito bites). They also protected against other insects and injuries caused by prickly or toxic plants (Fig. 9).

Mosquitoes transmitting malaria are common in Mali, especially in the Niger basin [3]. Numerous inflammatory lesions resulting from mosquito bites could be observed in soldiers after all-day or night training. Therefore, the basic preventive measure was to use oral antimalarial medications, such as atovaquone-proguanil or mefloquine. The use of repellents and sleeping under a mosquito-curtain tightly placed under the mattress was absolutely necessary. According to Malian physicians, there were about 600 cases of malaria in 2012 in Koulikoro, the place where Polish soldiers were located. During the stay at Koulikoro, the author learned about two cases of malaria among EUTM soldiers. It appears that Malian soldiers treat malaria as an upper respiratory tract infection that they have already had, are having or will have in the future. Medical support in Mali, including sanitary, hygiene and antiepidemic support, is at a very low level, far below European standards. For Malian people, treating malaria with modern methods is a luxury that they cannot afford for economic reasons. Lack of waste water systems, formation of water tanks (seasonal rivers) during the rainy season and the ever-present rubbish constitute perfect nourishment for bacteria and vectors of infectious and invasive diseases. Mosquitoes, flies, cockroaches, venomous snakes and spiders, scorpions, wild dogs, donkeys, high prevalence of venereal diseases, including HIV/AIDS [4], filth and poverty is an every-day reality in Mali. To face these threats, it is necessary to stick to basic principles of preventive medicine. Contact with local animals should be avoided, they should not be caught by soldiers or fed. Do not put hands in places difficult to access (cracks, rocks), where dangerous animals may hide, and do not sit in places without checking them first. After a night spent in the open, you should carefully shake out your boots, clothes and other equipment. If it is possible, you should have a bath at least once a day in water from controlled sources. Change underwear at least once a day. Brush your teeth with bottled water. You should completely avoid drinking local water and bathing in fresh water tanks - in which not only dead animals but also crocodiles, hippopotamuses and microscopic *Schistosoma* larvae that penetrate through human skin may be found. Avoid eating local food, which is very often prepared at low sanitary standards (Fig. 10).

Driving on hard-surfaced Malian roads is another challenge. The number of holes on the tarmac road between Bamako and Koulikoro is unexpectedly high. Dilapidated vehicles with no lights and in poor technical condition, overloaded microbuses full of people, overloaded trucks whose drivers do not observe traffic regulations (driving on the right), pose a serious threat to other road users (Fig. 11).

Figure 10. Military kitchen
Rycina 10. Kuchnia wojskowa

Figure 11. Dilapidated vehicle seen on the Malian road
Rycina 11. Zdezelowany pojazd spotkany na malijskiej drodze

The ever-present scooters and zig-zagging motorcycles often carrying four people is also a common sight. On the roads of Bamako, the capital of Mali, one may see luxurious Mercedes or Toyota cars next to herds of sheep, cattle or donkeys, which Malian people use for draft work. Pedestrians do not observe any regulations, they enter the road at the most unexpected moment. All this makes any Malian road a state of organized chaos, which is very dangerous for anyone unfamiliar with local habits. Common sense and imagination is absolutely necessary in such circumstances. There are many more threats to people from Europe in the West African climate, and it is impossible to mention them all. The mission in Mali must be considered difficult, mainly due to environmental factors, such as climate, flora and fauna [5].

Nevertheless, it is worth taking part in such an operation for the sake of new experiences. To see military and medical equipment used by our allies, to meet soldiers from other countries, and to learn methods of training for our own and allied soldiers is priceless. No such training in Poland is able to provide the kind of experience that can be gained in the tropical conditions of West Africa.

Acknowledgements
The author is grateful to Włodzimierz Majewski, MD, PhD, Associate Professor at PMU for kind help and support in writing this article.

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Walking blood bank at a military field hospital in Afghanistan

Chodzący bank krwi w wojskowym szpitalu polowym w Afganistanie

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Abstract. Fresh whole blood therapy is a proven and effective life-saving procedure performed on individuals suffering from multi-organ injuries and massive hemorrhage in operational conditions. Acquisition and safe use of fresh blood involves selecting an appropriate number of donors, known as a walking blood bank. The authors present certain aspects regarding selection of blood donors at a military field hospital (Medical Support Group) during the operation carried out by the Polish Military Contingent in Afghanistan, with particular emphasis on the effects of harsh environmental conditions on realization of the project.
Key words: fresh whole blood, military field hospital, walking blood bank

Streszczenie. Terapia świeżą krwią pełną jest potwierdzoną i skuteczną procedurą ratującą życie poszkodowanych z urazami wielonarządowymi i masywnym krwotokiem w warunkach działań militarnych. Pozyskiwanie i bezpieczne stosowanie świeżej krwi pełnej wymaga wyselekcjonowania odpowiedniej puli dawców określanych jako chodzący bank krwi. Autorzy prezentują wybrane aspekty kwalifikacji dawców krwi w wojskowym szpitalu polowym (Grupie Zabezpieczenia Medycznego) podczas operacji Polskiego Kontyngentu Wojskowego w Afganistanie, ze szczególnym uwzględnieniem wpływu trudnych warunków środowiskowych na realizację przedsięwzięcia.
Słowa kluczowe: chodzący bank krwi, świeża krew pełna, wojskowy szpital polowy

Received: 23.10.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 65-71

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Significance of blood treatment in the functioning of a military field hospital

The military field hospital (Medical Support Group - MSG), functioning within the structures of Polish Military Contingent (PMC) in the Islamic Republic of Afghanistan, was obliged to perform level 2 medical evacuation tasks under an agreement concluded with and in cooperation with American health care. MSG started operating during Rotation 6 of PMC within ISAF (International Security Assistance Force) in 2010. However, it was not until 2011, during Rotation 9 of PCM, that the Polish field hospital became fully independent and capable of providing first aid for subjects with multi-organ injuries and massive hemorrhages based on its own human resources and equipment. Until then, aid to the injured was provided in a military medical unit, U.S. Forces - Forward Surgical Team (FST), located at the same place as MSG, i.e. at the military base in Ghazni. One of the basic conditions allowing MSG to become independent was to implement the Walking Blood Bank (WBB) program with procedures of collecting and using fresh whole blood (FWB). Due to the specific nature of the injuries in wounded subjects, especially those with massive hemorrhage, it was difficult to provide a sufficient amount of blood and its components. The total amount of blood components stored at MSG was usually 12 units of red blood cell concentrate (RBCC), about 12 units of fresh frozen plasma (FFP) and 12 units of cryoprecipitate. These amounts, however, were not enough to support a large number of injured subjects requiring transfusion. It was also not enough to support massive losses when there was a large disparity between the number of the injured and the available resources of medical support, especially as far as transfusion therapy was concerned.
The store was enough to support one injured person with a massive hemorrhage, so it was definitely too little.

The impossibility of ensuring larger and more frequent supplies of blood components from the supplying unit known as Blood Support Detachment (BSD) required implementation of a procedure of FWB acquisition [1]. It became necessary to initiate a procedure of fresh whole blood collection and use, also because FWB therapy is a recommended procedure in subjects requiring massive transfusions, and it provides optimal resuscitation and more effective hemostasis compared to the therapy with blood components [2]. The procedure of FWB collection was performed according to the guidelines used in the theatre of military operations and published in "Joint Theatre Trauma System Clinical Practice Guideline".

The program of fresh whole blood collection was developed and initiated with Rotation 9 of PMC in Afghanistan, while special standard operating procedures (SOP 421) were finally implemented with Rotation 11 of PMC. Additionally, the personnel was trained in theoretical and practical knowledge. One of the conclusions after the practical training was that it was necessary to highly simplify the procedures of blood collection in combat conditions, when the number of the injured was really high. A very important element of FWB acquisition was to qualify and store an adequate pool of candidates for donors, defined as a walking blood bank [1].

Donor eligibility requirements for a walking blood bank

Qualification of candidates for blood donors was based on slightly different principles that those applied in organization units of public blood service in Poland. Under Polish law, the eligibility requirements for donors of blood and its components are regulated by the Regulation of the Minister of Health of 18 April 2005 on conditions of blood collection from candidates for blood donors (Dz.U. No. 79, item 691, as amended).

This regulation specifies health requirements for candidates for donation of blood and its components, a list of tests that should be performed to be qualified and the frequency and permissible volume of blood or its components that can be collected at one time.

Aside from analyzing medical history, e.g. completing a detailed and extensive questionnaire with elements of epidemiological interview, it is also necessary to perform a physical examination. This examination includes an assessment of appearance and general condition, an assessment of any disparity between body mass and height, and also an assessment of body temperature, pulse, arterial blood pressure and lymph nodes. Before each blood collection procedure it is necessary to determine the hemoglobin level [3].

Donor qualification, also in emergency, was performed under a simplified questionnaire (DD 572 Form) unified with U.S. Forces health care and functioning in Polish and English language versions. Donor candidates included in the WBB program were subject to laboratory diagnostics, including CBC (Complete Blood Count) and markers of blood-borne diseases, such as HIV, HCV, HBV, syphilis, malaria. The same range of tests, but retrospectively, was performed at emergency blood collection, with additional determination of ABO group antigens and D antigen of the Rh system with the use of a gel microcolumn assay or monoclonal reagents.

Because it was impossible to train the personnel before the mission, mainly due to the lack of specialists that could conduct such training in the home country, it took place in PMC in cooperation with the U.S. Forces health care units in such a way as to obtain maximum interoperability of donor qualification. Therefore, almost uniform versions of donor qualification questionnaires were implemented, and they consisted of a two-page form, whose Polish language version was modified mainly in the donor data section and medical qualification section, which allowed issuing an unequivocal medical assessment about meeting or not meeting eligibility criteria for being a donor. Page two of the questionnaire comprised questions concerning mainly epidemiological history (donor's stay in endemic countries of blood-borne diseases, risky sexual behavior or use of drugs or psychotropic substances). The model of the first page of the Polish language version questionnaire with marked modified sections is presented in Figure 1.

Effect of environmental factors on the implementation of WBB program

One of the basic parameters to qualify a donor of whole blood or its components is peripheral blood morphology, especially the level of the hemoglobin (Hb). According to the studies conducted in 2003-2007 among blood donors in Poland, the number of donors was 534,807-623,209, the number of donations was 971,899-1,005,732 per year, and the number of disqualifications due to insufficient Hb level - from 14,617 to 34,883.

ZAPIS DONACJI KRWI PEŁNEJ

☐ SPEŁNIA WYMOGI* ☐ NIE SPEŁNIA WYMOGÓW**

Figure 1. Modified fresh whole blood donation form - first page
Rycina 1. Zmodyfikowany formularz donacji świeżej krwi pełnej - pierwsza strona

This was the main cause of temporary disqualification; its rate in males amounted to 3.1%, in females <50 years 11.6% and in regular donors was about 50% higher than in donors giving blood for the first time [4]. Representative and multicenter studies on assessment of basic parameters of peripheral blood morphology in specific populations, especially in healthy subjects, are conducted quite rarely. A multicenter NHANES (National Health and Nutrition Examination Surveys) study on the general population conducted in the United States in 2005-2008 and REDS (Retrovirus Epidemiology Donor Study) study conducted among blood donors revealed similar mean hemoglobin levels both in first-time donors and the remaining population with the mean dependent on age and sex [5]. The results of NHANES and REDS studies are shown in Figure 2.

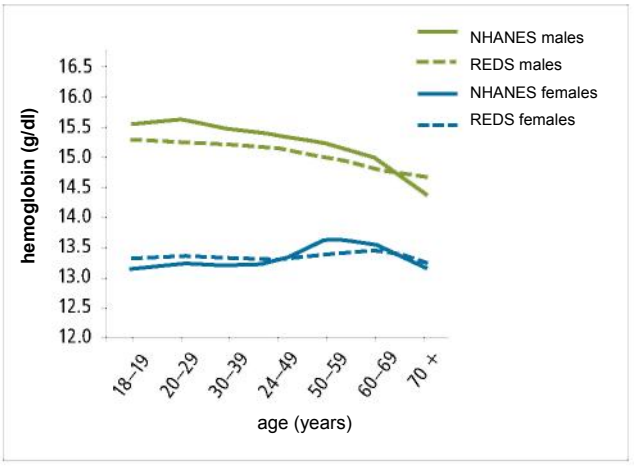

Figure 2. Mean hemoglobin values (g/dL) in REDS donors versus NHANES participants, analyzed according to age and sex
Rycina 2. Średni poziom hemoglobiny (g/dl) u dawców badania REDS i uczestników badania NHANES, analizowany według wieku i płci

A study of the hemoglobin level conducted among selected inhabitants of various regions in Italy, living in rural areas at the altitude of 500-600 m above sea level revealed that Hb values ranged from 14.88 (±1.07) to 15.41 (±1.03) in the male population and from 13.28 (±1.06) to 13.77 (±0.93) in the female population [6]. Assessment of peripheral blood parameters, especially the hemoglobin level, may be an important element in qualification of whole blood donors. Therefore, it is important to know which factors affect these parameters. It has been shown that smoking tobacco and prolonged stay at higher altitudes above sea level can have a significant influence on the hemoglobin and hematocrit levels in healthy subjects. A multicenter RISE (Donor Iron Status Evaluation) study conducted on first-time blood donors and NHANES revealed that smoking tobacco may increase the hemoglobin level by 0.26 g/dl in subjects smoking up to 10 cigarettes a day and up to 0.56 g/dl in subjects smoking more than 11 cigarettes a day [5].

Base Ghazni, in which the Polish military field hospital is situated, is located 2,171 m above sea level. The height above sea level may be divided into indirect (1,500-2,500 m), large (2,500-3,500 m), very large (3,500-5,800 m) and extremely large >5,800 m. The correlation between partial oxygen pressure change in the air and the height above sea level is well known. When the height increases, the partial oxygen pressure in the air and hemoglobin oxygen saturation in blood decreases, which also reduces arterial oxygen saturation - SaO2). The remarkable influence of hypoxia on the resting body may be observed even at a height of 2,500 m above sea level.

At sea level, latitude 45° and temperature 0°C, barometric pressure is 760 mm Hg (1013 hPa). At 1,000 meters above sea level, pressure drops by 12%, at 2,000 m by 22%, at 3,000 m by 31%, at 5,000 m by 50%. Increasing altitude and decreasing partial oxygen pressure in the air results, within a few hours spent in the mountains, in excessive production of red blood cells in a person from the lowlands. Aside from increased erythrocyte count, one may also observe increased blood hemoglobin concentration [7]. Decreased partial oxygen pressure that occurs at high altitudes is compensated with increased blood oxygen capacity caused by increased hemoglobin level. Blood oxygen capacity may increase to 250-300 ml/l of blood (in lowland conditions 200 ml/l), and hemoglobin level to 200-230 g/l [8].

Increased erythrocyte concentration and increased blood capacity to transport oxygen in high-mountain conditions, especially while undertaking physical activity, is also a result of reduced plasma volume caused by greater fluid loss due to low air humidity. Increased production of erythrocytes and hemoglobin is stimulated by greater erythropoietin secretion resulting from oxygen deficit as early as 3 hours after arrival in the mountains. Peak renal production of this hormone occurs after 24-48 hours and persists only for 7-8 days, despite continuous conditions of hypoxia, and the erythrocyte count continues to grow steadily [7]. According to numerous researchers, short stays in high-mountain conditions does not have a significant influence on basic morphologic parameters, including blood hemoglobin, hematocrit, and red blood count. On the other hand, a prolonged stay at the height of more than 2,000 m above sea level is a well-known training element used by athletes to improve physical capacity thanks to induction of adaptation mechanisms, including increase in red blood cells, Hb and Hct. It has been shown that in order to achieve hematologic acclimatization at 2,100-2,500 m above sea level, one has to stay at this altitude for at least 12 hours for the minimal period of 3 weeks [9].

Soldiers from PMC in Afghanistan that had been staying at the military base in Ghazni for a period of about 6 months were qualified for the WBB program after at least a month stay at 2,100 m above sea level, which had a potential effect on the basic morphologic parameters of peripheral blood. Studies on morphologic adaptation during acclimatization and high-altitude training reveal increased red blood cell mass by 6% after 4 weeks of training at 2,200 m above sea level and a relatively small and slow increase in hemoglobin mass (1% per week). The final process of morphologic acclimatization (increase in erythrocyte mass, hemoglobin and hematocrit level) as well as metabolic acclimatization is quite individual and depends on the concentration and metabolism of iron in the organism, concurrent diseases, exposure to stress and eating habits.

Publications on high-altitude adaptation reveal a linear correlation between hematocrit increase and the period of stay at a given height above sea level. It has been shown that the period of hematocrit adaptation (at initial hematocrit concentration of 36% at sea level and final hematocrit concentration of 50%) for the height of 3,500 m above sea level is about 40 days, which gives an acclimatization coefficient of 11.4/km (period of stay and height in km ratio). As a result, a hypothesis has been put forward that on the basis of this correlation one may calculate hematocrit adaptation for various altitudes [10]. This correlation, however, does not take into account other factors potentially affecting the hematocrit value, such as smoking tobacco, dehydration, sex, disorders in absorption and metabolism of iron and other metabolic and blood diseases. At 2,500 m above sea level, hematocrit adaptation in healthy subjects amounts to 28.5 days and results from the product of 2.5 (km) and 11.4 (coefficient). Since the hematocrit increase at 3,500 m above sea level was from 36% to 50% (increase by 14%), it may be assumed that the average daily increase was 0.35%. Taking into account the above criteria, hematocrit adaptation for blood donors and other people staying at the military base in Ghazni should be about 25 days for a person with the initial hematocrit value of 36%. It is estimated that the full process of high-altitude adaptation taking into account many other factors related to the physical and mental capacity of the organism may amount to one year or even two years, ultimately achieving values characteristic of subjects permanently living at high altitudes. This population is characterized among others with a higher mean extraction of O2 (VO2max) in hypoxic conditions and a slight decrease in VO2max during growing anoxemia, bradycardia, higher count and diameter of erythrocytes.

In order to unequivocally confirm the influence of altitude on parameters of peripheral blood morphology of donors included in the WBB program at the military base in Ghazni located at an intermediary height, it would be necessary to conduct specialist studies that could be available and used in the procedure of donor qualification. Despite that, one must remember about a possible influence of long stay of blood donors at the altitude exceeding 2,000 m above sea level on certain parameters used in qualifying subjects for blood donation in non-standard (field) conditions.

In compliance with current Polish regulations, male donors of whole blood may not have a blood hemoglobin level lower than 13.5 g/dl and female donors not lower than 12.5 g/dl. The regulations do not define maximal values. Nevertheless, according to laboratory standards normal hemoglobin values range from 12.5 to 18.0 g/dl for men and from 11.5 to 16.0 g/dl for women.

The World Health Organization defines anemia criteria dependent on reduction in hemoglobin level, age and sex. According to these criteria, normal hemoglobin concentration depending on sex and age is ≥ 13.5 g/dl for men independently of age and women >50, ≥12.5 g/dl for women <50 and 11.5 g/dl for children <16 years of age. [11]. Polish regulations on donation of whole blood do not include currently routine hematocrit determination in peripheral blood, whose laboratory reference is 42-52% for men and 37-47% for women.

Implementation of WBB program in PMC Afghanistan

The program was implemented at subsequent rotations of PMC Afghanistan. During Rotation 11, from May till August, WBB program included almost twice as many donors as during Rotation 9 in the same period, and the number of donations and transfusions of fresh whole blood was almost three times higher (Tab. 1). The increase in donations and transfusions resulted from the military situation in the region and the type of the injuries, often multi-organ injuries and massive hemorrhages.

Qualification of donors included in WBB program was based on standards of U.S. Forces health care, which required the hemoglobin value to be above 12.5 g/dl and hematocrit above 38%, independent of sex. Qualification tests of peripheral blood morphology among candidates for donors were performed with the use of a Sysmex XS 1000i hematology analyzer. When male donors were performing emergency FWB donation, peripheral blood morphology tests were performed retrospectively after donation. As for female donors, the only parameters determined prior to donation were Hb and Hct with the use of ISTAT portable machine, followed by retrospective CBC test. Selected results of Complete Blood Count conducted among donor candidates and whole blood donors are shown in Table 2.

Accounting for the effect of long stay of soldiers from PMC Afghanistan at altitude of 2,171 m above sea level at a military base in Ghazni on basic parameters of peripheral blood morphology, it must be said that the test results did not reveal significant differences (erythrocyte count, Hb and Hct level) in the population of donors participating in WBB program during Rotations 11 and 13 of PMC (Tab. 2). Higher mean values of selected parameters of peripheral blood morphology (RBC, Hb, Hct) in donors of WBB program compared to typical values of populations living on lowland areas may suggest that prolonged stay at the height of the military base in Ghazni could have an influence on their increase.

Table 1. Selected data from WBB program (rotations 9 and 11 of PMC Afghanistan)
Tabela 1. Wybrane dane z programu WBB (IX i XI zmiana PKW Afganistan)

Walking Blood Bank	Rotation 9 of PMC (17/05/2011-23/08/2011)	Rotation 11 of PMC (14/05/2012-20/08/2012)
number of donors in the program	74	144
number of donations from donors in the program following screening tests	19	82
number of disqualified donors.	2	3
number of donors with positive results of screening tests	0	0
total number of donations	35	96
number of transfused units	25	81
number of injured subjects who underwent transfusion	4	11
mean number of transfusions per 1 injured person	6.25	7.36
complications after transfusion (early)	0	0
complications after transfusion (late)	0	0*

* HBV DNA, HIV RNA, HCV RNA diagnostics underway

Table 2.-Selected peripheral blood parameters in donors (rotations 11 and 13 of PMC Afghanistan)
Tabela 2. Wybrane parametry morfologii krwi obwodowej u dawców (XI i XIII zmiana PKW Afganistan)

CBC parameters	RBC(mln/mm^3)		HGB(g/dL)		HCT(%)	
rotation of PMC/number of donors	11/82	13/68	11/82	13/68	11/82	13/68
mean	5.327	5.439	16.31	16.377	45.323	46.634
median	5.32	5.44	16.3	16.3	45.5	46.6
lowest value	4.23	4.76	12.7*	14.3	37.5	41.7
highest value	6.44	5.99	18.7	18.7	50.9	53.5
SD(±)	0.448	0.334	1.305	1.010	2.861	2.622

* female donor

Table 3. Selected peripheral blood parameters in WWB program donors screened before donation and on the day of donation (rotation 11 of PMC Afghanistan)
Tabela 3. Wybrane parametry morfologii krwi obwodowej u dawców programu WBB przed donacją i w dniu donacji (XI zmiana PKW Afganistan)

CBC parameters (n = 20)	RBC		HGB		HCT	
mean	5.49	5.35	16.67	16.13	45.99	44.86
median	5.49	5.285	16.8	16.25	46.1	44.25
lowest value	4.70	4.69	14.50	14.60	43.00	37.30
highest value	6.24	6.06	18.7	18.8	50.02	52.01
SD±	0.40	0.45	1.33	1.49	2.67	3.29

Mean hemoglobin level for donors from rotations 11 and 13 was 16.3 g/dl (±1.01). To compare, mean hemoglobin level for a male population living at lowland areas of Italy (at 500-600 m above sea level) ranged from 14.88 g/dl (±1.07) to 15.41g/dl (±1.03). Thus, it may be assumed that the influence of height above 2,000 m above sea level on the above-mentioned parameters is possible. However, lack of access to tests performed in Poland in the process of qualification for PMC Afghanistan and impossibility of performing specialist tests in the area of operations makes it impossible to precisely define the correlation between stay at the height of more than 2,000 m above sea level and the obtained results. On the basis of the above-mentioned mechanisms of altitude acclimatization it may be assumed that the WBB program participants underwent the required process of hematologic acclimatization lasting at least 3 weeks prior to blood donation. This acclimatization resulted in an increase in basic parameters of peripheral blood (Hb, Hct, red blood count) and their stabilization at the level characteristic for a specific height and intrapersonal features. This is confirmed by the results of peripheral blood morphology tests performed in the population of donors, whose Hb, Hct and RBC were tested twice, first on the day of qualification for WBB program and second during FWB donation (tab. 3). Out of 20 donors subjected to assessment, 65% (n = 13) donated blood after more than 2 months from inclusion to WBB program, 20% (n = 4) donated blood within 1 month, and 15% (n = 3) in less than 1 month after inclusion to WBB program. Mean time to donation after inclusion of donors in the program was 57.85 days, while the shortest period was 16 days and the longest 83 days.

Test results show that no further increase of basic parameters of peripheral blood (Hb, Hct, RBC) was observed among donors who underwent tests twice in a mean period of 57.85 days from the first test prior to donation. This trend may indicate that the significant majority of donors included in the WBB program (except for 1 case) had finished the process of hematologic acclimatization before FWB donation. In the course of the WBB program realization, during rotations 11 and 13 of PMC, in the group of 218 potential donors and FWB donors, there were only 2 cases (0.9%) when the hemoglobin level was below the required standards for Polish blood donors, while the disqualification index in Poland was 3.1% in 2003-2007 for first-time male donors.

More than three times lower disqualification index among WBB program donors from PMC Afghanistan may be related to the effects of altitude on some parameters of peripheral blood, including hemoglobin level.

Discussion

Fresh whole blood therapy is a life-saving procedure performed on individuals suffering from multi-organ injuries and massive hemorrhage in operational conditions. The therapy is of paramount importance for military medical units performing level 2 medical evacuation tasks which function in difficult field conditions, especially when it is not possible to use blood components so that full qualitative and quantitative demand is met. The results here presented and the authors' own experiences clearly confirm that it is absolutely necessary to use fresh whole blood in injured subjects with massive bleeding.

Acquisition and safe use of fresh blood involves selecting an appropriate number of donors known as a walking blood bank. The procedures of donor qualification for blood collection must be as simple and safe as possible. In combat conditions there is no place for complex and time-consuming procedures of donor qualification and collecting blood or its components with the use of standards typical of public blood service units at peace. Implementation of the WBB program at Rotations 9 and 11 of PMC Afghanistan was the condition to initiate independent operation of MSG and interoperability with the American mission. Military operations may take place in various environmental conditions, including high-mountain conditions. These conditions may have a significant influence on physical and mental performance of soldiers.

The literature review and the results presented by the authors indicate that prolonged stay at the height over 2,000 m above sea level may cause an increase in the concentration of hematocrit, hemoglobin and red blood cells in candidates for blood donation included in the WBB program, and the necessary process of hematologic acclimatization lasts about 3 weeks. The authors hope that this review will allow deeper understanding of the presented issues by the personnel of military field hospitals and military health care and will ensure initiation of necessary training well before leaving for the military operation area.

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Differences in life expectancy in the provinces of Poland against the background of economic conditions

Zróżnicowanie i zmiany wskaźnika oczekiwanej długości życia w województwach Polski na tle uwarunkowań ekonomicznych

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Abstract. Over time, health care financing increases throughout the world. Life expectancy has risen, but even within the continent of Europe itself this is extremely varied. Although the differences between countries are fairly explicable due to differences in health care systems, financing schemes and funds available to health services, such differences within one country are rather hard to explain. In different Polish provinces, life expectancy ranges from 70.4 years for males living in the Łódź province to 82 years for females living in the Podkarpackie province. Life expectancy differences between Polish males and females are greater than in other EU countries, and between some provinces is as much as 10 years. These considerable differences in life expectancy are also seen between people living in rural vs. urban areas; especially in reference to males. Since the figures on health service financing and on the wealth of particular provinces do not explain the causes of the phenomenon, there is a need to find what other social and economic parameters influence life expectancy.
Keywords: health expenditures, life expectancy

Streszczenie. W skali całego świata, wraz z upływem czasu, wzrasta wielkość finansowania ochrony zdrowia. Podnosi się także wskaźnik oczekiwanej długości życia, który nawet w obrębie samego kontynentu europejskiego jest mocno zróżnicowany. Jakkolwiek ze względu na odmienną organizację służby zdrowia, odmienność systemów finansowania i wysokości środków przeznaczanych na zdrowie różnice pomiędzy państwami są możliwe do wytłumaczenia, to zróżnicowanie w obrębie jednego kraju trudno jednoznacznie wyjaśnić. W województwach Polski wskaźnik oczekiwanej długości życia waha się od 70,4 roku w przypadku mężczyzn zamieszkujących województwo łódzkie do 82 lat w przypadku kobiet zamieszkujących województwo podkarpackie. Różnice pomiędzy długością życia kobiet i mężczyzn są większe niż w pozostałych krajach Unii Europejskiej i w skali województw sięgają nawet 10 lat. Widoczne jest również mocne zróżnicowanie długości życia społeczeństw zamieszkujących obszary wiejskie i miejskie, w szczególności populacji mężczyzn. Jako że same wskaźniki dotyczące finansowania służby zdrowia i zamożności obszarów województw nie wyjaśniają przyczyn zaistniałego zjawiska, pojawia się potrzeba określenia wpływu innych cech społecznych i gospodarczych na długość życia.
Słowa kluczowe: oczekiwana długość życia, wydatki na ochronę zdrowia

Received: 29.10.2013. Accepted for print: 20.12.2013.
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 72-77

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Expenditure on health care has been growing throughout the world. According to data of the World Health Organization [1], the total amount of expenditure on health per inhabitant has more than doubled over the last 15 years. The growth took place in the scope of funds disbursed in total and government funds, which indicates that issues connected with the health of the society are considered as significant (Figure 1).

The difference between the total expenditure and government expenditure on health represents private funds directly disbursed by patients and insurance companies, private expenditure in systems, in which the co-payment system is at the advanced level (for example in Switzerland). Private expenditure grows more quickly than government expenditure, which indicates the increase in the demand for health services and, on the other hand, may constitute a symptom of the insufficient supply of health services financed from public funds.

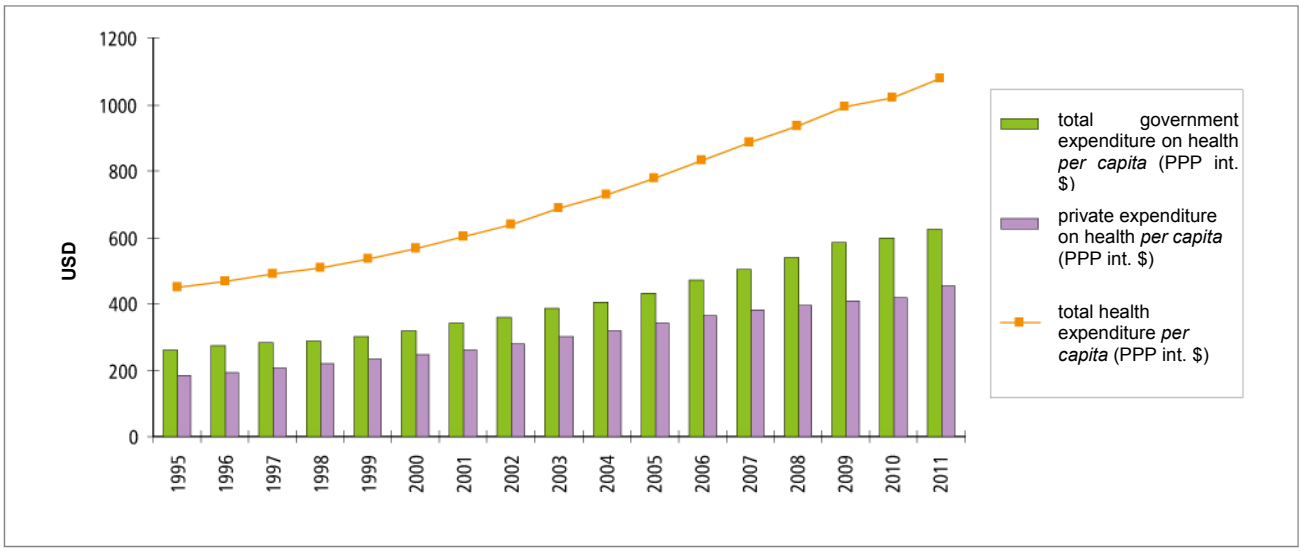

Figure 1. Per capita level and structure of expenditure on health care in 1995-2011
Rycina 1. Wysokość i struktura globalnych wydatków na zdrowie *per capita w* latach 1995-2011
Source: Own compilation on the basis of data provided by the World Health Organization [1]

According to Morris et al. [2], there is no system of health care which would be able to offer the supply of medical services corresponding to the level of demand on the part of patients. Moreover, the overall increase in the health care financing is connected with the growing demand for medical services. Patients' expectations are growing, trends for a healthy lifestyle are appearing, emphasis is being put on the preventive treatment which, due to early detection of diseases, contributes to evening out expenditure connected with treatment in the future. An increase in the level of morbidity and mortality as a result of certain diseases, in particular neoplastic diseases, has been observed [1,3].

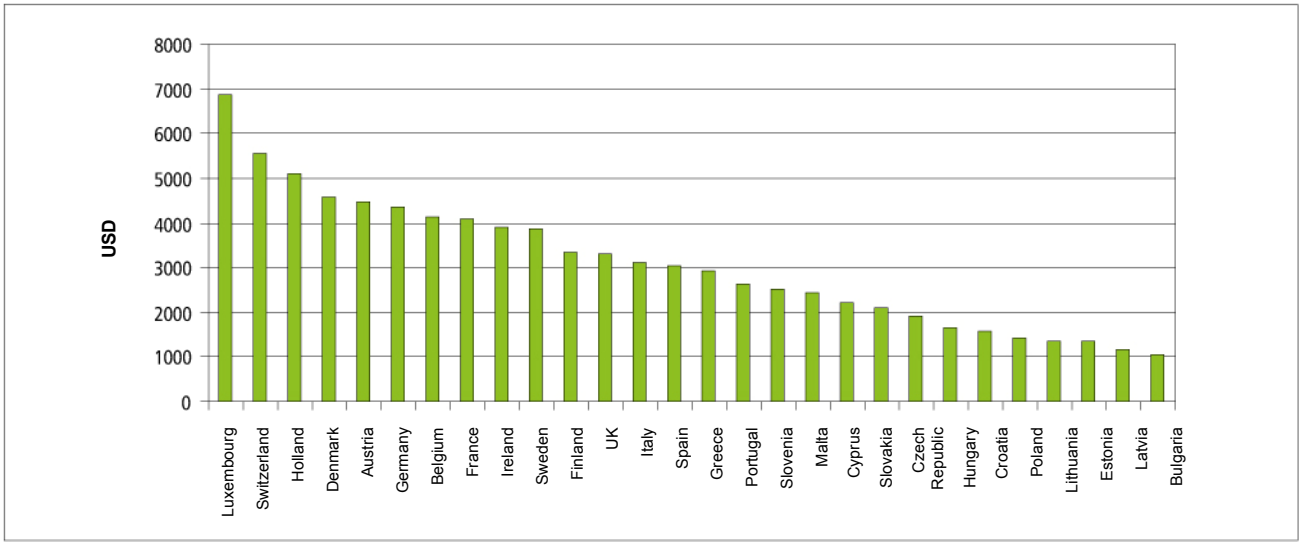

Figure 2. Expenditure on health care in EU countries per inhabitant in 2011 (including purchasing power parity)
Rycina 2. Wysokość wydatków na ochronę zdrowia w krajach UE w przeliczeniu na mieszkańca w 2011 r. (z uwzględnieniem parytetu sity nabywczej waluty)
Source: Own compilation on the basis of data provided by the European Commission [4]

The highest expenditure may be observed in Europe, but across the entire continent its level varies significantly. Even within the European Union itself the range of health care financing per inhabitant varies from 1,000 to nearly 7,000 USD [4]. Poland has one of the lowest levels of expenditure as compared to other countries of the European Community (Figure 2).

Health care financing in Poland per inhabitant in 2011, including public and private funding, amounts to slightly more than 1,400 USD. It is one of the lowest rates in Europe and may explain the lower life expectancy of Polish citizens (by over 3 years) as compared to the average life expectancy in the European Union. According to data of the European Commission [4], Poles live on average 75.85 years. Italy has the longest-living population of the European Union (82.7 years), whereas Switzerland has the same for the European continent. Citizens of Switzerland live on average 82.75, i.e. 7 years longer than Poles. French women live the longest among women (by 4.6 years longer than Poles), Icelanders live the longest among men (as many as 8.1 years longer than Poles). A characteristic feature for the above-mentioned rate calculated for Poland is also the disparity between life expectancy of males and females, which is greater than in other European countries (Table 1).

The greatest disparities (over 10 years) occur in Lithuania, Latvia, Ukraine, Belarus and Estonia. It is also worth mentioning that the above-mentioned countries are located in the same geographical zone and, moreover, they once constituted republics of the USSR. In this case, historical and systemic conditions could have an impact on lower life expectancy and greater disparities between males and females. Slightly smaller differences may be observed in Poland - 8.5 years on average. The differentiation is also visible across provinces, from 7.6 in the Pomorskie province up to 9.4 in the Lubelskie Province [6]. The highest, most similar rates of life expectancy are achieved in the provinces located in their direct vicinity, i.e. the Podkarpackie and Małopolskie provinces (78 and 77.8 years, respectively). In 2011 and in previous years, the Łódzkie province achieved the lowest level in this classification and varied by as many as 3 years from the Podkarpackie province. Additionally, we may observe, especially for males, a difference in life expectancy divided by rural and urban areas. This is particularly visible in the Mazowieckie province (3.2 years), Zachodniopomorskie province and Podlaskie province (2.5 years) (Figure 3).

Figure 4 presents the differences in male life expectancies in rural and urban areas in two provinces with high life expectancy - the Podlaskie and Opolskie provinces and in two provinces with low life expectancy - the Łódzkie and Śląskie provinces.

Table 1. Life expectancy of males and females, and longevity of males and females in European countries in 2011
Tabela 1. Oczekiwana długość życia kobiet i mężczyzn i różnica długości życia kobiet i mężczyzn w krajach Europy w 2011 r.

country	difference	female	male
Belarus	11.7	77.8	66.1
Ukraine	11.4	74.8	63.4
Lithuania	11.2	79.3	68.1
Latvia	10.2	78.8	68.6
Estonia	10.1	81.3	71.2
Poland	8.5	81.1	72.6
Hungary	7.5	78.7	71.2
Slovakia	7.5	79.8	72.3
Romania	7.2	78.2	71
Bulgaria	7.1	77.8	70.7
France	7	85.7	78.7
Croatia	6.5	80.4	73.9
Slovenia	6.5	83.3	76.8
Finland	6.5	83.8	77.3
Portugal	6.4	84	77.6
Czech Republic	6.3	81.1	74.8
Bosnia and Herzegovina	6.2	79.3	73.1
Spain	6	85.4	79.4
Serbia	5.9	77.8	71.9
Albania	5.7	80.7	75
Austria	5.6	83.9	78.3
Montenegro	5.5	78.9	73.4
Belgium	5.4	83.2	77.8
Macedonia	5.3	78.3	73
Italy	5.2	85.3	80.1
Luxembourg	5.1	83.6	78.5
Germany	4.8	83.2	78.4
Liechtenstein	4.7	84.2	79.5
Greece	4.6	83.1	78.5
Ireland	4.5	82.8	78.3
Norway	4.5	83.6	79.1
Switzerland	4.5	85	80.5
Malta	4.3	82.9	78.6
Denmark	4.1	81.9	77.8
UK	4	83.1	79.1
Sweden	3.9	83.8	79.9
Cyprus	3.8	83.1	79.3
Holland	3.7	83.1	79.4
Iceland	3.4	84.1	80.7

Source: Own compilation on the basis of data provided by the European Commission and CIA [4,5]

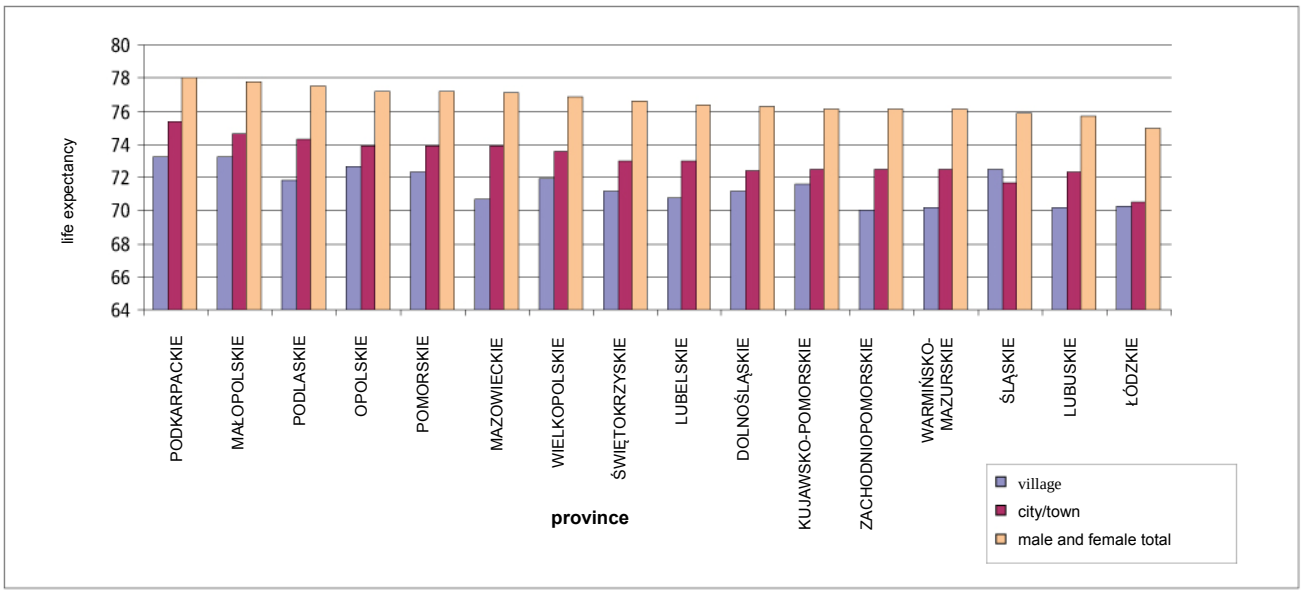

Figure 3. Male life expectancy in urban vs. rural areas in Polish provinces in 2011
Rycina 3. Oczekiwana długość życia mężczyzn w mieście i na wsi w województwach Polski w 2011 r.
Source: Own compilation on the basis of data provided by the Main Statistical Office [6]

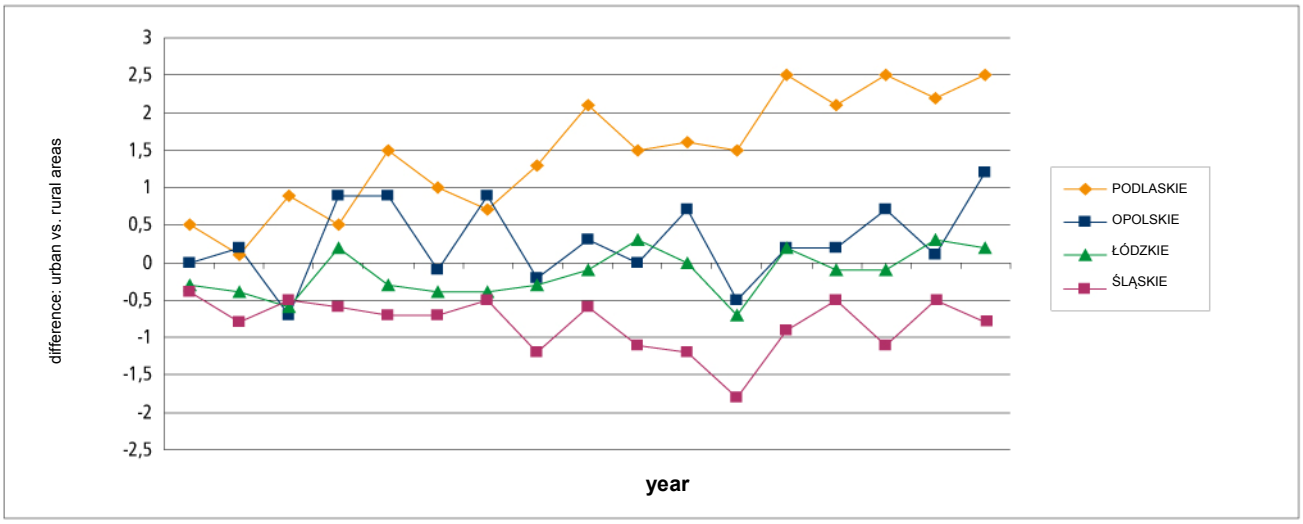

Figure 4. Differences in male life expectancy in urban vs. rural areas in selected Polish provinces in 1995-2011
Rycina 4. Różnice oczekiwanej długości życia mężczyzn w podziale na wieś i miasto w latach 1995-2011 w wybranych województwach
Source: Own compilation on the basis of data provided by the Main Statistical Office [6]

Positive values constitute results favorable to males from urban areas (longer life expectancy of males residing in urban areas), whereas negative values indicate longer life expectancy of males residing in rural areas. Provinces, the comparison of which shows better results for males residing in rural areas (the above-mentioned Łódzkie and Śląskie provinces), are characterized by the lowest life expectancy across the country - below 76 years.

For women, the average life expectancy exceeds the national average and that tendency is recorded in all provinces (Figure 5), whereas the differentiation between rural and urban areas is minor (Figure 6).

In the Małopolskie province in the entire analyzed period, women in rural areas lived longer than, or as long as, women in urban areas. The situation in the Śląskie province for females in rural areas is definitely more favorable, but, as already mentioned, the life expectancy measured for that province is one of the lowest.

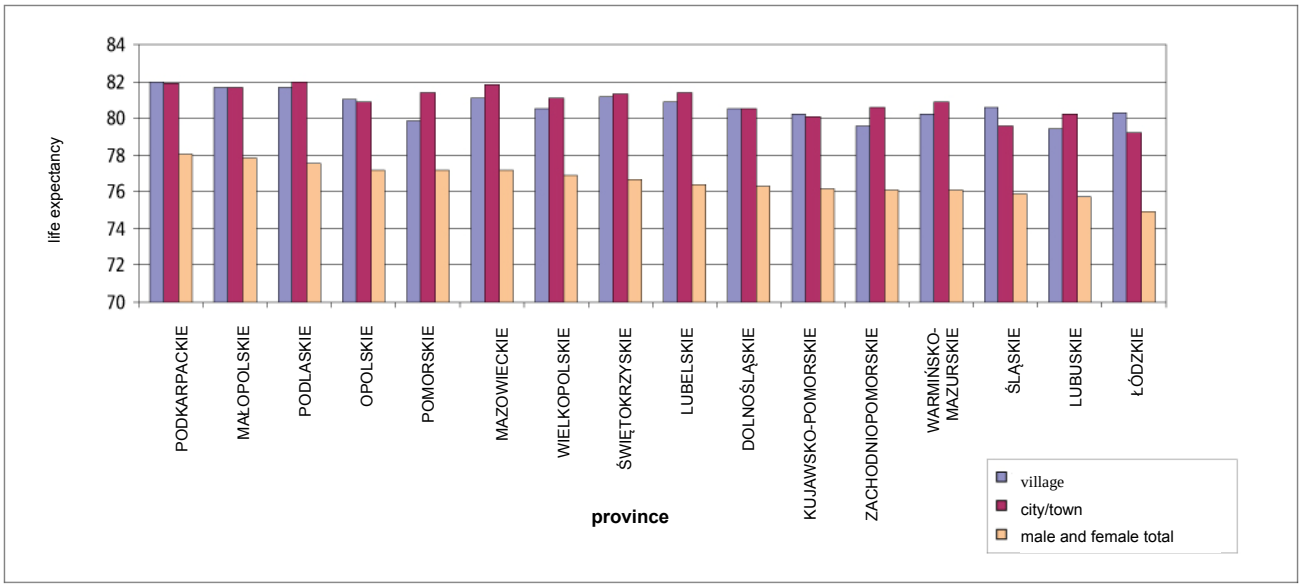

Figure 5. Female life expectancy in urban vs. rural areas in Polish provinces in 2011
Rycina 5. Oczekiwana długość życia kobiet w mieście i na wsi w województwach Polski w 2011 r.
Source: Own compilation on the basis of data provided by the Main Statistical Office

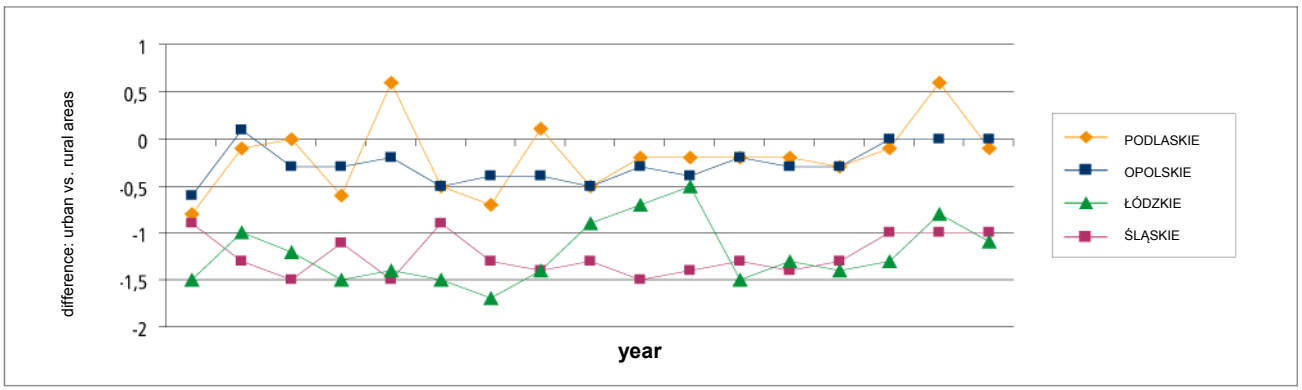

Figure 6. Differences in female life expectancy in urban vs. rural areas in selected Polish provinces in 1995-2011
Rycina 6. Różnice oczekiwanej długości życia kobietw podziale na wieś i miasto w latach 1995-2011 w wybranych województwach
Source: Own compilation on the basis of data provided by the Main Statistical Office [6]

The similar situation is present in the Łódzkie province. In other provinces, differences did not exceed 1.5 years. Interesting differences occur in the Małopolskie province, in which males in rural areas lived shorter than males in urban areas, whereas females in rural areas lived longer than, or as long as, females in urban areas throughout the entire analyzed period. In turn, the Łódzkie province is interesting due to the lowest life expectancy, significantly different from other provinces, and the fact that it is an area where the diversity takes a different shape. In the Śląskie province, in all analyzed years, the statistics speaks in favor of inhabitants from rural areas.

As the analyses show, the only province (apart from the Śląskie and Łódzkie provinces, in which the tendency was in favor of males in rural areas) was the Opolskie province, but the difference did not exceed 0.9 years and occurred in favor of rural areas merely in 4 years of the analyzed period. In the light of the above, the question arises concerning the reason for these disparities. As Table 2 indicates, it seems that the described phenomenon is not related to macro-economic indices. For example, provinces with the lowest life expectancy are characterized by one of higher levels of GDP per inhabitant.

Table 2. Per capita Polish GDP per province as % of EU per capita GDP in 2011
Tabela 2. PKB per capita w skali województw jako % poziomu wartości PKB per capita w Unii Europejskiej w 2011 r.

province	*% GDP per capita*
Mazowieckie	102
Dolnośląskie	70
Śląskie	67
Wielkopolskie	65
Pomorskie	60
Łódzkie	58
Zachodniopomorskie	54
Małopolskie	53
Lubelskie	53
Kujawsko-Pomorskie	52
Opolskie	50
Świętokrzyskie	47
Warmińsko-Mazurskie	46
Podlaskie	45
Lubuskie	42
Podkarpackie	42
Poland	62

Source: Own compilation on the basis of data provided by the European Commission [4]

Reasons for the differentiation are not to be found in the level of budget expenditure of provinces on health care (Table 3). The Podkarpackie and Małopolskie provinces (the highest life expectancy) and the Łódzkie province (the lowest life expectancy) are among the 25% units with the lowest average level of expenditure within the recent 10 years per inhabitant. At the same time, life expectancy in the Małopolskie and Podlaskie provinces was lower than in the Łódzkie, Lubuskie and Śląskie provinces, closing the longevity ranking of provinces.

The reasons for the disparities may be related to the allocation and manner of disposal of financial means and health care resources, not the funding level itself.
Due to the different life expectancy rates in urban and rural areas, as well as their great differentiation, a manner of allocation of financial means between those areas may have a significant impact on that phenomenon. The question arises about the differentiation of rates within provinces themselves, their association with changes in the level of social and economic development, promoting healthy lifestyle trends and health threats occurring with the progressing economic development.

Table 3. Per capita health care expenditure in Polish provinces (averaged from 2002-2011)
Tabela 3. Wysokość wydatków na ochronę zdrowia per capita w województwach Polski (wyniki uśrednione z okresu 2002-2011 r.)

province	per capita health care expenditure 2002-2011 (PLN)
Mazowieckie	38.48
Pomorskie	38.31
Dolnośląskie	35.82
Świętokrzyskie	26.06
Kujawsko-Pomorskie	24.74
Lubelskie	22.90
Zachodniopomorskie	22.85
Opolskie	20.50
Podlaskie	19.75
Śląskie	18.72
Wielkopolskie	16.88
Lubuskie	16.66
Łódzkie	16.41
Podkarpackie	14.87
Małopolskie	14.65
Warmińsko-Mazurskie	11.40

Source: Own compilation on the basis of data provided by the Main Statistical Office [6]

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Health care funds versus mortality rates in different provinces of Poland

Zasoby finansowe ochrony zdrowia a poziom śmiertelności w województwach Polski

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Abstract. Incorrect allocation of health care funds can be conducive to increasing disproportions in health status and health care availability. A first signal indicating there are problems in the fund allocation process is the increasing dissatisfaction of the populace with the availability and quality of services provided by the health care system. Health care supply is irrelevant to the real demand generated by patients. Due to the irrelevance of supply and demand, methods aiming at ensuring health care availability to all patients are used; yet this approach does not solve problems resulting from insufficient supply of health care and, consequently, often leads to lower therapeutic standards being used. The provinces of Poland differ substantially in terms of mortality rates, which range from 8.3‰ in the Pomorskie province to 12.3‰ in the Łódzkie province (2009-2011). As there is no clear association between the level of funding and the health state indices, the causes of the phenomenon should be attributed to the way how funds for medical care and, more generally, public health care (including healthy lifestyle promotion) are distributed.
Key words: funds allocation, health care financing, mortality, National Health Fund, provinces

Streszczenie. Nieprawidłowa alokacja środków finansowych przeznaczonych na ochronę zdrowia może sprzyjać narastaniu dysproporcji w zdrowiu i dostępie do świadczeń opieki zdrowotnej. Pierwszym sygnałem mówiącym o problemach w gospodarowaniu zasobami jest narastające niezadowolenie społeczeństwa z dostępności i jakości usług świadczonych przez polską służbę zdrowia. Podaż usług zdrowotnych nie odpowiada faktycznemu zapotrzebowaniu, generowanemu przez pacjentów. W wyniku niedopasowania popytu do podaży stosowane są metody mające na celu zapewnienie równości dostępu do świadczeń dla wszystkich pacjentów, jednak nie rozwiązuje to problemu związanego z niewystarczającą ich podażą i często skutkuje obniżeniem standardów leczenia. Województwa Polski charakteryzują się dużym zróżnicowaniem śmiertelności wśród społeczeństwa - od 8,3‰ w województwie pomorskim do 12,3‰ w województwie łódzkim (2009-2011). Ze względu na brak wyraźnego związku pomiędzy wysokością finansowania a wskaźnikami opisującymi zdrowotność ludności przyczyn zjawiska można dopatrywać się w sposobie gospodarowania środkami na świadczenia medyczne i zadania związane z dziedziną zdrowia publicznego, w tym również promowaniu zdrowego trybu życia.
Słowa kluczowe: alokacja zasobów, finansowanie opieki zdrowotnej, NFZ, śmiertelność, województwa

Received: 28.11.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 78-83

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There has been much discussion concerning the rational management of health care funds [1]. Health care fund allocation is understood as conscious fund distribution among beneficiaries, based on predetermined guidelines [2]. Incorrect allocation results in a common feeling that the health care system does not meet the people's expectations, which may be related to insufficient supply of medical services directed to patients, unsatisfactory quality of the services or their limited availability [1]. An opinion poll on health care system conducted by CEBOS (Public Opinion Research Center) in 2012 shows that patients' dissatisfaction is mainly related to limited availability of specialists and diagnostic tests.

A negative opinion on the availability of the above-mentioned services was expressed by 70% of respondents, who attributed the problems to the long waiting time to see a specialist, long distances between health care center and the place of residence and the lack of possibility to arrange a visit at a convenient date. Service efficiency at health care centers and treatment conditions were given a negative opinion by 47% of respondents. The most positive opinions were given to availability of general practitioners (satisfaction was expressed by more than 70% of respondents). As for help provided in an emergency, treatment quality and technological advancement of medical equipment, the number of positive opinions did not exceed 55%. Moreover, 47% of respondents claimed that patients were not treated equally [3].

The idea of social equality could be a criterion for optimal health care funds allocation. On the one hand, equality means that social status, sex, social, economic and geographical conditions have no impact on health effects, and on the other hand that all patients are provided with equal availability of services, of equal quality and equal treatment [1,2,4]. The aim of rational fund management is to deliver medical services to as many people in need as possible.

Suchecka [1] talks about two possible interpretations of rational management of health care funds. They involve financing medical services that ensure a certain level of health at minimal costs or financing services that allow development of the best state of health at a given cost. Defining the levels of health according to the above interpretations remains, however, an unclear and controversial issue [1]. Rational management also means certain limitations of service availability. There are several methods of rationalizations but they also raise doubts and are related to deliberate lowering of standards of health services provided. These methods include: aiming at only partial recovery, making treatment initiation dependent on the disease advancement, defining time framework when services may be provided and performing incomplete services without all the required procedures [2]. According to this idea, limitations resulting from financing rationalization are related to the amount of available health care funds and should be reduced with their increase. However, when the health fund allocation errors occur at the fund distribution stage between regions or between particular groups of expenses, the problem of fund allocation for particular services may become more serious.

The results of incorrect allocation of funds may also include increasing the imbalance between supply and demand of services, which means unfulfilled health needs reported by society. In this case, the availability and quality of services may appear to be inadequate to the expenses, which in turn is related to social injustice [1].

According to the Constitution of the Republic of Poland, all citizens have the right to equal access to publicly funded health services, and the governing bodies are responsible for providing health care for the disabled, the elderly, pregnant women and children. Other state responsibilities concerning health care include fighting epidemics, preventing environmental changes that could have a negative influence on human health and supporting physical education [5,6]. The Polish health care system is financed by the National Health Fund and state and local budgets. Moreover, budgets of individual households, employers and private insurance companies may also be health care payers [7]. According to the Act on Publicly Funded Health Care Services of 27 August 2004, National Health Fund tasks include defining the quality of health services, their availability and costs (which is the basis for concluding agreements concerning health care services), financing health care services, rescue activities, monitoring medical prescriptions, implementing, financing and managing health programs, and promoting health [8]. Local government units are responsible for health care infrastructure, defining health needs, health promotion (occupational medicine, mental health care, preventing addictions, and providing equal access to health services). Since 1999, local governments have been able to found and own provincial and regional hospitals as well as most of the outpatient clinics. Unfortunately, local governments do not have the right to interfere with independent health care institutions until they are in the state of bankruptcy [5,7,8]. Financing current services is the responsibility of National Health Fund, which distributes resources among provincial departments according to an algorithm prepared for each consecutive year. They are subsequently distributed among particular services and activities. Actual financing distribution among the provinces in 2010, 2011 and 2012 is shown in the figure.

The amount of resources per number of inhabitants in each province varied. The differences between the most and the least financed provinces in 2010, 2011, 2012 were respectively: PLN 375, PLN 290 and PLN 150 [9].

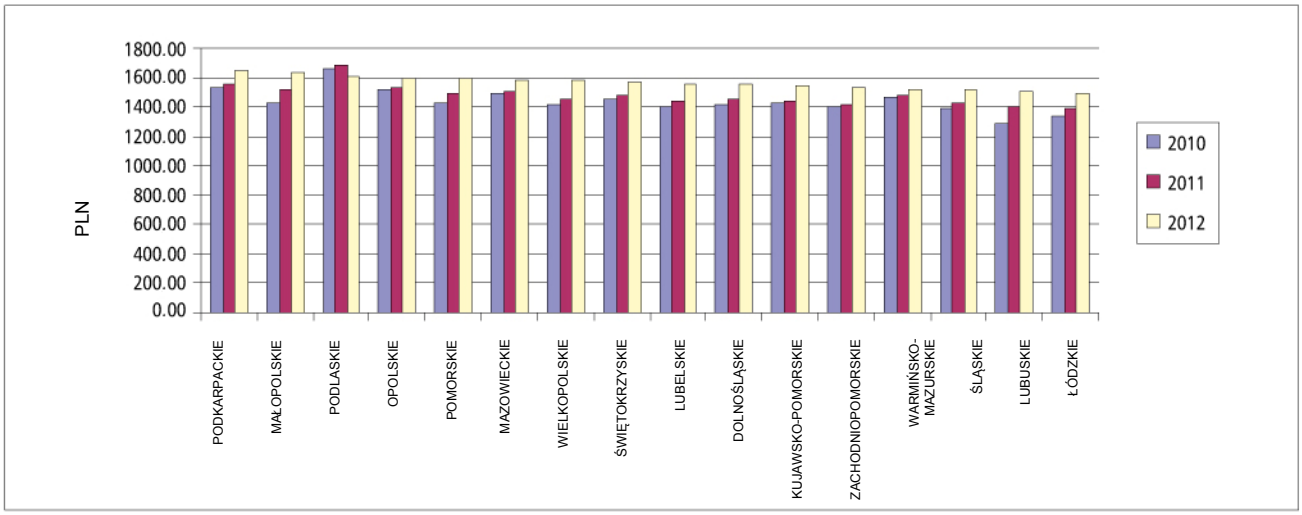

Figure. National Health Fund financing distribution among NHF Provincial Divisions per inhabitant in 2010, 2011, and 2012 (PLN)
Rycina. Podział środków NFZ pomiędzy oddziały wojewódzkie w przeliczeniu na jednego mieszkańca w latach 2010, 2011, 2012 (PLN)
Source: Own compilation on the basis of data provided by the National Health Fund [9] and Main Statistical Office [10]

The distribution appears to be increasingly just. However, differences in financing persist despite a general increase in financial resources at the national level. Other data compilations prepared by NHF, in which the costs were calculated not per inhabitant but per insured person, also revealed differences in the amount of money granted to particular provinces. Calculating funds per inhabitant without considering insurance is justified because there are groups of people who are not insured, but still have the right to free health service when the service is actually delivered. These groups include subjects entitled to receive services from social care, subjects below 18 years of age, pregnant women (also in the period after delivery), subjects addicted to drugs and alcohol in the period of detoxification, and subjects during mental treatment and prisoners [5]. Contributions of soldiers performing military service, students, clergymen, subjects of social care, unemployed with no right to benefit, subjects on parental leave and victims of war are financed by the state budget [7].

Although the amount of health care funds does not explain the differences in lifespan index, the amount of money provided by the National Health Fund used to pay for services may influence their supply. Even more so, if the money distributed by provincial departments to be used for particular services is distributed inadequately to current needs. Table 1 shows the ranking of provinces according mortality indices per 100,000 inhabitants. The analysis covered two periods, i.e. the years 1999-2001 and 2009-2011. The index was calculated as the average value of the 3 years per 100,000 inhabitants. Four provinces with the highest and the lowest index in the period of 2009-2011 were allocated an average amount of NHF financing resulting from financing plan for 2010-2011 per inhabitant of the province. In the Świętokrzyskie, Lubelskie, Śląskie and Łódzkie provinces, the mortality indices per number of inhabitants are the highest in the country and exceed 10% (12% for the Łódzkie province). At the same time, four provinces from the top and bottom of the ranking were allocated comparable funds - Łódzkie, Śląskie, Małopolskie and Podkarpackie (differences did not exceed PLN 38). These provinces also demonstrate the maximum and minimum values in the ranking of longevity. The analysis of data from the Main Statistical Office revealed high differentiation of the index with regard to the period of time. The Łódzkie province had the highest index in both analyzed periods, and the number of deaths per number of inhabitants increased. The highest increase occurred in the Zachodniopomorskie (by 104 more deaths per 100,000 inhabitants), Opolskie (91) and Śląskie (83) provinces. The only province where the index decreased was the Wielkopolskie province, in which there were 44 fewer deaths per 100,000 inhabitants. The index remained almost at the same level in the Małopolskie (0), Mazowieckie (4) and Podkarpackie (11) provinces [10].

Table 1. Mortality indices per 100,000 inhabitants in selected Polish provinces in the years 2009-2011
Tabela. 1. Wskaźnik zgonów w przeliczeniu na 100 000 mieszkańców w wybranych województwach Polski w okresie 2009-2011

province	life expectancy	number of deaths / 100,000 people (averaged)		average amount financed by NHF in PLN/person
		1999-2001	2009-2011	
Łódzkie	74.9	1,208.31	1,231.43	1,447.24
Świętokrzyskie	76.7	1,047.39	1,082.55	1,523.01
Lubelskie	76.4	1,031.25	1,069.96	1,445.07
Śląskie	75.9	952.65	1,035.20	1,484.94
Warmińsko-Mazurskie	76.1	829.46	901.27	1,548.05
Małopolskie	77.8	894.93	895.17	1,465.09
Podkarpackie	78.0	857.13	868.19	1,470.81
Pomorskie	77.2	831.69	860.64	1,650.49

Source: Own compilation on the basis of data provided by the National Health Fund [9] and Main Statistical Office [10]

The above may be the basis for concluding that the amount of funds alone does not directly influence the mortality and life expectancy indices. Interesting indices occur in the Pomorskie province, which has the lowest death rate and the highest average financing value. It is possible that effectiveness of fund management and their rational allocation results in a continuously low mortality index.

The Pomorskie province is also distinguished by the lowest death index in Poland due to cardiovascular diseases. Table 2 presents mortality indices, where death was caused by neoplasms, cardiovascular and nervous system diseases and mental disorders. The index was calculated as the average value of 3 years (2009-2011) per 100,000 inhabitants. The most common death causes in all the provinces were cardiovascular diseases and neoplastic diseases. The number of deaths resulting from cardiovascular diseases in the analyzed period changed irregularly within the province boundaries. Those provinces where the average rate decreased were: Podlaskie, Małopolskie, Lubelskie, Podkarpackie, Mazowieckie, Wielkopolskie, Śląskie, and Łódzkie. In the Łódzkie province, the rate continued at one of the highest levels in both the analyzed periods. In the Świętokrzyskie province, with the highest number of deaths, the increase was even greater. The province with the lowest total death rate (Pomorskie) was ranked last, having also a reduced mortality rate. As for neoplastic diseases, an increase in mortality occurred in all the provinces. The highest mortality occurred in the Łódzkie province. The highest increase occurred in the Śląskie (44 deaths/100,000 inhabitants), Zachodniopomorskie (38) and Kujawsko-Pomorskie (38) provinces. The highest mortality related to nervous system diseases was observed in the Łódzkie and Śląskie provinces. The Łódzkie province differed the most from the remaining areas. A worrying fact is the increase in mortality resulting from mental disturbances and behavioral disturbances that can be observed in certain areas of the country. The highest number of deaths resulting from the above-mentioned conditions occurred in the Śląskie and Pomorskie provinces.

The data indicate an accumulation of mortality risk due to the analyzed diseases in the Łódzkie province. A higher risk observed in the Świętokrzyskie and Lubelskie provinces is related to cardiovascular diseases, and in the Śląskie province to neoplastic diseases. In all the provinces, the main cause of death was cardiovascular diseases. The level of the above-mentioned indices reflects the treatment quality and standards, the level of specialist services availability, the level of people's awareness concerning health care and healthy lifestyles, access to information on health, and the management of resources aimed at diagnostics, treatment and functioning of the health care system. The unfavorable health status of people in certain provinces may be related to some drawbacks in the above-mentioned areas. Repeating errors in health care fund management may contribute to increasing disparities between the provinces with regard to health status and increasing health risk in areas with high mortality rates, as well as maintaining disparity in access to health services.

Table 2. Mean mortality rates due to selected diseases in Polish provinces in the years 2009-2011 (per 100,000 inhabitants)
Tabela 2. Średnia śmiertelność w wyniku wybranych chorób w województwach Polski w okresie 2009-2011 (liczba zgonów/100 000 mieszkańców)

disease	national index level	province	deaths/100,000 people (1999-2001)	deaths/100,000 people (2009-2011)
neoplastic diseases	highest	Łódzkie	255.20	281.48
		Kujawsko-Pomorskie	234.50	272.68
		Śląskie	227.20	271.26
		Dolnośląskie	232.23	262.86
	lowest	Podlaskie	215.06	235.52
		Małopolskie	214.28	231.03
		Lubelskie	206.27	229.93
		Podkarpackie	180.02	202.85
cardiovascular diseases	highest	Świętokrzyskie	518.78	562.67
		Łódzkie	592.62	556.81
		Lubelskie	506.19	533.96
		Dolnośląskie	458.20	496.43
	lowest	Zachodniopomorskie	392.72	421.20
		Wielkopolskie	449.32	385.22
		Warmińsko-Mazurskie	310.06	366.91
		Pomorskie	372.16	334.06
diabetes	highest	Opolskie	7.71	25.93
		Wielkopolskie	21.68	25.19
		Śląskie	16.41	23.94
		Podlaskie	19.12	20.24
	lowest	Lubelskie	10.32	12.69
		Małopolskie	6.40	11.54
		Świętokrzyskie	14.59	10.06
		Podkarpackie	11.89	8.47
diseases of the nervous system	highest	Łódzkie	12.09	21.32
		Śląskie	9.89	17.42
		Warmińsko-Mazurskie	8.11	16.31
		Podlaskie	9.14	15.29
	lowest	Świętokrzyskie	11.40	11.21
		Małopolskie	7.81	10.54
		Zachodniopomorskie	8.05	9.80
		Opolskie	6.35	9.26
mental disturbances and disturbances related to sense organs	highest	Śląskie	2.94	9.87
		Pomorskie	1.53	9.03
		Łódzkie	9.05	7.80
		Warmińsko-Mazurskie	3.13	7.38
	lowest	Mazowieckie	4.60	1.58
		Świętokrzyskie	6.44	1.12
		Lubuskie	4.84	0.62
		Opolskie	0.09	0.23

Source: Own compilation on the basis of data provided by the Main Statistical Office [10]

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Role of endoscopic ultrasound in the diagnosis of portal hypertension

Znaczenie badania endosonograficznego w diagnostyce nadciśnienia wrotnego

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Abstract. The cause of portal hypertension involves disease processes that lead to obstruction of blood flow in different sections of the portal system. Obstruction can be located in: portal veins, the liver and hepatic veins. Endoscopic ultrasound (EUS) is characterized by high sensitivity and specificity. It comes from the reduction of the distance between the camera head and the examined organs and also its originally good resolution. In contrast to routine endoscopy, EUS reveals each layer of the esophageal wall and the stomach separately. Routine endoscopy is used to assess features of portal hypertension characterized only in superficial varices, while EUS allows the assessment of deep varices located outside the wall of the gastrointestinal tract. An additional option of Doppler flow during EUS enables a definite diagnosis. Detection, with EUS, of advanced deep varices of the esophagus and stomach in patients without apparent superficial varices during routine endoscopy and without parameters of decompensated cirrhosis, makes it possible to prevent a hemodynamic disequilibrium in the form of hemorrhage. Apart from imaging of portal hypertension in EUS, it is possible to use injection sclerotherapy in vessels found in the deeper layers of the gastrointestinal wall.
Key words: endoscopic ultrasound, esophageal and gastric varices, liver cirrhosis, portal hypertension

Streszczenie. Przyczyną nadciśnienia wrotnego są procesy chorobowe powodujące utrudnienia przepływu krwi w różnych odcinkach układu wrotnego. Przeszkoda może znajdować się w obrębie żył układu wrotnego, w samej wątrobie i w obrębie żył wątrobowych. Badanie endosonograficzne (EUS) cechuje wysoka czułość i specyficzność. Wynika ona ze zmniejszenia dystansu dzielącego głowicę aparatu od badanego narządu oraz pierwotnie dobrej rozdzielczości. W przeciwieństwie do endoskopii, EUS uwidacznia każdą warstwę przełyku i żołądka osobno. Badanie endoskopowe stosowane rutynowo do oceny cech nadciśnienia wrotnego pozwala na zobrazowanie jedynie żylaków powierzchownych, natomiast badanie EUS umożliwia także ocenę żylaków głębokich położonych poza ścianą przewodu pokarmowego. Dodatkowa opcja przepływu doplerowskiego umożliwia pewne rozpoznanie. Wykrywanie w EUS zaawansowanych żylaków głębokich przełyku i żołądka u chorych bez rozpoznanych żylaków w badaniu endoskopowym oraz bez parametrów dekompensacji marskości wątroby daje możliwość wyprzedzenia załamania równowagi hemodynamicznej pod postacią krwotoku. Poza obrazowaniem cech nadciśnienia wrotnego w EUS istnieje możliwość terapii z użyciem iniekcji środka obliterującego do naczyń położonych w głębszych warstwach ściany przewodu pokarmowego.
Słowa klucze: endosonografia, marskość wątroby, nadciśnienie wrotne, żylaki przełyku i żołądka

Received: 05.06.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 84-88

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Under physiological conditions, the portal venous system collects blood containing products of digestion from abdominal organs and delivers them to the liver. In terms of hemodynamics, the portal circulation is a separate reservoir of systemic circulation. Portal blood flow takes place due to the hepatic venous pressure gradient. Pressure in the portal vessels decreases in the direction of blood flow. An increase in portal pressure is caused by an obstruction of portal blood flow or excessive systemic blood inflow into the portal circulation system. A block of blood flow at each level between the right ventricle and capillary vessels in the visceral organs is retrogradely transferred and leads to portal hypertension.

Portal hypertension is caused by disease processes that lead to the obstruction of blood flow in different sections of the portal system. This obstruction can be located in the portal veins, in the liver and hepatic veins [1]. This allows the blocks can be classified as: prehepatic, intrahepatic or posthepatic (Tab.).

In Europe, by far the most frequent cause of portal hypertension is liver cirrhosis, which accounts for 90% of cases. In 10% of cases, the cause is portal venous thrombosis, resulting from a congenital or acquired hypercoagulable state. The most common cause of portal hypertension worldwide is schistosomiasis. In the course of liver cirrhosis, it seems that the primary disorder which leads to portal hypertension is an increase in intrasinusoidal resistance to portal vein flow. This is not only the result of remodeling of the liver but also a result of the contraction of myofibroblasts and the activation of hepatic stellate cells. This increase in intrahepatic vascular pressure is modified by an increase in the concentration of endogenous vasoconstricting factors such as: endothelins, leucotriens, thromboxane A, angiotensin II, stimulation of the α-adrenergic system and reduction in the activity of vasodilatating factors such as nitrogen monoxide and prostacyclines [1,2].

Normal functioning of the liver requires constant hemodynamic parameters of portal circulation that provide a proper relationship between the hydrostatic and oncotic pressure at the level of the hepatic sinus. Disturbances of this balance lead to hemodynamic disorders in portal flow, and further to liver function impairment. Liver cirrhosis leads to the development of hyperkinetic circulation. Visceral vascular resistance decreases and cardiac output increases. This process decreases blood inflow to the portal circulation, thus, increasing portal pressure. It is automatically reduced by an increase in vascular bed volume and by the opening of normally inactive porto-systemic collateral vessels that are a natural pathway of the collateral circulation that regulates existing hemodynamic disorders. As long as the compensation mechanism is sufficient, transitional hemodynamic disorders do not have any clinical significance. Porto-systemic collateral vessels become of particular importance under pathological conditions when the increase in portal pressure exceeds their compensatory capabilities, causing congestion. Elevated portal pressure forces blood into the low pressure venous system [3]. In such a situation, the naturally existing porto-systemic collateral vessels that are normally closed undergo recanalization. The collateral gastroesophageal circulation is the cause of gastroesophageal varices. Recanalization of the umbilical vein and the development of paraumbilical veins may lead to overfilling of the abdominal wall vessels *(caput medusae)*. Anastomoses between the inferior and superior mesenteric veins cause hemorrhoids. Branches of the splenic vein together with the left renal vein may form reno-splenic anastomoses. However, development of the collateral circulation decreases portal hypertension to a lesser extent because it is not sufficient in relation to the large amount of blood that flows into the portal system [4].

Other causative factor for portal hypertension development is the stimulation of the renin-angiotensin-aldosterone system (RAAS). The activation of the process results from vascular relaxation and a decrease in the effective volume of circulating blood. The activation of the RAAS leads to sodium and water retention in the patient's body and is one of the causative factors for ascites [1].

Table. Classification of portal hypertension
Tabela. Klasyfikacja nadciśnienia wrotnego

Block		Cause
prehepatic		portal venous thrombosis splenic artery thrombosis
intrahepatic	presinusoidal	primary biliary cirrhosis granulomatous hepatitis arterioportal fistulas infiltrative diseases of the liver
	sinusoidal	cirrhosis massive macrovesicular steatosis acute and chronic hepatitis
	postsinusoidal	sinusoidal obstruction syndrome (veno-occlusive disease)
posthepatic		hepatic vein thrombosis (Budd–Chiari syndrome) fibrinous pericarditis right-sided heart failure

Esopheagal varices are a common and very dangerous complication of hepatic hypertension, which is characterized by an increase in portal venous pressure above 12 mm Hg [5]. Due to the fact that the direct measurement of portal venous pressure and determination of the proper range of portal pressure is difficult, a gradient of pressure between the portal vein and the vena cava inferior (hepatic venous pressure gradient - HVPG) higher than 5-10 mm Hg [6,7] is considered a criterion for portal hypertension. At the diagnosis of liver cirrhosis, esophageal varices are found in 50% of patients, and variceal bleeding occurs in about 30-40% [8]. Among noninvasive methods for the detection of varices, the "golden standard" in the diagnostics is endoscopic ultrasound of the upper gastrointestinal tract. In the three-stage classification of varices (small, medium, large), small varices minimally protrude into the esophageal lumen, medium varices are tortuous veins occupying less than one-third of the esophageal lumen, whereas large varices occupy more than one-third of the esophageal lumen [3].

Varices are mostly located in the esophagus. However, they may be also diagnosed in the gastric region during gastroscopy. Gastric varices are found in 5-33% of patients with portal hypertension. Within 2 years of the diagnosis, bleeding occurs in 25% of patients. Most commonly, e.g. in as many as 90% of cases, gastric varices co-occur with esophageal varices as gastroesophageal varices (GOV). The classification of varices is based on their relation with esophageal varices and their location [9,10]. There are two types of gastric varices: gastroesophageal varices (GOV) that are a continuation of esophageal varices and isolated gastric varices (IGV) that are not accompanied by esophageal varices.

Classification of gastric varices:

- Gastroesophageal varices type 1 (GOV 1) extend along the lesser curvature.
- Gastroesophageal varices type 2 (GOV 2) extend to the greater curvature.
- Isolated gastric varices type 1 (IGV1) are located in the region of the fundus.
- Isolated gastric varices type 2 (IGV2) are located in the region of the body and antrum.

The most common are gastroesophageal varices type 1 in 74% of cases, type 2 in 16%, whereas isolated gastric varices are found significantly less frequently in10% of cases [3,9].

Portal hypertension is a complicated multicausative disease process that requires a range of specialist treatment methods and diagnostic techniques, where imaging and endoscopic examinations are crucial. The esophageal submucosal surface can be observed by means of classical fiberscopes. However it is impossible to visualize the deeper layers. These limitations have resulted in an increased interest in ultrasonography as a complement to classical endoscopy. The examination system combining both imaging methods is endoscopic ultrasonography (EUS) [11]. By means of a high-frequency transducer, it allows the ultrasonographic visualization of higher resolutions. The use of the transducer for frequencies of 5–20 MHz provides excellent image quality of the gastrointestinal wall and its adjacent structures. Endoscopic ultrasound (EUS) is characterized by high sensitivity and specificity. This results from the reduction in the distance between the camera head and the examined organs, and also its originally good tissue and spatial resolution.

In contrast to routine endoscopy, EUS reveals each layer of the esophageal wall and the stomach separately [12]. Therefore, it plays a particular role in the diagnostics of submucosal lesions. An example of submucosal lesions found in endoscopic examinations of the upper gastrointestinal tract are varices. Larger verices are very characteristic, especially in the esophagus, and can be diagnosed by gastroscopy. Bluish discoloration, typical localization, irregular shape and dilated tortuous veins assist in the diagnosis. In the esophagogastric anastomosis and in the stomach, they may manifest as thickened irregular folds (Fig. 1). In such case, varices should be always taken into consideration before an attempt to take tissue samples, which seems obvious from the endosonographist's point of view. Any doubts should be clarified by endosonographic ultrasound [13].

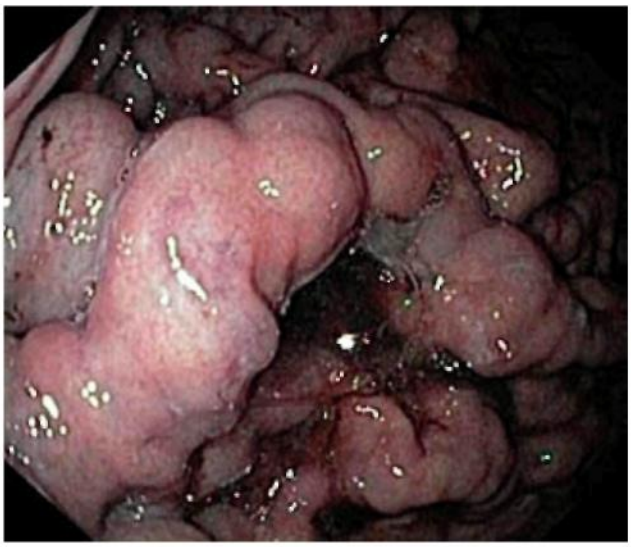

Figure 1. Endoscopic image of irregular stomach folds (gastric fundus varices in EUS in figures 2 and 3). Clinic's own material
Rycina 1. Obraz endoskopowy nieregularnych fałdów żołądka (żylaki dna żołądka w EUS na ryc. 2 i 3). Materiał własny Kliniki

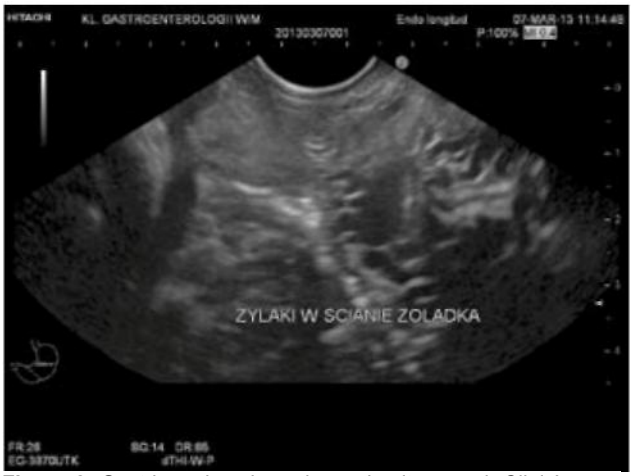

Figure 2. Gastric varices in endoscopic ultrasound. Clinic's own material
Rycina 2. Obraz endosonograficzny żylaków żołądka. Materiał własny Kliniki

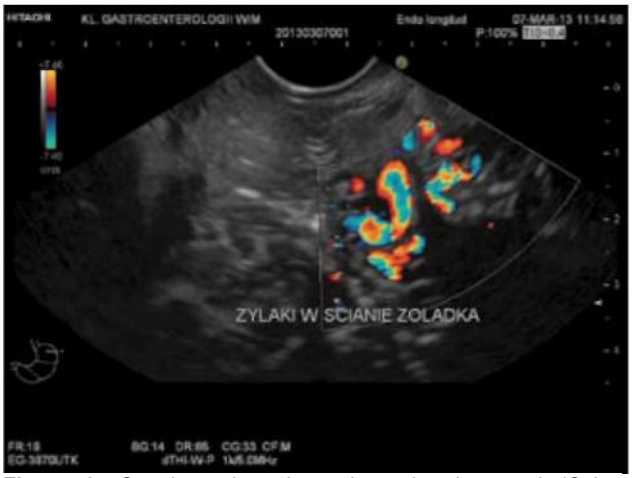

Figure 3. Gastric varices in endoscopic ultrasound (Color Doppler). Clinic's own material
Rycina 3. Obraz endosonograficzny żylaków żołądka (kolorowy dopler). Materiał własny Kliniki

Routine endoscopy used to evaluate features of portal hypertension allows the visualization of superficial varices only, while EUS allows the assessment of deep varices located outside the wall of the gastrointestinal tract [14,15]. Based on the location, it may be differentiated between deep paraesophageal, periesophageal, paragastric and perigastric varices [16,17]. There is a relationship between the frequency of bleeding episodes, and the width of the deep varices of the esophageal and gastric wall. Any doubt concerning esophageal submucosal lesions or thickened gastric folds diagnosed in a patient with portal hypertension requires endoscopy [18]. In EUS, varices are hypoechoic or anechoic, oval or irregularly shaped structures, located in the submucosa. In the case of deep varices, oval anechoic structures are located outside the wall of the gastrointestinal tract (Fig. 2). The option of Doppler flow during EUS enables a definite diagnosis (Fig. 3) [19]. There are studies that indicate the possibility to detect advanced deep varices of the esophagus and stomach in patients without apparent superficial varices during routine endoscopy of the upper gastrointestinal tract. This is another capability of endosonography in the clinical evaluation of patients with portal hypertension, independently of parameters of decompensated cirrhosis. Apart from imaging features of portal hypertension in EUS, therapy of vessels diagnosed as pathological is also possible. There are reports on a possible therapy of varices in EUS by means of injection sclerotherapy in vessels found in deeper layers of the gastrointestinal wall [20].

Endoscopic injection sclerotherapy involves intravariceal injection of a sclerosant by means of a needle passed through the biopsy channel of the endoscope.

In the intravariceal technique, the agent is injected directly into the varix. The first injection of 1-2 ml of the sclerosant should be administered 1 cm below the varix. Then, all visible vessels are injected at the gastroesophageal junction. More proximally, injections are placed in 3-cm to 5-cm intervals up to 10 cm from the gastrointestinal junction. Approximately 10–20 ml of sclerosant is used per session, based on the size and number of varices [21].

The body's functional reservoirs and regenerative capacity of the liver enables the liver to maintain the systemic homeostasis for a long time, despite the considerable damage to the liver parenchyma. This is the period during which the formation of the collateral circulation takes place, along with deep varices that are invisible in gastroscopy. In this period, there are no parameters of decompensated cirrhosis. The diagnostics of the above-mentioned pathologies available by endosonography makes it possible to prevent a hemodynamic disequilibrium in the form of hemorrhage.

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Peptide angiotensin converting enzyme inhibitors as the supportive food components in the therapy of hypertension

Peptydowe inhibitory enzymu konwertującego angiotensynę jako składniki żywności wspomagające terapię nadciśnienia tętniczego

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Abstract. Hypertension is a civilization disease occurring all over the world, especially in economically well-developed countries. Many factors affect the occurrence of this disease, including the age of a patient, genetic predisposition, lifestyle and body mass. The latter two are related to diet. The food components affecting the reduction of the elevated blood pressure are angiotensin converting enzyme inhibitors (ACE inhibitors) present in food proteins. Some of them are available on the market as food products, food components or supplements. This review describes selected ACE inhibitors from food showing an antihypertensive effect in animals and/or humans, and compares them with drugs inhibiting the ACE activity.
Key words: ACE inhibitors, angiotensin converting enzyme (ACE), drugs, food proteins, peptides.

Streszczenie. Nadciśnienie tętnicze jest chorobą cywilizacyjną występującą u pacjentów na całym świecie, szczególnie w krajach o wysokim poziomie rozwoju gospodarczego. Wiele czynników wpływa na występowanie tej choroby, takich jak m.in. wiek pacjenta, predyspozycje genetyczne, styl życia, masa ciała. Dwa ostatnie związane są z dietą. Składnikami żywności, które wykazują zdolność obniżania ciśnienia krwi są znajdujące się w sekwencjach białek inhibitory enzymu konwertującego angiotensynę (inhibitory ACE). Niektóre z nich są dostępne na rynku w formie produktów żywnościowych, składników żywności lub suplementów. W niniejszym przeglądzie przedstawiono charakterystykę wybranych inhibitorów ACE pochodzących z żywności, wykazujących efekt przeciwnadciśnieniowy u zwierząt i/lub ludzi oraz porównano takie peptydy z lekami hamującymi działanie ACE.
Słowa kluczowe: białka żywności, enzym konwertujący angiotensynę (ACE), inhibitory ACE, leki, peptydy.

Received: 30.07.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 89-95

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Types of hypertension

Hypertension is one of increasingly common cardiovascular diseases. In economically well-developed countries, these diseases, along with cancer, are the cause of death in more than 60% of patients. Cardiovascular diseases, including hypertension, are reaching epidemic proportions in those countries, statistically exceeding the mortality due to inflammatory diseases [1].

There are several types of hypertension. The classification is based on values of systolic/diastolic blood pressure and/or etiology of the disease. In the case of the first criterion, it is differentiated between prehypertension (129-139/80-90 mm Hg), stage 1 hypertension (140-159/90-99 mm Hg), stage 2 hypertension (≥160/≥100 mm Hg) and stage 3 hypertension (≥180/≥110 mm Hg). The values in the parenthesis mean the level of systolic/diastolic blood pressure, respectively [2]. The classification is based on the etiology of the disease differentiates between primary and secondary hypertension.

Primary hypertension occurs in 95% of patients. The cause of this type of hypertension cannot be clearly defined or removed, hence it requires lifelong treatment and management. About 5% of patients develop secondary hypertension, which means that it is possible to determine its cause, i.e. a disease process where one of the symptoms is an increase in blood pressure. Common causes of secondary hypertension include: obstructive sleep apnea, renal parenchymal diseases, kidney transplantation, renal artery stenosis, Conn's syndrome, pregnancy as well as some medications and chemical substances [3].

Management of hypertension with angiotensin converting enzyme

A significant role in reducing blood pressure is played by angiotensin converting enzyme inhibitors (ACE, EC 3.4.15.1). Angiotensin is a glycoprotein found in many organs and bodily fluids. Analysis of the three-dimensional structure of ACE showed that it is a zinc metallopeptidase. It was shown that ACE can occur in the following forms: somatic (somatic ACE) and testicular (testicular ACE). In recent years, angiotensin converting enzyme homologue (ACE homologue - ACEH) has been identified. Depending on the form, ACE has domains that contain active sites responsible for the hydrolysis of angiotensin I. Somatic ACE has two domains (N- and C-terminal domains), in which the hydrolysis of angiotensin I to angiotensin II takes place, whereas in testicular ACE, the process of the hydrolysis involves the C-terminal domain. In the case of ACEH, angiotensin convertase involves the active site adjacent to the N-terminal domain of somatic ACE. In addition, ACEH does not hydrolyze bradykinin. The activity of peptide ACE inhibitors is related to the interaction with the active site of ACE. According to the literature, the C-terminal domain of ACE is critical for blood pressure regulation [4].

The mechanism of blood pressure regulation with ACE is controlled by a number of biochemical pathways and is related to the activity of the following systems: renin-angiotensin [EC 3.4.22.15] (renin-angiotensin system - RAS), renin-chymase [EC 3.4.21.39] (renin-chymase system - RCS), kinin-nitric oxide system (KNOS) and neutral endopeptidase, known as enkephalinase [EC 3.4.24.11] (neutral endopeptidase system - NEPS). RAS is also known as the renin-angiotensin-aldosterone system (RAAS) and is considered to play the leading role among those systems responsible for blood pressure regulation [5].

In the RAS pathway, renin is released from its precursor, prorenin, through the action of kallikrein [EC 3.4.21.34]. Renin acts on its own substrate, i.e. angiotensinogen, to generate the decapeptid angiotensin I (Ang I) with the sequence Asp-Arg-Val-Tyr-Ile-His-Pro-Phe-His-Leu. Under the influence of ACE, angiotensin I is decomposed to octapeptide Asp-Arg-Val-Tyr-Ile-His-Pro-Phe and dipeptide His-Leu. This octapeptide is angiotensin II (Ang II), which is mostly found in the pulmonary vascular endothelium. Angiotensin II is produced in many tissues, e.g. in the endothelium, brain, heart and adrenal cortex. Angiotensin II causes vasoconstriction (increase in blood pressure) by the direct contraction of arterioles and stimulation of aldosterone synthesis in the adrenal cortex [6]. Angiotensin II is also responsible for the activation of the endothelin converting enzyme (ECE; EC 3.4.24.71), which produces endothelin I (End I) leading to vasoconstriction. Endothelin I enhances the formation of angiotensin II, which suggests its effect on the modification of ACE activity [4]. Angiotensin converting enzyme is also responsible for the hydrolysis of bradykinin to inactive fragments [5].

The main receptors of angiotensin II are AT1, AT2 and AT3. The effect of angiotensin on many tissues is mediated by the AT1 receptor but the stimulation of the AT2 receptor can inhibit some of its effects. The role of the AT3 receptor has not yet been precisely defined [4].

The renin-chymase system (RCS) differs from the RAS by the fact that the conversion of angiotensin I to angiotensin II mainly takes place in the heart, and the enzyme responsible for the conversion is chymase [EC 3.4.21.39]. Chymase does not catalyse bradykinin decomposition [4].

In the KNOS system (kinin-nitric oxide), proteins from the group of globulin-α_2 or kininogens are subject to the action of enzymes, i.a. kallikrein, to give rise to kinins, which, in turn, give rise to kallidin, with the sequence: Lys-Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe-Arg. At a further stage, it undergoes degradation to bradykinin (Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe-Arg) and two peptides: Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe and Lys-Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe. The sequences: Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe and Lys-Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe are hydrolyzed by ACEH. The effect of bradykinin is enhanced via enzymatic release of nitric oxide (II) (NO) from L-arginine by the action of nitric oxide synthase (NOS, EC 1.14.13.39). This pathway is inhibited by the action of ACE by releasing dipeptide with the sequence Phe-Arg from the C-terminal of bradykinin, which leads to vasoconstriction. Angiotensin II acts at both AT1 and AT2 receptors to stimulate the production of nitric oxide (II) [4].

Neutral endopeptidase (NEP, EC 3.4.24.11) causes vasoconstriction in many ways, including the hydrolysis of bradykinin to inactive fragments. NEP hydrolyzes natriuretic peptides with vasodilatory properties, which results in vasoconstriction. In addition, neutral endopeptidase can hydrolyze both angiotensin I and II to angiotensin 1-7, a vasodilatory peptide [4].

Chemical structure, mechanism of action and classification of peptide ACE inhibitors

The effect of ACE inhibitor relates to the inhibition of the formation of angiotensin II, responsible for increasing blood pressure and the development of organ complications associated with hypertension. In addition, ACE inhibition prevents the breakdown of vasodilatating bradykinin. ACE inhibitors are considered to have nephroprotective, antiproliferative and anticoagulatory effects [6].

A detailed mechanism of action for peptide ACE inhibitors has not yet been determined. However, certain common properties of peptides with this activity were indicated. For example, short-chain peptides (di- or tripeptides), "preferred" by ACE, are mostly made up of amino acid residues with hydrophobic properties, a branched side chain or aromatic rings. Many ACE inhibitors from food contain C-terminal proline residue, whereas isoleucine or valine are mostly N-terminal amino acids [5].

Some ACE inhibitors, especially those with a longer sequence, contain the C-terminal arginine or lysine residue. It was observed that the groups: arginine guanidino group and lysine ϵ-amino group significantly contributed to an increase in the activity of these peptides, and the exchange of C-terminal arginine residue led to the complete loss of bioactivity. This leads to the conclusion that the mechanism of action of ACE requires the inhibitor's interaction with the anion-binding site, which significantly differs from the catalytic site of an enzyme [5]. This is a characteristic mechanism, especially for noncompetitive inhibitors. After binding to the enzyme, the inhibitor deforms its active center and prevents the enzyme from binding to the substrate. This type of inhibition is characteristic of enzymes containing a characteristic group necessary to maintain their catalytic activity. This may indicate that the binding of the inhibitor to a zinc ion causes the inhibition of the enzyme's activity [7]. Some of peptide ACE inhibitors have C-terminal amino acid residues. Glutamic acid shows the ability to chelate a zinc ion which is a component of the catalytic center of angiotensin converting enzyme [5].

Depending on the way in which peptide interacts with ACE in the system, ACE inhibitors can be divided into three categories. The first one include the true inhibitors (true inhibitor type). The activity of these peptides is not affected by hydrolysis to shorter fragments by the action of ACE or proteolytic enzymes. The second group, called "substrate inhibitors" (substrate inhibitor type), includes peptides which display decreased activity due to interactions with ACE. The third category includes the pro-drug inhibitors (pro-drug inhibitor type). They are converted to true inhibitors (first category) by ACE or gastrointestinal enzymes. *In vivo* studies in rats with congenital hypertension showed that ACE inhibitors from the first and third category exhibit hypotensive properties [8]. An example of pro-drug ACE inhibitor is the sequence Leu-Lys-Pro-Asn-Met (source: sardine protein), which is hydrolyzed by ACE to the tripeptide Leu-Lys-Pro, whose activity *in vitro* was eight times as great as in the sequence Leu-Lys-Pro-Asn-Met [9].

Peptides - ACE inhibitors from food

Peptide ACE inhibitors from food are classified as bioactive components. Apart from the documented nutritive value of food, bioactive peptide contained in food have a proven beneficial health effect after digestion by the human [10]. The source of exogenous ACE inhibitors can be food proteins, e.g. milk and dairy products, meat, eggs, fish as well as vegetable proteins, e.g. soya, wheat, corn, or rapeseed [11].

The richest source of antihypertensive peptides among food proteins are milk proteins. Peptides with the antihypertensive effect are formed, among other things, as a result of pharmaceutical processes with bacterial cultures such as *Lactobacillus helveticus, Lactobacillus delbrueckii ssp. bulgaricus, Lactococcus lactis ssp. diacetylactis, Lactococcus lactis ssp. cremoris* and *Streptococcus salivarius ssp. thermophilus.* Due to the activity of *Lactobacillus helveticus,* ACE inhibitors with the sequences Val-Pro-Pro and Ile-Pro-Pro are released from milk caseins from different animal species. The antihypertensive effect of these peptides has been confirmed in clinical studies, and the mentioned sequences are a component of commercially available products, e.g. in Japan and Finland. These are Peptide angiotensin converting enzyme inhibitors as the supportive food components in the therapy of hypertension fermented milk drinks with the following names: Ame-al S®/Calpis®, Calpis Co. Ltd. (Japan), Valio Evolus® Double Effect and Valio Ltd. (Finland) [11].

Other dairy commercial products with antihypertensive properties are: the whey protein hydrolyzate "BioZate" (from the USA), containing fragments from β-lactoglobulin, and "C12" (from the Netherlands) used as a food additive, enriched with the antihypertensive casein peptide Phe-Phe-Val-Ala-Pro-Phe-Pro-Glu-Val-Phe-Gly-Lys [11]. An example of products with beneficial health effects is koumiss, a fermented mare's milk drink. In this drink, the following peptides were identified: Tyr-GIn-Asp-Pro-Arg-Leu-Gly-Pro-Tre--Gly-Glu-Leu-Asp-Pro-Ala-Tre-Gln-Pro-lle-Val-Ala-Val--His-Asn-Pro-Val-lle-Val, Pro-Lys-Asp-Leu-Arg-Glu-Asn, Leu-Leu-Leu-Ala-His-Leu-Leu and Asn-His-Arg-Asn-Arg--Met-Met-Asp-His-Val-His, which are classified as pro-drug type ACE inhibitors [12].

ACE inhibitors, naturally found in fermented milk products and ripened cheeses, are often regarded as natural functional foods [10]. In the case of cheeses, these peptides result from proteolytic processes during cheese ripening. An example of ACE inhibitors from cheese are casokinins identified in the aqueous extract of Gouda cheese (source: β-casein fragments 58-72, 193-209, 194-209). β-casein fragment 60-68 with the ACE inhibitory activity was identified after a 6-hour ripening process of Cheddar cheese [11].

The peptides Leu-lle-Trp-Lys-Leu, Arg-Pro-Tyr-Leu and Leu-Asn-Asn-Ser-Arg-Ala-Pro from bovine lactoferrin decreased blood pressure in rats. The sequence Leu-lle-Trp-Lys-Leu showed the highest bioactivity, and the hypotensive effect persisted for 24 hours after its administration [13].

Peptide ACE inhibitors were also obtained by enzymatic hydrolysis of bird egg proteins. So far, studies in rats confirmed the antihypertensive effect of the sequence Arg-Ala-Asp-His-Pro-Phe-Leu and lle-Val-Phe (source: egg protein hydrolyzed by pepsin). Also the peptides Arg-Ala-Asp-His-Pro-Phe (source: ovalbumin) and Arg-Val-Pro-Ser-Leu (source: ovotransferrin) decreased blood pressure in rats [11]. Two sequences with the ACE inhibitory activity from hen egg ovalbumin, i.e. Arg-Ala-Asp-His-Pro-Phe-Leu and Arg-Ala-Asp-His-Pro-Phe, are called ovokinin and ovokinin 2-7, respectively. Structural modifications of ovokinin-derived peptides and their derivatives improved their bioavailability and biological activity. It was observed that structurally modified fragments with the sequences Arg-Pro-Phe-His-Pro-Phe and Arg-Pro-Leu-Lys-Pro-Trp after the oral administration to rats demonstrated a greater antihypertensive activity than ovokinin 2-7 [11].

In addition, it was proven that egg yolk proteins hydrolyzed by Newlase F, a preparation of microbiological origin, and by gastrointestinal enzymes, i.e. pepsin and chymotrypsin, release low molecular mass oligopeptides. The intravenous administration of the aqueous extract of the mixture of these oligopeptides to rats reduced both systolic and diastolic blood pressure by 10%. The volume of the applied preparation was 5 ml/kg body weight, which was equivalent to 500 mg hydrolysate/kg body weight [10].

Relatively few scientific reports on ACE inhibitors identified in meat proteins discuss their documented effects in humans and animals. Peptides with the ACE inhibitory activity were identified in thermolysin hydrolysates of chicken muscle proteins. The sequences lle-Lys-Trp, Leu-Ala-Pro and Leu-Lys-Pro reduced diastolic blood pressure in rats by 50, 40 and 75 mm Hg, respectively, after the intravenous administration of a dose of 10 mg/kg body weight [8].

Examples of hypotensive peptides from porcine meat are the myopentapeptides Met-Asn-Pro-Pro-Lys and lle-Tre-Tre-Asn-Pro (source: myosin heavy chain), Val-Lys-Lys-Val-Leu-Gly-Asn-Pro (source: myosin light chain), Lys-Arg-Val-lle-Tre-Tyr (source: myosin) as well as Trp-Val-Pro-Ser-Val,Tyr-Tre-Val-Pro, Val-Val-Tyr-Pro-Trp (source: blood plasma). Studies showed that the above-mentioned peptides lowered systolic blood pressure in rats [8].

Peptide with the sequence Val-Leu-Ala-Gln-Tyr-Lys derived from beef sirloins was the subject of clinical studies as a potential component of hypotensive functional foods. The antihypertensive properties of the peptide Val-Leu-Ala-Gln-Tyr-Lys were also examined in studies in rats [11]. Similar studies were performed for peptides derived from duck skin by-products. Proteolysis of duck skin proteins released ACE inhibitor with the sequence Trp-Tyr-Pro-Ala-Ala-Pro. The intravenous administration of a hydrolysate of the above-mentioned ACE inhibitor to rats lowered blood pressure and normalized the heart rhythm [14].

Also fish proteins can be a source of peptide ACE inhibitors. Studies by Matsui and Kawasaki [15] showed that pepsin and alkaline protease from *Bacillus licheniformis* released a peptide with the sequence Val-Tyr from sardine muscles. The oral administration in the form of hydrolysate drink containing the sequence Val-Tyr (4 g hydrolysate/200 ml a day) to patients with mild hypertension lowered systolic pressure by 9.3 mm Hg, and diastolic pressure by 5.2 mm Hg.

Another food product with hypotensive properties is a component of Katsuobushi, a Japanese food. This is a thermolysin hydrolysate derived from smoked sardines with the sequence Leu-Lys-Pro-Asn-Met. Clinical studies showed a reduction in blood pressure in a range of 12.55 ±1.5 mm Hg in 30 patients receiving Katsuobushi for 8 weeks (1.5 g/day). It was granted the FOSHU status (Foods of Special Health Use) by the Japanese Ministry of Health [8].

Proteins from other fish species also contain peptide ACE inhibitors with a documented antihypertensive effect on rats with congenital hypertension. These are peptides have been derived from tuna, salmon and Alaska pollock proteins [8].

Raw materials and products of plant origin can also be a valuable source of peptides with the ACE inhibitory activity derived from food. Studies showed that during the process of soybean protein digestion in human and animal gastrointestinal tracts, peptides with the following sequences were generated: Val-Leu-Ile-Val-Pro, Tyr-Leu-Ala-Gly-Asn-GIn, Phe-Phe-Leu, Ile-Tyr-Leu-Leu and Val-Met-Asp-Lys-Pro-Gly. These peptides clearly inhibited the activity of angiotensin converting enzyme [2]. The presence of peptides with the ACE inhibitory activity was also confirmed in ribulose-1,5-bisphosphate carboxylase (RuBisCO; E.C. 4.1.1.39), an enzyme derived from spinach, which so far was not regarded as a potential source of bioactive peptides. Peptides with the sequences Met-Arg-Trp and Met-Arg-Trp-Asp lowered blood pressure in hypertensive rats 2 h after the administration of a dose of 20 and 30 mg/kg body weight (bw). Whereas peptide with the sequence Ile-Ala-Tyr-Lys-Pro-Ala-Gly lowered blood pressure in rats after the administration of a dose of 100 mg/kg bw. [11].

Four peptides with the sequences Ile-Tyr, Arg-Ile-Tyr, Val-Trp-Val and Trp-Ile-Ser were identified in rapeseed proteins treated with subtilisin. Studies showed that they were resistant to the effect of gastrointestinal enzymes, and a dose of 0.15 g/kg body weight lowered blood pressure in rats [11]. In thermolysin hydrolysates of α-zein from maize, the following sequences were identified: Leu-Arg-Pro, Leu-Ser-Pro and Leu-GIn-Pro. The oral administration of hydrolysates containing the above-mentioned peptides significantly reduced blood pressure in rats. The greatest reduction in blood pressure was observed 6 hours after administration [11].

ACE inhibitors were identified in Asian foods such as: natto (Japan), tempeh (Indonesia), Douchi (a dish containing Chinese preserved black bean), tofu "Tofuyo", noodles and soy sauce [11].

Drugs - ACE inhibitors

The therapeutic potential of ACE inhibitors has become a challenge for the pharmaceutical industry [15]. ACE inhibitors are currently considered to be one of the most important groups of drugs [6]. In Europe and in the United States, the following synthetic ACE inhibitors are known: benazepril, captopril, enalapril, fosinopril, lisinopril, zestril, moexipril, perindopril, chinapril, accupril, ramipril, and trandolapril [16].

Based on their pharmacokinetic characteristics, ACE inhibitory drugs can be divided into several categories. The first one includes sulfhydryl-containing ACE inhibitors (SH). They are structurally similar to captopril (e.g. fentiapril, pivalopril, zofenopril, and alacepril). The next group includes dicarboxyl-containing ACE inhibitors, which exhibit structural similarity to enalapril (e.g. lisinopril, benazepril, chinapril, moexipril, spirapril, perindopril, pentoril, and cilazapril). The other category of drugs are phosphorus-containing ACE inhibitors, which have a structure similar to fosinopril [17]. The characteristics of chemical structure of drugs is important in terms of their activity, elimination profile, concentration in blood and bioavailability. These features influence the duration of the intended effect of a drug, which determines its selection and dose in the therapy of hypertension [18]. For example, 24-hour blood pressure monitoring demonstrated the effectiveness of the following drugs, taken by patients once a day: cilazapril, enalapril, fosi-nopril, lisinopril and trandolapril. However, captopril and chinapril, taken once a day, were not effective in the treatment of patients with mild and severe hypertension [17].

The effectiveness of ACE inhibitory drugs and peptides was compared. The analysis compared captopril and the sequences Leu-Lys-Pro-Asn-Met (component of Katsuobushi) and Leu-Lys-Pro derived from sardine proteins. The studies were performed in groups of hypertensive rats which received the drug (1.25 mg/kg bw) and peptides orally (Leu-Lys-Pro-Asn-Met: 8.0 mg/kg bw; Leu-Lys-Pro: 2.25 mg/kg bw). It was demonstrated that both the sequence Leu-Lys-Pro-Asn-Met and captopril led to the maximum drop in blood pressure in rats in the same time, i.e. 4 hours after the administration of the active substance. In the case of the sequence Leu-Lys-Pro, the reduction in blood pressure in rats was observed after 2 hours. Based on the activity, i.e. IC_{50} value expressed in micromoles, it was shown that the effectiveness of food peptides *in vivo* was 66% (Leu-Lys-Pro-Asn-Met) and 91% (Leu-Lys-Pro), when compared to captopril [9].

Adverse effects related to therapy with ACE inhibitors

ACE inhibitors taken by patients with hypertension may be accompanied by adverse effects associated with the respiratory, digestive, urinary, nervous and sensory as well as hematopoietic systems. Also skin symptoms and water-electrolyte balance disorders may occur. The most common symptom associated with the respiratory system is a dry cough, the result of an increase in bradykinin concentration and substance P concentration in the bronchial tree due to decreased ACE activity. It is a complication typical of patients over 60 years of age, nonsmokers, mainly women. It was found that the ethnic origin has an effect on the incidence of dry cough in patients with hypertension - African Americans and Chinese from Hong Kong had this complaint more often than Caucasian patients. Some authors believe that the most reasonable solution in the case of cough during therapy with ACE inhibitors is to change drugs to pharmaceuticals from the group of angiotensin II receptor blockers [6].

One of the most dangerous complications associated with the therapy of hypertension with ACE inhibitors is angioedema. It was observed in patients treated with enalapril. Angioedema can cause obturation of the respiratory tract, which can be life-threatening [6].

Disorders of the digestive system associated with the treatment with ACE inhibitors include vomiting, nausea, diarrhea and, to a lesser extent, dysgeusia. Also cases of liver damage in patients treated with enalapril and acute pancreatitis (most of ACE inhibitors) were observed [6].

Treatment with ACE inhibitors may cause complications associated with the urinary system. The most common one is an increase in urea and creatinine concentrations in serum. This is particularly important in hypertensive patients with renal insufficiency. Then, the criterion to select the adequate ACE inhibitor is the route of drug elimination. For example, ACE inhibitors, such as: benazepril, fosinopril and ramipril are partially eliminated by the liver [6].

Patients treated with ACE inhibitors also reported other adverse effects such as: fatigue, dizziness and psychotic symptoms. The last one occurred especially in elderly patients. Treatment with ACE inhibitors may be accompanied by skin reactions, e.g.: rash (captopril, lisinopril), angioedema, pruritus, urticaria, pemphigus, excessive hair loss, and photosensitivity reaction [6].

Therapy with ACE inhibitors can be associated with water-electrolyte balance disorders. The most common adverse effects include hyperkalemia. Therefore, it is recommended that patients with renal insufficiency control their serum potassium concentration. Patients with diabetes should be aware of the fact that initiation of treatment with ACE inhibitors increases the risk of hypoglycemia because ACE inhibitors reduce insulin resistance [6].

Some studies on adverse effects associated with the use of synthetic ACE inhibitors in patients with hypertension are related to differences within the structure of a drug [18]. For example, captopril and zofenopril contain a sulfhydryl group (SH), which plays an important role in antioxidative processes. Due to this, the above-mentioned drugs have a beneficial effect on the treatment of ischemic diseases, atherosclerosis and other diseases caused by the accumulation of free radicals. However, the sulfhydryl group present in these ACE inhibitory drugs may cause adverse effects such as: dysgeusia, rash, proteinuria. Dysgeusia was observed, e.g. in patients treated with captopril. This effect did not occur in patients who were treated with drugs that do not contain the SH group [18].

Taking drugs with food can cause interactions between the drug and some food ingredients. This aspect is particularly important in patients with hypertension treated, for example, due to diabetes, high cholesterol level and heart failure, as well as treated with at least several drugs. Interactions between drugs and food can have an effect on the effectiveness of the drug or reduction in the absorption of a food ingredient. In the case of ACE inhibitors, pharmaceutists recommend to take the drugs on an empty stomach [19].

Summary

The above-presented characteristic of ACE inhibitors from food mainly refers to peptides whose effect was confirmed in experimental studies on animals. An analysis of the literature related to bioactive peptides, including ACE inhibitors, indicates that most studies were performed on a laboratory scale or in rats. Relatively few publications were dedicated to those ACE inhibitors which were examined in clinical studies. This results from differences in legislative requirements which have to be fulfilled by nutraceuticals, functional food and pharmaceuticals [20]. So far, the best known ACE inhibitors with a documented clinical effect are the sequences: Val-Pro-Pro and Ile-Pro-Pro [11].

The subject of clinical studies were simple peptides derived from proteins from milk, fermented dairy products [11], meat and fish [8]. The obtained peptides were mainly a component of drinks and were, mostly in this form, administered to patients orally. Some of ACE inhibitors caused a reduction in blood pressure comparable to that achieved by pharmacological treatment. No adverse effects or other undesirable changes were observed in patients with hypertension or in healthy subjects after taking food containing ACE inhibitors [4].

Synthetic ACE inhibitors have been used in the treatment of hypertension for 30 years. They belong to a well-known group of drugs. However, therapy with ACE inhibitors is often accompanied by adverse effects. When recommending the adequate drug to patients, it is required to take all precautions, consider contraindications and control adverse effects [6]. This reduces the risk of complications and has a positive effect on the proper functioning of the body.

Researchers believe that, when compared to synthetic ACE-inhibiting drugs, peptides with this activity derived from food can be considered to have a milder effect and be less toxic and safer for the human body [7]. These peptides are functional food components and taking them in diet or as nutraceuticals generates a long-term preventive effect.

The presented paper does not exhaust the question on the discovery and identification of new ACE inhibitors and their origin. Reports are appearing around the world concerning the application potential of peptides from the diet in the treatment of civilization diseases, including hypertension. However, it should be remembered that, in spite of the fact that peptide ACE inhibitors are regarded as safe food components and they can be used for prevention as a dietary supplement supporting pharmacotherapy, they should not be considered a replacement for pharmaceuticals. However, a change in dietary pattern based on the newest knowledge of bioactive and functional food components can significantly contribute to health promotion and prevention of civilization diseases, including hypertension.

Acknowledgements

This paper was financed by the Chair of Food Biochemistry, Faculty of Food Science, University of Warmia and Mazury, Olsztyn, Poland.

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Head-up tilt test - rational using of a gold standard in the diagnosis of reflex syncope

Test pochyleniowy - racjonalne wykorzystanie złotego standardu diagnostyki omdleń odruchowych

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Abstract. Loss of consciousness and fainting are some of the most common causes of medical consultation. A diligent interview is of basic importance in the diagnosis of loss of consciousness as it allows the recognition of patients in immediate danger to life, and also to channel the following interdisciplinary diagnostic processes with the participation of a cardiologist, a neurologist, a psychiatrist and a psychologist. A special place in diagnosis of neurocardiogenic syncope is occupied by the head-up tilt test (HUTT). The main aim of this paper is to highlight indications to HUTT and to indicate situations in which the test is unnecessary due to a lack of impact on the therapy.
Key word: head-up tilt test, syncope

Streszczenie. Utrata przytomności i zasłabnięcia to jedne z najczęstszych przyczyn konsultacji lekarskich. Podstawowe znaczenie w diagnostyce utrat przytomności ma dokładnie zebrany wywiad lekarski. Pozwala on na wyłonienie grupy chorych z bezpośrednim zagrożeniem życia oraz ukierunkowanie dalszego interdyscyplinarnego przebiegu diagnostyki dolegliwości z udziałem kardiologa, neurologa, psychiatry i psychologa. Szczególne miejsce w diagnostyce omdleń odruchowych zajmuje test pochyleniowy. Artykuł ma na celu uwypuklenie wskazań do wykonywania badania oraz pokazanie sytuacji, w których jest to zbędne z uwagi na brak wpływu na zastosowaną terapię.
Słowa kluczowe: omdlenie, test pochyleniowy

Received: 02.09.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 96-101

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Syncope - why is the definition important?

According to the current guidelines of the European Society of Cardiology (ESC) [1], syncope is defined as transient loss of consciousness due to global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery [1]. The same document underlined that it is important to differentiate syncope from conditions without loss of consciousness, and to differentiate situations in which loss of consciousness does not result from hypoperfusion of the central nervous system (CNS) (Tab. 1).

Syncope is not a disease but a symptom which can be clinically characteristic of various disease entities or can be the result of over-reactivity of the healthy organism to some external and internal stimuli [2]. Syncope is a common problem in the general population. Additionally, the situation is complicated by the fact that the main causes of syncope vary in individual age groups [3]. In the general population as well as in young individuals, reflex syncope prevails [4,5] and the first syncopal episode occurs between 10 and 30 years of age, with the peak age of onset at about 15 years of age [6]. With age, the participation of arrhythmia and organic cardiovascular diseases increases [7]. The second peak age of onset occurs after 65 years of age. However, in this group, syncope is secondary to cardiovascular diseases prevails [4], and the participation of reflex vasovagal mechanisms is estimated to form 31-34% of the causes of syncope.

Table 1. Classification of syncope
Tabela 1. Klasyfikacja omdleń

Reflex (neurally mediated) syncope
vasovagal syncope situational syncope carotid sinus syncope atypical forms
Syncope due to orthostatic hypotension
primary autonomic failure (multiple system atrophy, Parkinson's disease, and Lewy body dementia) secondary autonomic failure (diabetes, amyloidosis, spinal cord injuries, and uremia) drug-induced orthostatic hypotension (hypotensive drugs, phenothiazines, antidepressants, and alcohol) fluid loss
Cardiovascular syncope
bradycardia (sinus node dysfunction, tachycardia-bradycardia syndrome, atrioventricular conduction system disease, implanted device malfunction) tachycardia (supraventricular or ventricular) organic diseases (valvular heart disease, hypertrophic cardiomyopathy, myocardial ischemia, atrial myxoma, cardiac tamponade, pulmonary embolism, acute aortic dissection, pulmonary hypertension)

Observed episodes of orthostatic hypotension are mostly induced by drugs and polypragmasia [4]. The largest source of information on the epidemiology of syncope is the Framingham Study, in which over a lifetime, at least one syncopal episode occurred in 3% of males and 3.5% of females, and the incidence of syncope significantly increased after 70 years of age [8].

Loss of consciousness - is it always diagnosed the same way?

The crucial stage in the diagnostics of syncope is the differentiation of syncope from conditions imitating transient loss of consciousness such as metabolic disorders (including hypoglycemia or hypoxia) as well as epilepsy, intoxication or transient ischemia of the CNS, often erroneously called "syncope" [1]. Detailed physical examination, which often allows the initial diagnosis and prognosis and indicates to perform additional examinations, is of essential importance. The extended diagnostics of loss of consciousness may include, for ecample, echocardiographic examination, prolonged ECG Holter monitoring (24-hour examination, event Holter, prolonged ECG telemonitoring, implantable loop recorders), 24-hour ambulatory blood pressure monitoring (ABPM), and electrophysiological study and exercise stress testing. Among the provocative tests, carotid sinus massage, active standing test and head-up tilt test (HUTT; tilt test, TT) should be mentioned. However, all these examinations are not necessary for all patients.

As mentioned above, the basic element in the diagnostics of patients with syncope is the initial evaluation [1]. Based on a diligent interview with the patient and anyone who witnessed the patient's loss of consciousness, physical examination, measurement of blood pressure supine/sitting and upon standing as well as an analysis of the 12-lead resting electrocardiographic examination, the initial diagnosis can be made and the risk of serious cardiovascular events or sudden cardiac death can be assessed [1,9,10]. It is important to determine the situation in which syncope occurred, prodromes and concomitant symptoms with a particular focus on palpitations, chest pain, dizziness, visual disturbances, pallor of the skin or seizures. The initial evaluation allows the detection of vasovagal, situational, orthostatic syncope, cardiac ischemia-related syncope and syncope from arrhythmia (but only with ECG evidence) in as many as 23-50% of patients (Tab. 2) [11,12]. The detection of a given type of syncope based only on the initial evaluation allows the discontinuation of further examinations. In other cases, it is necessary to extend the diagnostics.

The largest diagnostic capabilities involve the case of syncope of arrhythmic origin. Electrocardiographic monitoring is recommended if there are clinical or electrocardiographic features suggesting arrhythmia as the cause of syncope [13]. The method of monitoring and its duration should be adjusted to the rate of syncopal recurrence, whereas the most popular, conventional 24-hour Holter ECG monitoring is indicated only if syncope occurs more often than once a week (Class of Recommendation: IB). Currently, in patients with less frequent incidents of syncope, prolonged remote telemonitoring systems with real time on-line ECG recording evaluation can be used. The duration of observation is limited exclusively to the patient's tolerance, and without limitations in terms of the device's memory and battery capacity. In other cases, also implantable loop recorders can be used [13,14].

In the case where an organic cause of loss of consciousness is suspected, it is indicated to perform echocardiography. However, it allows the identification of cause of syncope in very few patients. Documented organic disease which can be the cause of syncope does not require further search for the causes of loss of consciousness. Head-up tilt test - rational using of a gold standard in diagnosis of reflex syncope

Table 2. Data from initial interviews indicating the mechanism of syncope [1]
Tabela 2. Dane z oceny wstępnej wskazujące na określony rodzaj omdleń [1]

Type of syncope	Data from the interview
vasovagal syncope	syncope triggered by emotional stress or orthostatic stress accompanied by typical prodromes
situational syncope	syncope during or directly after the occurrence of specific triggers
orthostatic syncope	syncope after standing up, when there is a documentation of orthostatic hypotension.
cardiac ischemia-related syncope	syncope with acute ischemia supported by ECG evidence, with myocardial infarction or without myocardial infarction.
cardiovascular syncope	syncope in a patient with: - prolapsing myxoma, - severe aortic stenosis, - pulmonary hypertension, - pulmonary embolism, - acute aortic dissection.
arrhythmia-related syncope	syncope in a patient with: - persistent bradycardia <40/min in awake or repetitive episodes of sinoatrial block or sinus pauses >3 s, - Mobitz II second degree AV block or third degree AV block, - alternating right or left bundle branch block, - VT or rapid paroxysmal SVT, - episodes of non-sustained polymorphic VT, - long or short QT interval, - pacing system malfunction or ICD with ventricular pauses.

Abbreviations: AV block - atrioventricular block, EKG - electrocardiogram, ICD - implantable cardioverter defibrillator, SVT - supraventricular tachycardia, VT - ventricular tachycardia

Head-up tilt test - for everyone?

Since the diagnostics for a broadly defined loss of consciousness should be planned individually for each patient, the indications to perform echocardiography or ECG monitoring should be always analyzed in detail. However, the same care should be applied in the case of the head-up tilt test.

The HUTT is a test intended to induce a neurally mediated reflex in predisposed patients. During long-term standing, i.e. orthostatic stress, according to the force of gravity, blood moves to the venous bed below the diaphragm, with a simultaneous decrease in the venous return. These phenomena triggers a reflex resulting in a reduction in blood pressure, as well as often bradycardia, which leads to fainting or syncope. Such a reaction results from vagal overactivity, which reduces the ability for vasoconstriction response.

The HUTT for the diagnostics of syncope of unknown etiology was introduced by Kenny et al. in 1986. [15]. Since then, the way to perform the test has changed many times - the tilt angle, types of pharmaceutical provocation and the duration of individual phases have been modified [16]. Currently, the head-up tilt test is mostly performed according to one of two protocols. The most common one seems to be the protocol developed by Ammirati et al. (Italian protocol) [17]. According to the Italian protocol, the passive phase of the test lasts 20 minutes, followed by provocation with sublingual administration of nitroglycerin (NTG), which commences the active phase that lasts up to 15 minutes. Other, less often used test methods are: Westminster protocol, covering a 45-minute passive phase without NTG provocation [16], and isoproterenol test [18,19] or other possible modifications of the duration of individual phases and provocation means.

The head-up tilt test, as every test, has its disadvantages. Frequent false positive results in patients with carotid sinus syndrome [20] and with other forms of reflex responses [21] should be mentioned. In addition, in patients with sinus node disease or paroxysmal atrioventricular block, reflex reaction may occur during the HUTT despite no history of syncope [20]. Of particular importance is the inclination angle of the tilt table during the test. An angle of 60° is characterized by the largest sensitivity and specificity, whereas a reduction of the angle leads to a reduction in sensitivity, and an inclination of more than 60° to an increase in the number of false positive results [22]. Another important determinant which has an effect on HUTT sensitivity (independent of specificity) is the duration of the passive phase - the longer the passive test phase, the greater the sensitivity [23].

The most important disadvantages of the HUTT include poor reproducibility of results, estimated to be between 31 and 92% in the case of a positive neurocardiogenic reflex and between 85 and 94% in the case of a negative result [24], as well as no exclusion of reflex syncope in the case of a negative TT [1].

Possible complications of the test should be always considered. During the HUTT, asystole may occur, which requires resuscitation in patients with cardiodepressive type of syncope. After the test, arrhythmia, including mainly atrial fibrillation paroxysms may occur [25,26].

Head-up tilt test - when to perform and when not?

The HUTT is performed as part of the diagnostics for vasovagal syncope. However, the initial evaluation itself often permits a final diagnosis. Therefore, in patients with a typical history of syncope preceded by typical prodromes, or with a history of only a single syncope, there is no need to perform a test to provoke a neurally mediated syncope. The indication for the HUTT is reflex syncope suspected in patients in whom the initial evaluation does not permit a definite diagnosis to be made [15,16,22]. However, there are situations when the very first episode of syncope is the indication for provocation of a vasovagal response. Patients in whom another loss of consciousness endangers their life or the lives of others, that is, patients from vocational groups such as bus and truck drivers or people working at heights should undergo the test in each case of syncope. Another, however disputable, exception from this principle is the (physician's or patient's) willingness to demonstrate the patient the mechanism of the reported complaints, avoid the fear of another loss of consciousness and to assure the harmless character of "disease" by provoking fainting/syncope in controlled settings with a focus on prodromes. The HUTT should not be performed in patients in order to evaluate the effectiveness of treatment, in patients with a history of fainting without a complete loss of consciousness, or with syncope of unclear etiology, in whom epilepsy, neurological disorders or other cardiovascular diseases were not excluded as the cause of syncope.

If during the diagnostics, organic heart disease was found, the HUTT can be performed only after it is ruled out as the cause of loss of consciousness. In elderly patients in whom syncope is often caused by orthostatic hypotension, the HUTT can be helpful to differentiate the mechanism of syncope (then, the passive test phase becomes an equivalent of the tilting test), or to differentiate syncope from drop attacks [27]. The HUTT is the only examination which allows the diagnosis of postural orthostatic tachycardia syndrome (POTS), a rare form of loss of consciousness which mostly occurs in young women [28].

The HUTT is a relatively safe examination. However, contraindications should be kept in mind. Provocation of a neurally mediated reaction should not be performed in pregnant women, patients with severe atherosclerosis of cerebral vessels as well in those with syncope caused by organic diseases, found, for example by echocardiography [2]. Depending on the pharmacological provocation, the isoproterenol protocol in patients with coronary heart disease [29] or sick sinus syndrome [30,31] should not be performed. Contraindications for the HUTT should be followed not only by persons performing the test, but, above all, by physicians referring patients to diagnostic centers, including GPs. This helps to reduce patient waiting time for specialist consultation or hospitalization, and, as a consequence, to prevent needless disappointments resulting from a prolonged diagnostic-therapeutic process [32].

Is a neurological consultation always necessary?

When diagnosing a patient with loss of consciousness, it should be remembered that not every patient with syncope requires a complete neurological evaluation - including examinations such as: ultrasonography of the cephalad arteries, electroencephalography, or head CT. Such extensive diagnostics is necessary only in cases with suspected loss of consciousness which is not syncope. In addition, in patients with orthostatic hypotension, neurological diagnostics should be considered if primary autonomic failure is suspected in the course of such diseases as: multiple system atrophy, Parkinson's disease and Lewy body dementia.

In order to differentiate between reflex and neurological causes of loss of consciousness (including cases of patients with suspected mental disorders and pseudosyncope), the HUTT can be performed with simultaneous EEG monitoring and video recording [33]. In these patients, a diligent psychiatric and psychological evaluation is recommended [34].

It should be remembered that syncope with prolonged bradycardia and hypotension can be accompanied by involuntary urination and defecation, asynchronous myoclonus and eye movements, which is a manifestation of CNS hypoperfusion and can be mistaken as seizures. Hence, a positive HUTT result may avoid a patient's long-term use of anticonvulsants [35] and from further consequences of diagnosed epilepsy [36,37].

Table 3. Types of examination performed for the diagnosis of different kinds of syncope and loss of consciousness
Tabela 3. Badania stosowane przy podejrzeniu różnych rodzajów omdleń i utrat przytomności

Suspected cause of loss of consciousness	Recommended examinations:
vasovagal syncope	interview head-up tilt test
situational syncope	interview provocation test (including exercise stress testing)
carotid sinus syncope	interview carotid sinus massage
orthostatic hypotension	interview active standing test 24-hour ambulatory blood pressure monitoring (ABPM) neurological consultation
arrhythmia-related syncope	12-lead resting ECG monitoring 24-hour Holter ECG monitoring telemetric monitoring implantable loop recorders (ILR/ICM) electrophysiological study adenosine triphosphate test
syncope due to organic heart disease	echocardiography (TTE, TEE) computed tomography/ magnetic resonance imaging of the heart
loss of consciousness in the form of psychogenic pseudosyncope	psychiatric consultation HUTT with simultaneous EEG monitoring
loss of consciousness due to cerebrovascular disorders	neurological consultation ultrasound/CT angiography of carotid and vertebral arteries head CT/MRI
loss of consciousness during epilepsy	neurological consultation EEG

Abbreviations: ABPM - ambulatory blood pressure monitoring, EEG - electroencephalography, ICM - implantable cardiac monitors, ILR - implantable loop recorder, MRI - magnetic resonance imaging, TEE - transesophageal echocardiography, CT - computed tomography, HUTT - head-up tilt test, TTE - transthoracic echocardiography, and US - ultrasonogram

Summary

The head-up tilt test is a non-invasive examination helpful in the diagnostics of syncope of unknown etiology. Considering its disadvantages and limitations, the examination should not be performed in every patient but only in strictly defined cases, including patients with an atypical clinical picture along with a significant suspicion of a reflex mechanism of syncope. It is the only examination which allows the diagnosis of postural orthostatic tachycardia, which occurs mainly in young women. In addition, it is helpful in the population of elderly patients in whom, after ruling out cardiogenic syncope, it allows the diagnosis of vasovagal syndrome, orthostatic hypotension and differentiation of syncope from falls. Limitations of the HUTT should not lead to abandonment of the test but it should rather encourage it to become a more careful and well-thought-out qualification, one which would allow satisfactory sensitivity and specificity. The complete diagnostics of loss of consciousness should be performed individually, and the selection of examinations and diagnostic procedures has to be rational in order to minimize the costs and duration of the entire diagnostic process.

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Posterior capsular opacification pathogenesis and clinical signs

Zmętnienie torebki tylnej: patogeneza i objawy kliniczne

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Abstract. Posterior capsular opacification (PCO) is defined as a secondary cataract. It is clinically manifested with a loss of transparency of the optical centers, leading to a reduction in visual acuity. PCO is the most common complication after cataract surgery with simultaneous implantation of an artificial intraocular lens. Lens epithelial cells (LEC) which remain in the lens capsule after the removed lenticular masses are mainly responsible for this process. They undergo fibroblastic metaplasia under the influence of cytokines such as transforming growth factor (TGF), interleukin IL-1 and IL-6, and basic fibroblast growth factor (b-FGF). The decrease in visual acuity is proportional to the opacity level and the number of proliferating cells.
Keywords: pathogenesis, PCO

Streszczenie. Zmętnienie torebki tylnej *[posterior capsular opacification* - PCO) definowane jest jako zaćma wtórna. Klinicznie wyraża się utratą przejrzystości ośrodków optycznych prowadząc do obniżenia ostrości wzroku. PCO jest najczęstszym powikłaniem po operacji zaćmy z jednoczesną implantacją sztucznej soczewki wewnątrzgałkowej. W głównej mierze za proces ten odpowiedzialne są komórki nabłonka soczewki *[lens epithelial cells* - LEC), które pozostają w torebce soczewki po usuniętych masach soczewkowych. Ulegają one metaplazji fibromiofiblastycznej pod wpływem cytokin, takich jak transformujący czynnik wzrostu *[transforminggrowth factor-JGf),* interleukina IL-1 i IL-6, podstawowy czynnik wzrostu fibroblastów *[basic fibroblast growth factor-* b-FGF). Spadek ostrości wzroku jest proporcjonalny do gęstości zmętnienia i do ilości proliferujących komórek.
Słowa kluczowe: patogeneza, PCO

Received: 05.07.2013. Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 102-105

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Introduction

The most common late complication following cataract surgery is posterior capsular opacification (PCO), also known as a secondary cataract [1,2]. It affects 25-50% of cases and occurs in adults mostly between year 2 and 5 after surgery [2]. In children, secondary cataracts occur in 51-100% of cases [3,4]. PCO leads to a reduction in visual acuity, thus decreasing quality of life after cataract surgery. Lens epithelial cells (LEC) which remain in the lens capsule after the removed lenticular masses are mainly responsible for this process. Activated LEC undergo metaplasia and then proliferate in the intracapsular space where, as a result of further processes, they undergo thickening and hypertrophy [5,3]. PCO in young patients occurs more often and is more intensive. The cause seems to be an increased number of LEC and their higher mitotic activity [6].

Etiopathogenesis

Two types of LEC - A and E, from the same cell line, are located on the lenticular capsule [7-9]. They undergo transformation to myofibroblasts under the influence of autocrinely regulated cytokines such as transforming growth factor (TGF), interleukin IL-1 and IL-6, and basic fibroblast growth factor (b-FGF). The ability of LEC to move (amoeboid movement by projecting cytoplasmic protrusions) is possible due to actin and myosin filaments, located in their cytoplasm and arranged in the form of thin, longitudinal fibers [10].

The entire mechanism is initiated by the previously-mentioned cytokines. They determine the direction of cell movement by stimulating the leading edge of the migrating cell. In response to stimuli, signaling proteins that indicate the direction of movement accumulate at the leading edge. Simultaneously, inside the cell, actin filament polymerization and stimulation of the head of myosin filaments take place. The myosin heads rotate around their own axis and pull heavy chains, enabling both types of filaments to bind. Binding of actin and myosin results in their arrangement perpendicular to the cell wall in direction of which the movement is to take place [5]. Anterior LEC (type A) undergo fibrous metaplasia into myofibroblasts and can migrate in the direction of the posterior capsule where they proliferate and undergo hypertrophy and hyperplasia on the capsule surface, causing opacification. Type E cells, undergoing continuous mitosis, take part in the pathogenesis of capsular pearls [5,11]. These are opacified clusters of posteriorly migrated equatorial LEC (Bladder or Wedl cells) [12]. They may also contribute to the fibrous form of PCO through fibrous metaplasia. According to some authors, A and E cells may cause both types of PCO [5]. In most cases, classic PCO is caused by proliferation of equatorial cells [5]. The decrease in visual acuity is proportional to the opacity level and the number of proliferating cells. The formation of fibrous elements at the site of opacification may cause folds and micro-ruptures of the posterior capsule [5]. Apart from classic PCO, postoperative proliferation of LEC is also the cause of anterior capsular opacification (ACO) [13]. Residual cortical fibers may also undergo particular regenerative processes, forming pathological opacifications known as Sommering's ring and Elschnig pearls [10,11]. An important role in the pathogenesis of PCO is also played by the extracellular matrix (ECM) [14]. By means of fibronectin and the complex of receptors called integrins, regulated by transforming growth factor α1 (TGF-α1), ECM takes part in the process of migration and attachment of lens epithelial cells to the lens capsule, which determines the possibility of their later hyperplasia [14]. The intraocular lens, which is a foreign body, in a short period of time induces an inflammatory reaction in the anterior chamber manifesting as the presence of multinucleated leukocytes, giant cells and fibroblasts [7]. These cells synthesize TGF α and tumor necrosis factor α (TNF-α) that, in turn, activate the process of LEC transformation, which leads to a secondary cataract. This process is characterized by fibrosis and contraction caused by the activity of actin filaments [5]. In immunohistochemical examinations, ECM molecules, fibronectin or collagen were found on the surface of the intraocular lens [15]. The accumulation of collagen on the intraocular lens (IOL) and lens capsule may cause opacification and folds on the posterior capsule [10]. The degree and type of IOL flattening by LEC depends on the material from which the IOL is made, on its surface, shape, diameter of the optic part, mechanical features of haptics and fixation methods [10,15,16].

Clinical symptoms

Visual acuity does not always reflect the degree of PCO. Some patients with a significant PCO are relatively asymptomatic in the slit-lamp examination, whereas other patients have significant symptoms of visible mild haziness [17]. It is clinically manifested with the loss of transparency of the optical centers, leading to a reduction in visual acuity. A secondary cataract has several clinical forms [3].

- Haziness - reduced transparency of the posterior capsule or its grey color. In the initial phase, it may not cause visual disorders (Fig. 1) [6].
- Posterior capsule folding in the form of wide strands, occurring in the early postoperative stage, as well as in the form of tiny folds resulting from the influence of myofibroblasts (Fig. 2) [18].
- Granularity - Elschnig's pearls, large balls resembling pearls. They occur in the late postoperative stage (months - years) (Fig. 3) [10].
- Posterior capsule fibrosis - greyish strands detected and left during surgery [12] or formed postoperatively due to fibrous metaplasia of LEC. They cause a significant reduction in vision acuity (Fig. 4).

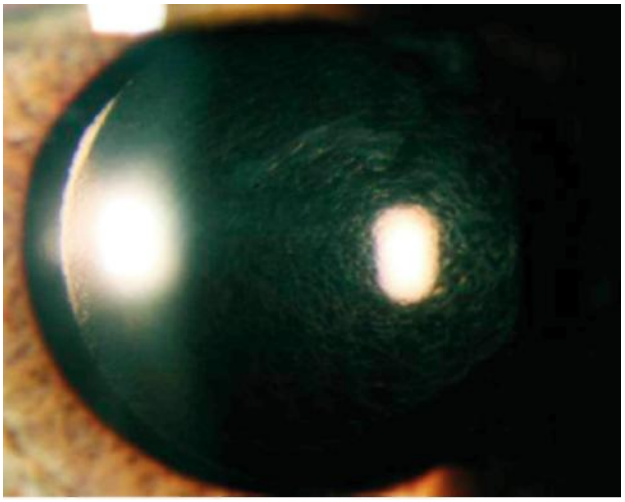

Figure 1. Posterior capsule haziness
Rycina 1. Przymglenie torebki tylnej

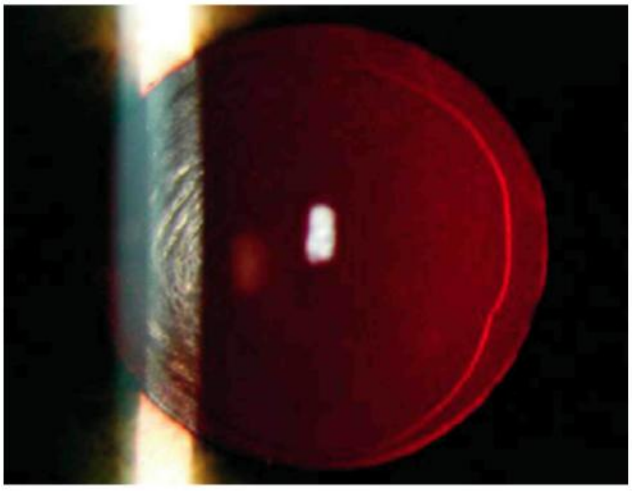

Figure 2. Posterior capsule folding
Rycina 2. Pofałdowanie torebki tylnej

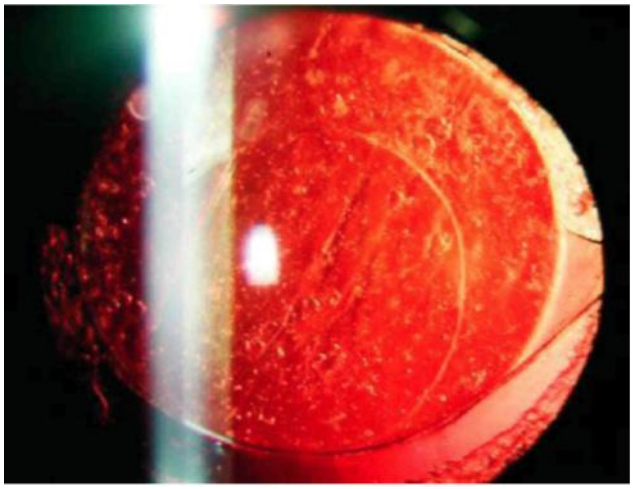

Figure 3. Elschnig pearls
Rycina 3. Perły Elschniga

- Sommering's ring - occurs less often in the age of modern cataract surgery (Fig. 5). It is a circular ring formed from regenerating, cortical fibers left during surgery and residual LEC which undergo proliferation in the closed intracapsular space. [10]. However, the ophthalmologists rarely deal with a single clinical type of PCO. The most common are mixed forms that may significantly reduce good visual function.

The aim of the modern cataract surgery is not only to remove the cataract, but, above all, to provide a quick visual rehabilitation. Increasing attention is being given

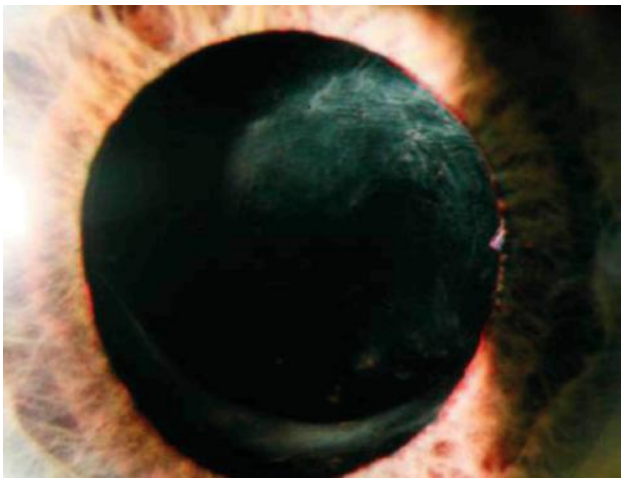

Figure 4. Posterior capsule fibrosis
Rycina 4. Zwłóknienie torebki tylnej

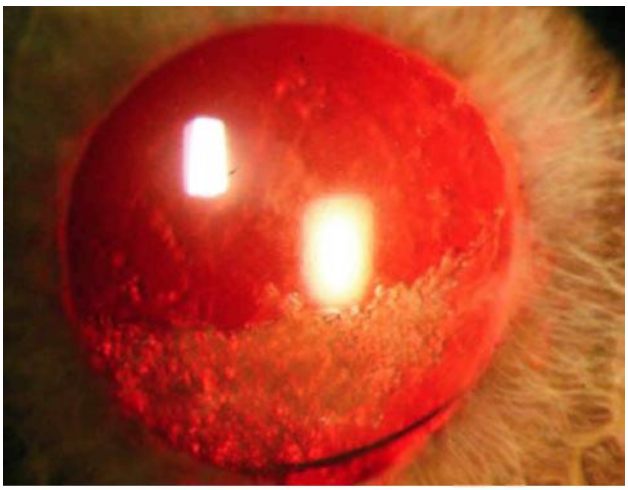

Figure 5. Sommering's ring
Rycina 5. Pierścień Sommeringa

to the patient's quality of life after surgery. Patients expect a quick return to work and common life activities. Perfectly performed surgery is not enough for the patient's satisfaction, it is also important that the patient can continue to take advantage of good visual acuity. Unfortunately, the late postoperative stage may involve deterioration of the visual function associated with the loss of transparency of optical centers due to posterior capsular opacification. A detailed understanding of the pathophysiology of PCO development helps ophthalmologists to use the most adequate method of prevention, while the knowledge of clinical symptoms allows the correct diagnosis of PCO and the initiation of adequate treatment.

Conclusions

1. PCO includes various types of disorders of transparency of the posterior surface of the lens capsule in the late stage after cataract surgery.
2. Lens epithelial cells type A and E are mainly responsible for this process.
3. The main clinical symptom is a decrease in visual acuity that is proportional to the opacity level and the number of proliferating LEC.
4. Detailed knowledge of pathophysiology and clinical symptoms is a significant element in the prevention and treatment of PCO.

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GMA and LCAP as new methods of treatment for ulcerative colitis

Afereza granulocytowo-monocytowa i leukocytafereza jako nowe metody leczenia wrzodziejącego zapalenia jelita grubego

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Abstract. Ulcerative colitis belongs to a group of diseases known as inflammatory bowel disease (IBD) and is a chronic inflammatory disease of the gastrointestinal tract, with periods of intestinal inflammatory activity and remission. This article describes new methods of treatment for ulcerative colitis, which are effective and safe in the induction and maintenance of remission: GMA - selective granulocyte and monocyte/macrophages adsorptive apheresis and LCAP - leukocytapheresis. They are alternatives to biological treatment and help taper down the dose of the drugs used in the conventional treatment.
Key words: Adacolumn, GMA-selective granulocyte and monocyte/macrophages adsorptive apheresis, LCAP-leukocytapheresis, ulcerative colitis, ulcerative colitis treatment

Streszczenie. Wrzodziejące zapalenie jelita grubego należy do grupy nieswoistych zapaleń jelit i jest przewlekłą chorobą przewodu pokarmowego, przebiegającą z okresami remisji i nawrotów. Artykuł przedstawia nowe metody leczenia wrzodziejącego zapalenia jelita grubego, efektywne i bezpieczne w indukcji i podtrzymaniu remisji choroby, takie jak afereza granulocytowo-monocytowa oraz leukocytafereza. Stanowią one alternatywę dla leczenia biologicznego i pozwalają zmniejszyć dawki leków stosowanych w leczeniu konwencjonalnym.
Słowa kluczowe: Adacolumn, afereza granulocytowo-monocytowa, leczenie wrzodziejącego zapalenia jelita grubego, leukocytafereza, wrzodziejące zapalenie jelita grubego

Delivered: 01.03.2013.
Accepted for print: 20.12.2013
No conflicts of interest were declared.
Mil. Phys., 2014; 92(1): 106-111

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Ulcerative colitis constitutes a serious clinical problem [1]. The etiopathogenesis and development of ulcerative colitis is dependent on genetic, immune and environmental factors [2]. Clinical practice reveals that genetically predisposed individuals may develop inflammatory bowel disease mostly due to an inappropriate immune response to microorganisms in the gut flora. It has been proven that the saprophytic gut flora of patients with ulcerative colitis is diminished in favor of sulfate-reducing bacteria and *Escherichia coli*. An impaired innate immune mechanism is observed as well, which is reflected in the lowered level of immunoglobulin A in the mucous membrane and impaired phagocytosis [8]. Whereas specific gene variants are commonly recognized risk factors in the susceptibility of the development of ulcerative colitis, few environmental factors affect the course of the disease or function as life risk factors for its development. Proven environmental factors that significantly contribute to the development of ulcerative colitis include tobacco smoking, exposure to infection with intestinal pathogens, appendectomy, antibiotic therapy and administration of oral contraceptives.

The above factors do not prompt the development of the disease on their own but they may be significant in genetically predisposed individuals. Critical immunopathogenetic factors in the development of the disease (such as intestinal bacteria, mucosal barrier and immune response within the mucous membrane) have yet to be defined. It appears that the most known and well-defined factor of the above is mucosal immune response. What has most significantly aided the development of modern and promising forms of treatment of ulcerative colitis is our knowledge of the role of immune response in the pathogenesis of the disease. Discussions on the immunopathogenesis of ulcerative colitis are not only highly relevant in relation to the cognition of the pathophysiology of the disease, but also allow us to better understand the mechanisms and rational therapeutic indications for a wide array of recently developed and future forms of its treatment.

The intestinal immune system is characterized by a unique organizational structure. It encompasses physiological inflammation and mechanisms suppressing the immune response (food tolerance). It is also responsible for the production of immunoglobulins. During the course of the disease, inflammatory mediators are overproduced in relation to anti-inflammatory substances. Both types of cytokines are produced thanks to cells engaged in specific and non-specific inflammatory responses (lymphocytes, T helper cells, Wells, macrophages and dendritic cells). Ulcerative colitis patients have a prevalent subpopulation of Th2 cells producing the interleukins IL-4, IL-5, IL-6, IL-10 which are responsible for the humoral immune response featuring an increased synthesis of proinflammatory cytokines TNF-α, IL-1β, IL-8, IL-12 and antibodies [9] (including autoantibodies against perinuclear antineutrophil cytoplasmic antibodies (pANCA)) [9,3]. Ulcerative colitis is characterized by an imbalance between proinflammatory and anti-inflammatory cytokines [12]. Inflammation occurs within the mucous membrane of the large intestine, which is caused by activated granulocytes and monocytes/macrofages infiltrating the intestinal mucous membrane. They are the main source of proinflammatory cytokines (TNF-α, IL-1β, IL-6, IL-8, IL-12, IL-23), free oxygen radicals and matrix metalloproteinases [10,13,20,22,27].

Ulcerative colitis is a non-specific inflammatory disease and the observed macro- and microscopic changes have a diffuse and superficial character that is restricted to the mucous membrane of the large intestine [1,26].

The course of the disease features periods of exacerbation (relapse) intersected by remission periods of varied length [1,26]. Primary clinical symptoms include diarrhea, gastrointestinal bleeding and, at times, abdominal pain and body weight loss. According to the Montreal classification and its pediatric modification (Paris classification), one may differentiate between several types of ulcerative colitis [25,26], depending on where specifically the disease occurs. The clinical evaluation of the severity of bouts of the disease is made based on the Truelove and Witts scale, clinical activity index (CAI) and ulcerative colitis disease activity index (UCDAI) or Mayo scale, which involve the endoscopic evaluation of the intestinal mucous membrane. Samples collected from endoscopy test undergo histopathological evaluation [1].

Conventional and new methods of treatment for ulcerative colitis

The basic aim of ulcerative colitis treatment is to manage clinical symptoms to induce remission and maintain it at a later stage. The choice of treatment method is dependent on the severity of clinical symptoms of the disease. Treatment of ulcerative colitis is dependent on the severity of the bout of the disease and the location of inflammatory changes within the mucous membrane of the large intestine [1].

Patients with severe bouts usually require more aggressive treatment, whereas patients suffering from milder forms of the disease may need a minor behavior correction. We should always remember, however, that pharmacotherapy involves the risk of adverse effects. Such risk should be thoroughly assessed in the context of possible therapeutic benefits. One should also remember that adverse effects are frequently independent of drug dose and therefore every patient should be considered individually. Currently, steroid therapy is a frequent subject of both discussion and controversy. It seems that an important goal of treatment is to induce remission without the use of steroids. According to some authors, induction of remission without the use of steroids is necessary if a treatment is to be evaluated positively.

The traditional model of treatment includes:

- 5-aminosalicylic acid (sulfasalazine, mesalazine, olsalazine) preparations;
- glucocorticoids (prednisone, hydrocortisone, methylprednisolone, budesonide);
- immunosuppressive drugs (6-mercaptopurine and azathioprine, methotrexate, cyclosporine), generally used in patients with steroid resistance and steroid dependence.

Unfortunately, long-term conventional therapy carries the risk of adverse effects and the development of steroid dependence [1]. An alternative solution to conventional treatment, especially if steroid resistance occurs [1], is to apply biological therapy by the use of monoclonal antibodies against TNF-α, i.e. infliximab (IFX) and adalimumab (ADA).

Conventional treatment is associated with a number of adverse effects. Possible adverse effects of 5-aminosalicylic acid preparations are the following: nausea, vomiting, diarrhea, abdominal pain, headache, anorexia, macrocytosis, hemolytic anemia, urticaria, transient oligospermia, fibrosing alveolitis, eosinophilic pneumonia, liver and kidney damage, lupus-like symptoms, peripheral neuropathy, and alopecia [41].

It has been observed that patients with systemic glucocorticoid treatment display symptoms of Cushing syndrome, which includes acne, obesity, moon faces, sleep and mood disorders, incorrect glucose tolerance, myopathy, dyspepsia, hypertension, hormonal, endocrine disruption, osteoporosis, pathological fractures. Cataracts can occur and susceptibility to infections increases as well [40]. Adverse effects of immunosuppressive drugs:

- 6-mercaptopurine and azathioprine: bone marrow suppression (mainly leukopenia, thrombocytopenia), pancreatitis, hepatotoxicity, nausea, vomiting, abdominal pain, opportunistic infections, and lymphoma [7,40];
- methotrexate: leukopenia, nausea, vomiting, liver fibrosis, allergic pneumonia, lung fibrosis, and congenital anomalies in the fetus;
- cyclosporine: hypertension, seizures, paresthesia, tremor, gum hyperplasia, hirsutism, electrolyte abnormalities, kidney damage, and opportunistic infections.

Biological therapy that includes INX and ADA treatment can cause infections [34]; other reactions resulting from the administration of the drugs include: injection site reactions, headache and dizziness, nausea, fever, chills, chest pain, coughing, shortness of breath, difficulty in swallowing, itching, rash, urticaria, muscle aches, joint pain, lupus-like symptoms, lymphoproliferative disorders, and tumors [7,40].

It is necessary to exclude any active infection before the administration of immunosuppressive drugs and before the start of biological therapy; this requires screening for tuberculosis, viral hepatitis, viral and bacterial causes of inflammatory bowel disease [7,34].

In view of the pathogenetic conditioning of the disease and the role of leukocytes in the development of the disease, it has been decided that the apheresis (removal) of peripheral blood leukocytes in extracorporeal circulation is an effective and safe method of ulcerative colitis treatment [13], which results in the lowering of the level of proinflammatory cytokines [20]. Currently, there are two methods: granulocyte and monocyte adsorptive apheresis (GMA) and leukocytapheresis (LCAP).

Adverse effects associated with GMA and LCAP are the following: mild, transient headaches lasting up to 3 hours [38], dizziness, fever, chills, chest pain, balance disorder, nausea, vomiting, anemia, increased liver enzymes, abdominal pain, diarrhea, transient hypotension, malaise, shortness of breath, feeling of palpitation, rash, reduction in the number of leukocytes, reduction in platelet count, and paresthesia [10, 17, 30]. Some of the adverse effects have been associated with the replacement of heparin with another anticoagulant (nafamostat mesilate) during the apheresis procedure [13]. Most of the reported and listed adverse effects had a mild character and they frequently resulted from the technical aspect of apheresis (difficulties in gaining vascular access, setting the appropriate speed of blood flow, increase in systemic venous pressure, problems with coagulation and the return of blood) [17].

The GMA procedure involves the removal of activated granulocytes and monocytes/macrophages from the peripheral blood (by the use of the Adacolumn device). LCAP removes circulating lymphocytes, granulocytes and monocytes (by the use of Cellsorba), which reduces the level of proinflammatory cytokines and improves the clinical condition of patients [10, 11, 13].

There are two medical devices on the European and Japanese markets that are dedicated to GMA and LCAP procedures: Adacolumn (Japan Immunoresearch Laboratories Co., Ltd; Takasaki, Gunma, Japan) and Cellsorba (Asahi Medical, Japan) [19].

The Adacolumn is a column of 335 ml capacity; it is filled with 220 g of cellulose acetate microspheres (approx. 35,000 microspheres) 2mm in diameter, which are immersed in sterile saline and selectively adsorb for approx. 65 percent of granulocytes, 55 percent of monocytes/macrophages and a small number of lymphocytes (2 percent) [13,17].

Cellsorba is an adsorption column made of a polyester fiber filter and it removes 90-100 percent of granulocytes and monocytes as well as approx. 30 percent of platelets from peripheral blood within the first 30 minutes of the procedure [13].

Operation of the Adacolumn

Blood from the cephalic vein flows through the Adacolumn device at a speed of 30-50 ml/min and it returns to the same vein located in the second forearm of the patient. Apheresis made by the use of Adacolumn lasts about 60 minutes; the device filters about 2-3 l of blood during that time [10]. Heparin is added to blood that flows from the patient to the Adacolumn [13]. By default, the procedure is carried out once a week for 5-10 weeks in order to reduce remission [19], and once a month to maintain remission [24,35].

On the molecular level, cellulose acetate microspheres combine themselves during apheresis with the immunoglobulins and immune complexes of the patient's plasma and they activate the complement system.

The above opsonins allow leukocytes with Fc gamma R receptors and CR3 complement component receptors to adhere to a cellulose acetate hemisphere, which means that selective removal of monocytes/macrophages, a small number of CD19-B lymphocytes and CD56-NK cells occurs (natural killers) [13,20].

GMA induces other anti-inflammatory processes such as:

- increase in the number of CD34+ cells, including CD10, immature neutrophils from the bone marrow, which have fewer proinflammatory properties than mature neutrophils [13,36]
- decrease in the number of proinflammatory monocytes (CD14(+) and CD16 (+)), and increase in the number of T CD4 (+) lymphocytes [39,20],
- reduced level of circulating L-selectin and increase in the level of CD11b/CD18 (Mac-1), which slows down the process of rolling leukocytes along the vascular endothelial surface and thus reduces the migration of granulocytes and the process of infiltration of the intestinal mucous membrane [13]
- reduced the expression of TLR2 on granulocytes. TLRs participate both in the innate immunity against pathogens and in the acquired immunity; however, if activated mistakenly, they can exacerbate inflammatory response by promoting the production of proinflammatory cytokines, namely IL-1β, IL-8 and INF-α [20]
- decrease in the level of proinflammatory cytokines such as IL-1β and IL-8, which activates the chemotaxis of neutrophils [20].

Application of GMA and LCAP in clinical practice

A number of randomized studies carried out in Europe and in Japan proves that apheresis is a safe and effective form of immunomodulatory therapy [4].

A total of 53 centers in Japan conducted a large study where a group of 656 patients with ulcerative colitis underwent Adacolumn-assisted GMA therapy for 7 years (1999-2006). Patients were between 14 and 18 years of age and the male sex predominated. At the beginning of the study, 92 percent of the subjects were treated with aminosalicylates, 74 percent with prednisolone and 9 percent with immunomodulatory drugs. About 40 percent of the subjects suffered from a severe form of ulcerative colitis and more than 70 percent of the subjects displayed ulcerative colitis resistant to conventional treatment. 77.3 percent gave overall positive response to the treatment (remission or considerable improvement) and the percentage of remission based on CAI was 71.7%. Endoscopic assessment revealed that the applied treatment method healed the intestinal mucosal membrane effectively. The condition of patients who underwent at least 6 aphereses was considerably better than those who underwent 5 aphereses or less. No severe adverse reactions were reported in the observed groups of patients with regards to apheresis therapy.

Moderate symptoms such as headache, fever, chest pain, and balance disorder were observed in 7.7 percent of the subjects. GMA may become a safe alternative to biological treatment, especially in patients resistant to conventional methods of treatment [17,18].

Another Japanese study presented the results of the long-term effectiveness of leukocytapheresis as a method for the treatment of ulcerative colitis. The study was carried out for a period of 36 months and it encompassed 47 subjects with ulcerative colitis and CAI > 7, who underwent 10 leukocytaphereses within 10 weeks. Leukocytapheresis supplemented conventional treatment (mesalazine and steroids). Remission was observed in 33 of the 47 subjects (70.2 percent) and 22 of the 33 (60.6 percent) subjects in remission completed their steroid therapy [16].

Similar results were achieved in a 15-person group of subjects with ulcerative colitis and a 25-person group of subjects with Crohn's disease whose active chronic inflammation resisted conventional treatment. They underwent 5-10 GMA aphereses. Clinical activity and DAI (disease activity index) were assessed at the beginning of the study and after each of the series of apheresis procedures; additionally, endoscopy was performed during the tenth and the twentieth week of the study. 85 percent of the subjects gave a positive clinical response to the apheresis treatment and 65 percent achieved complete remission. 10 subjects with ulcerative colitis (66 percent) and 16 subjects with Chron's disease (64 percent) achieved clinical remission and endoscopic remission which was maintained for 14 months on average [29].

Other studies have proven that apheresis effectively induces remission of mild to moderate ulcerative colitis, especially in its steroid-dependent or steroid-resistant form [15,22] and in patients with a short disease history who did not undergo prior glucocorticoid treatment and suffered from the first bout of ulcerative colitis [28,37].

GMA is a safe and effective method of treatment also in children with steroid dependent and steroid resistant forms of the disease (the study was conducted on a group of 37 children aged 5-17 years old who suffered from inflammatory bowel disease) [33].

It has been observed that GMA heals the intestinal mucosal membrane more frequently in patients whose endoscopic image revealed moderate changes than in those who displayed severe changes [32].

Numerous meta-analyses of clinical studies on several hundreds of subjects with ulcerative colitis emphasize benefits of LCAP and GMA.

They reveal that LCAP and GMA are safer and more effective than long term conventional treatment [10] and that GMA effectively increases the percentage of responses and remissions, allows patients to receive lower doses of steroids and is tolerated better than conventional treatment. (meta-analysis of nine randomized controlled studies on 686 subjects with ulcerative colitis) [21].

Moreover, GMA in patients with ulcerative colitis induces a larger number of clinical remissions than conventional treatment, as revealed by the meta-analysis of seven randomized studies conducted since May 2008 (594 subjects undergoing GMA once a week for 5-10 weeks) [19]. GMA is therefore a more effective method for the treatment and achievement of remission than continuation or intensification of conventional pharmacological treatments and it involves a smaller number of adverse effects than long-term steroid treatment [19].

Both GMA and LCAP are approved by the Japanese Ministry of Health, Labor, and Welfare as forms of treatment for ulcerative colitis. They are also used in Europe and have received European CE certification.

Summary

Granulocyte and monocyte adsorptive apheresis and leukocytapheresis are effective and safe methods for the induction and maintenance of remission, especially in patients suffering from mild to moderate steroid-dependent or steroid-resistant forms of ulcerative colitis and undergo immunosuppressive and biological treatment [31].

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War experiences of "Military Physician"

Losy wojenne „Lekarza Wojskowego”

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Abstract. The article discusses "Military Physician", a medical Journal published in Edinburgh in the years 1941 to 1946, being a reference to its pre-war editions, with Stanisław Konopka as a Chief Editor, and appearing in Warsaw between 1920 and August 1939. In Scotland, the journal acted as an organ of The Polish Military Medical Society in the United Kingdom. "Military Physician" was reactivated in Poland in 1945. This paper presents the history of the journal between 1941 and 1946 and makes a qualitative analysis of individual volumes in respect of themes and subjects published in each issue. Complete annuals from the wartime period "Military Physician" were analyzed, as well as the documents relating to the setting up and activity of the Polish Medical Faculty at the University of Edinburgh. The Edinburgh edition comprises 89 articles dedicated to both military and general medicine, with slightly more articles on general medicine.
Key words: periodicals - history, 20th century history of medicine

Streszczenie. Artykuł zawiera omówienie czasopisma „Lekarz Wojskowy", ukazującego się w latach 1941-1946 w Edynburgu i nawiązującego do edycji przedwojennej, której redaktorem do dnia wybuchu II wojny światowej byt Stanisław Konopka. Czasopismo wydawane było od roku 1920 do sierpnia 1939 roku w Warszawie; w Szkocji było organem Towarzystwa Naukowego Lekarzy Polskich Sił Zbrojnych. W Polsce powojennej czasopismo zaczęło się ukazywać ponownie od 1945 roku. Przedstawiono historię czasopisma w latach 1941-1946 oraz dokonano analizy jakościowej poszczególnych tomów pod kątem tematyki publikowanej w poszczególnych zeszytach. Do analizy wykorzystano kompletne roczniki edycji wojennej „Lekarza Wojskowego". Korzystano również z opracowań dotyczących powstania i działalności Polskiego Wydziału Lekarskiego w Edynburgu. Edycja edynburska zawierała 89 artykułów, poświęconych zagadnieniom zarówno medycyny wojskowej, jak i medycyny ogólnej i w ostatecznych liczbach ten stosunek był w niewielkim stopniu korzystniejszy dla medycyny ogólnej.
Słowa kluczowe: czasopisma-historia, historia medycyny XX wieku

Received: 02.09.2013 Accepted for print: 20/12/2013 No conflicts of interest were declared. Mil. Phys., 2014; 92(1): 112-117 Copyright by Military Institute of Medicine

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"The victor is not victorious if the vanquished does not consider himself so."

Quintus Ennius, c. 239 - c. 169 BC

History of origins

The war history of "Military Physician" was closely tied to the experiences of Polish soldiers, scattered across the world by the winds of the Second World War. Following the failure of the Polish territorial defense of September 1939, thousands of Polish soldiers and refugees found themselves outside occupied Poland. Professor Antoni Jurasz[1] recalled the course of events, the actors of which were military physicians: "In June 1940, which was after the disaster that befell France, part of the Polish Armed Forces ended up in Great Britain, or more specifically, in Scotland. There was a large number of Polish military doctors in one of the camps there. Colonel Irvin Fortescue, the then liaison officer between the British authorities and the Polish Armed Forces Command in Scotland, having learnt that not all Polish doctors would find employment during the reassembly of the Polish army, moved with a proposal to have specialist doctors temporarily assigned for internship at the Military Hospital in Edinburgh, and to make the first contact with the local medical circles. The commander of that military hospital was Lt. Col. Professor Crew[2]; not only did he approve of Fortescue's project, but also followed with a project of his own. When Crew learned that the Polish medical corps in Scotland featured a large number of lecturing professors from Polish medical faculties, as well as many graduates and undergraduates from Polish MD faculties, he put forward an idea to coordinate with the College of Medicine at the University of Edinburgh and establish the Polish Army Medical School therein.

By Crew's reasoning, this would enable the Polish professors and lecturers to carry on with their scientific work, and enable the graduates and undergraduates to complete their studies" [1].

Professor Jurasz did not mention his own contribution to the establishment of this Polish Army Medical School, the inauguration ceremony of which took place on 22 March 1941 with attendance of the President of the Republic of Poland, Władysław Raczkiewicz, British Crown officials and the University authorities. In his speech the Lord President of the University of Edinburgh referred to the courage of Polish soldiers, stating that the establishment of the Polish Faculty was also "(...) an acknowledgement of the bravery of Polish soldiers during the Battle of Britain" [2]. The first trimester began three days later.

The level of vocational education maintenance and the unity of medical doctors in Scotland were also favored by the initiative to found the Polish Military Medical Society in the United Kingdom of Great Britain (abstract from the Order of the Day of the 1st Corps Command No. 76 section 5, dated 5 April 1941). The Scientific Society was then established by high ranking officers of the 1st Corps who were staged in Scotland at the time [3]. The title of Society Chairman was bestowed on Col. Bolesław Pawłowski, MD[3] while Henryk Długosz, MD became its first Secretary. The Society came up with the initiative to issue a magazine under the title "Military Physician", the purpose of which in that foreign land was to publish the reminiscences of the war, which "would not only be of historical value, but also demonstrate the due performance of the Polish medical services in this war so far" [4]. The intent was to cover the issues relating to wartime healthcare in military units, the theatre of war, and civilian organizations. Moreover, the editorial staff would accept articles concerning general medicine, including contributions from English doctors.

The editorial staff

The first issue published abroad was captioned by the editors as follows: "The previous issue of *Military Physician* was published in August 1939. The present issue is appearing now, in July 1941. The former appeared in Warsaw, while this one is published 'somewhere in Scotland' on free and hospitable British soil. Both issues are separated by time and space. The space of the whole Europe. By 2 years of war" [4].

Since the first issue of "Military Physician" the concept would stand to closely collaborate with Czech doctors: "Invigorated by the shared spirit of fight for independence of our countries and scientific liberties which have been so dearly tormented in the Czech Republic and Poland, the medical doctors of the two nations have laid the common foundations for a harmonious and friendly cooperation in medicine" [5].

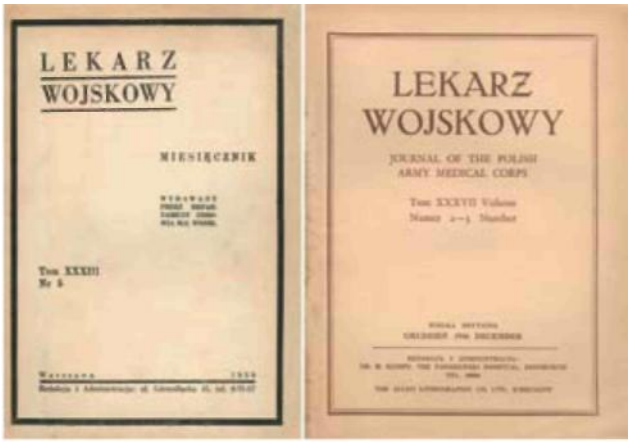

Figure. Covers of "Military Physician" from 1939 and 1946
Rycina. Okładki „Lekarza Wojskowego" z 1939 i z 1946

The editorial staff of "Military Physician" referred to the pre-war issue by numbering the first volume published in Scotland with the consecutive number: "Vol. 34". There was a certain inconsequence in the numbering of the journals, with the last of the 'Warsaw era' published in August, whereas the Edinburgh journals began appearing from "No. 1". Number 1 of Volume 34 was dated July 1941 and titled (in Polish): *"Lekarz Wojskowy" The magazine of military health services, medicine and hygiene. Published by the Polish Military Medical Society in the United Kingdom of Great Britain (TNL WP)*. The caption below read in English: "Journal of the Polish Army Medical Corps". Organ of the Polish Military Medical Society (Fig.).

The Editorial Committee was formed by the Editor-in-Chief, Zygmunt Żołędziowski, who held that position until 1945, and the editorial staff of Leonard Chat, MD; Zbigniew Godłowski, MD, Stefan Strumieński, MD, and Edward Rużyłło, MD (no. 1 and 2 of 1941). A total of 29 members were appointed to the Editorial Committee, with 3 from the original 'Warsaw era' Committee: Jerzy Babecki, Antoni Fiumel and Tadeusz Sokołowski. A large number of seats in the Committee were taken by the doctors employed at the Polish Army Medical School in Edinburgh, including Professor Antoni Jurasz, Tadeusz Rogalski[4] and Jakub Rostowski[5].

The editorial staff first changed, from no. 4 of 1942 (Vol. 35), with Stefan Strumiński as the only original staff member left and the appointment of Józef Mester. The staff members changed again on 9 March 1944, when Józef Mester stepped down and the magazine began cooperation with Jarosław Iwaszkiewicz, Henryk Kompt and Wiktor Tomaszewski. Henryk Kompt continued as Editor-in-Chief for nos. 2 and 3 of 1945 to the last issue of "Military Physician" in Scotland.

The editorial and administrative offices were originally located in Perth and moved in 1944 to The Ignacy Paderewski Hospital in Edinburgh. Printing was handled by Thomas Nelson and Sons, ltd.

The journal was supported by contributions from members of the Polish Military Medical Society, and its circulation grew to 1200 copies in the last year of publishing. The journal was directed first towards those Polish doctors who served in the army, the air force and the navy; yet it would reach a much wider audience, including the centers of Polish refugees outside the United Kingdom. The magazine was mainly circulated by the Kościuszko Foundation and the Polish Association of Medical Doctors and Dentists in the United States, which delivered the issues to the centers of Polish immigrants in America. The editorial staff took great care to secure the reception of "Military Physician" among the top representatives and organizations of medicine, as well as libraries, archiving institutions, and editors of medical journals in various parts of the globe [6]. The individual numbers varied in the number of pages and published papers. The issue was irregular, with only 13 numbers, including two doubles across 6 years.

The journal was printed on quality paper and the graphical layout did not vary between the individual numbers. Nearly all the articles were devoid of figures. What was distinctive about the magazine was the numerous advertisements, both on the covers and inside, with their publishing rights held solely by The Carlton Berry Co. of London.

The Edinburgh edition of "Military Physician"

Over 1,000 pages of 13 numbers of the Edinburgh edition were studied with the subjects of individual volumes. For the purpose of comparison, the division of contents was made into two groups: military medicine topics and general medicine topics. Moreover, both groups were classified according to specializations they concern. A total of 4 volumes of "Military Physician" were published in Edinburgh (see Table 1).

The contents of articles in "Military Physician" between 1941 and 1946 cover aspects of both military and general medicine. A total of 89 original, case study and reference articles were published. Table 2 shows the list of articles published in specific volumes and reveals that military medicine is the general subject of 45% of all the content. The table also shows that the content subjects began to shift from Vol. 36, an effect of appointing the new editorial staff. The detailed topical distribution of the journal is shown in Table 3. The largest number of articles is dedicated to general medicine at 28.1% of all issues covered in the journal. The next two most frequently recurrent specializations were communicable diseases (19.1%) and surgery (13.5%).

Table 1. "Military Physician" - Edinburgh edition
Tabela 1. Edycja edynburska „Lekarza Wojskowego"

Vol. no.	Year of issue	Numbers
34	1941 to 1942	1 (July 1941) 2 (September-October 1941) 3 (February-April 1942) 4 (June-July 1942) 5 (August-October 1942)
35	1942-1944	1 (November 1942 - January 1943) 2 (February-July 1943) 3 (February-July 1944)
36	1945	1 (February 1945) 2-3 (August 1945) 4 (December 1945)
37	1946	1 (February 1946) 2-3 (December 1946)

There is also a relatively large number of papers on laryngology (11.2%). The strictly military subject matter, i.e. the organization and tactics of health services amounted to a mere 9% of all published works. The detailed division of specializations by topics is shown in Table 4. The largest portions of the military medicine topics are surgery and communicable diseases, and the lead topic of general medicine is internal medicine.

Discussion

The contents according to the concept of the editorial staff concerned the then valid problems of health issues as related to war. The first number had two articles only, both concerning military medicine: one by Tadeusz Sokołowski and titled *O leczeniu ran* (Treatment of wounds), the other by Jan Kwoczyński: *Służba zdrowia brygady w warunkach pustynnych* (Brigade-level management of healthcare in a desert environment). The issue amounted to 24 pages and apart from the articles, the contents also included abstracts from *Medical Research Council* (1940), the reports of the Polish Military Medical Society sessions, and the "Varia" column featured the *Report from the Rockefeller Foundation Director in Europe* as well as *The notice of medical doctors' shortage in Great Britain*. Volume 1 had 5 numbers issued between July 1941 and October 1942; it contained 19 original papers, case reports and review articles on a total of 318 pages. The topics included *W sprawie epidemiologii duru plamistego w Polsce i Rosji* (On the epidemiology of typhus fever in Poland and Russia) by Leon Owczarewicz, *Leczenie ran bakteriofagiem,* (Bacteriofageal treatment of wounds) by Bolesław Szarecki, and *Schorzenia wśród żołnierzy polskich w Szkocji na podstawie materiału Izby Chorych jednego z obozów, w lecie 1940* (Disorders among Polish soldiers in Scotland: reference material of a selected military camp clinic from the summer of 1940) by Henryk Długosz.

Table 2. List of articles included in individual volumes with regard to military or general medicine subjects
Tabela 2. Zestawienie artykułów zamieszczonych w poszczególnych tomach z uwzględnieniem tematyki medycyny wojskowej i medycyny ogólnej

Subject type	Vol. 34	Vol. 35	Vol. 36	Vol. 37	Total
military medicine topics	15	8	11	5	40
general medicine topics	4	8	16	21	49

Table 3. List of articles included in individual volumes according to medical specialization
Tabela 3. Zestawienie artykułów zamieszczonych w poszczególnych tomach według specjalności

Specialization	Vol. 34	Vol. 35	Vol. 36	Vol. 37	Total	Percentage
general medicine (internal medicine, endocrinology, and dietetics)	5	3	9	8	25	28.1
communicable diseases, hygiene and epidemiology	3	5	4	5	17	19.1
surgery and orthopedics	7	3	2	-	12	13.5
laryngology	-	-	5	5	10	11.2
health service organization and tactics	3	1	2	2	8	9
dental and maxillofacial surgery	-	2	3	1	6	6.8
neurology, psychiatry and psychology	-	1	2	1	4	4.5
gynecology	-	-	1	2	3	3.4
radiology	1	1	-	-	2	2.2
varia	-	-	1	1	2	2.2

Table 4. List of articles included in individual issues according to specialization and divided into military or general medicine subjects
Tabela 4. Zestawienie artykułów zamieszczonych w poszczególnych tomach według specjalności z uwzględnieniem podziału na zagadnienia medycyny wojskowej i medycyny ogólnej

Specialization	Vol. 34	Vol. 35	Vol. 36	Vol. 37	Total
military medicine topics					
health service organization and tactics	3	1	2	2	8
field surgery and orthopedics	7	3	1	-	11
laryngology	-	-	5	-	5
field internal medicine	2	1	2	-	5
communicable diseases, hygiene and epidemiology in the military	3	3	2	3	11
general medicine topics					
surgery and orthopedics	-	-	1	-	1
general medicine (internal medicine, endocrinology, and dietetics)	3	2	7	8	20
communicable diseases	-	2	2	2	6
laryngology	-		0	5	5
dental and maxillofacial surgery	-	2	3	1	6
neurology, psychiatry and psychology	-	1	2	1	4
gynecology	-	-	1	2	3
radiology	1	1	-	-	2
varia	-	-	1	1	2

Each number contained reports from the sessions of the Polish Military Medical Society, announcements and abstracts. In Number 4 the editorial staff announced the opening of the column titled *Z życia Polskiego Wydziału Lekarskiego przy Uniwersytecie w Edynburgu* (The life of the Polish Army Medical School at the University of Edinburgh), "(...) the only Polish University now to continue teaching and scientific work for Polish medical knowledge" [7]. That column in the next number of "Military Physician" featured the list of military doctors held as POWs in German Nazi camps, who reported the demand for food packages and essential clothing.

Volume 34 No. 3 and Volume 35 No. 2 were dedicated in full to the two conventions of Czech and Polish doctors, which were held on 11 and 12 September 1941, and on 7 and 8 October 1942, respectively, in Edinburgh. A total of 9 works on military medicine were published on that occasion, 4 of which covered the topics of surgery. The two volumes included the speeches by the Convention chairmen, Professor Antoni Jurasz and Reader Josef Składał, complete with lengthy abstracts of the Convention papers.

Volume 35 includes 3 numbers only, issued between November 1942 and July 1944. The issues were delayed both by personnel changes in the Polish Military Medical Society and the editorial staff. The military doctors were sent to the 2nd Corps in the Middle East and were replaced by doctors who had been drafted when the war began [8]. The change affected the journal contents and the subjects about military medicine yielded to general medical topics. Number 3, which covers February to July 1944, featured 6 papers in the following areas: dietetics (1), the pathology of syphilis (1), tuberculosis (1), post-sulphamide psychotic conditions, disorders of the oral cavity and the congenital partial absence of dentation. The volume has 16 articles and recurrent columns on a total of 275 pages.

The first number of Volume 36 (February 1945) is dedicated to military aviation. It features 9 works, for example by Col. Antoni Fiumel, MD on *Służba zdrowia w lotnictwie polskim* (Health services in Polish military aviation from 1928 to 1939), the issues of hearing organs in airmen, nocturnal adaptation, and air evacuation of the sick and wounded. The next numbers of the volume also appeared that year, i.e. nos. 2-3 dated August 1945 and no. 4 in December 1945. The double number issue begins with the article by Antoni Jurasz: *Former and post-war health problems in Poland.* The volume mainly focused on general medicine, as exemplified by Jarosław Iwaszkiewicz's *W sprawie leczenia ostrego zapalenia ucha środkowego sulfamidami*, (On the treatment of ostitis media with sulphonamides or Jerzy Dekański's *Farmakologia ruchowych zakończeń nerwowych* (The pharmacology of locomotor nerve endings). The articles, reports and announcements total 193 pages.

During the Polish Military Medical Society's session of 10 December 1945 an initiative was undertaken to cooperate closely with the Association of Polish Medical Doctors of the British Empire. The General Management was to organize an editorial committee to collect and edit the material for print in "Military Physician". The next number had already secured 20 pages of print for the Association.

Volume 37 includes two numbers only; no. 1 was published in February 1946 and the double issue nos. 2-3 followed in December that year. This was also the last volume of the Edinburgh edition of "Military Physician". Among all works published therein, only 5 articles touched on military medicine, with 2 relating to actual war events: *Służba zdrowia 5 Kresowej Dywizji Piechoty w bitwie o Monte Cassino* (Health services of the 5th Borderlands Infantry Division during the Battle of Monte Cassino) by Gotfryd Kaczanowski (in no. 1), and *Służba Zdrowia w działaniach I. Sam. Bryg. Spad. pod Arnhem-Driel* (Health services during the operations of the 1st Autonomous Airborne Brigade at Arnhem-Driel) by Jan Golba (in nos. 2-3). The 214 pages of the volume feature 25 articles, 8 of which cover general medicine and 5 more are in the area of laryngology.

Nos. 2-3 featured the following note from the editorial staff: "The end of war and dissolution of the Polish Armed Forces abroad necessitates the transformation of this medical journal. During the time of war, *Lekarz Wojskowy* - aside from *Lekarz Wojskowy na Wschodzie* - was the only medical journal in the Polish language and serving the medical officers of the Polish military and centers of Polish emigration across the world [6].

Meanwhile the Polish edition of "Military Physician" was issued in Lublin with the date of 1 January 1945. Its evolutionary path for the next decades was determined by the words of General Michał Moczuge: "(...) the Motherland bestows duties on us and to perform them requires us to learn well the military essence of the field medicine doctrine by the rules of which the Red Army Medical and Sanitary Corps perform so superbly" [9].

The close ties between the wartime "Military Physician" and the Polish homeland are shown by the numerous notices published therein. Each number of the journal features the following message: "The editorial staff of *Military Physician* turns to you, Dear Readers, to send any information you may have about medical doctors held captive by the Germans. Please send the last name, first name, military rank, prison camp number and the prisoner ID number to the address of our staff". Number 5 reads: "Dear Colleagues! The Management of the Society calls to you affections. We are confident than no medical doctor will refrain from their core duty to our colleagues by profession who have been tormented by the misery of prisoner camps for four years now. Remember that a law applies from the first day of war to its last: *Deus mirabilis fortuna variabilis*. Please send your collected contributions to the attention of the Society's Treasurer" [10].

The post-war issues feature this call: "Considering the thorough depletion of older numbers of this journal, the Editorial Staff would like our Honourable Colleagues to return any obsolete copies you may no longer require to complete the archives of *Military Physician* for the medical libraries in our Homeland" [11], and: "The General Management would like to remind you about our campaign to collect books for the Homeland. Please send the books

to the postal address of the Association or directly to Warsaw at: S. Konopka, MD, Zakład Naukowo-Wydawniczy, 24 Chocimska St., Warsaw* [12].

Conclusion

The qualitative analysis demonstrates that "Military Physician" featured articles concerning the topics of military medicine and general medicine, and the ratio of one to the other in absolute numbers slightly favors general medicine. A large portion of the circulation is reports, latest news on events related to the Polish Military Medical Society and the Polish Army Medical School in Edinburgh, abstracts of papers from English journals, and obituaries.

"Military Physician" is the subject of several papers on the history of medical literature, and also on the history of the journal itself. In the article of 1964 titled *Historia naszego czasopisma* (The history of our journal), the authors wrote about the Edinburgh edition that "It should be assumed that *Military Physician* was not published during the war; the years of 1939 to 1945 are a gap in the historical continuity of the journal" [13]. The aforementioned Witold Brzeziński also referred to that "nonexistence" of the journal [8]. Now and 72 years following the first number of the wartime edition, we hereby give "Military Physician" its long due place in the history of Polish medical literature.

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* Stanisław Konopka was appointed as the Head of the Department of Science and Publishing at the Polish Ministry of Health and the director of the General Medical Library, which was established at that time. The facility currently houses the Polish National Institute of Hygiene and the National Institute of Public Health.

[1] **Antoni Tomasz Aleksander Jurasz** (1882-1961), a professor of surgery from 1930 to 1939 at the Medical Faculty of the Adam Mickiewicz University in Poznań; the chairman of the Polish Surgical Association and the Society of Surgeons and Orthopedists of Western Poland he established, also the president of the Polish Red Cross. During World War Two, a cofounder of the Polish Army Medical School at the University of Edinburgh and its first Reader. He also managed the Ignacy Paderewski Hospital he established in Edinburgh where he ran the surgical clinic.

[2] **Francis Albert Eley Crew** (1886-1973), Lieutenant Colonel and then Brigadier of the Army Medical Services (wartime only), Commander of the Military Hospital at Edinburgh Castle; professor and geneticist. Buchanan Professor of Animal Genetics. Honorary Professor at the Polish Army Medical School from 1941 to 1949, no lectures given.

[3] **Bolesław Pawłowski** (1892-1946), Colonel of the Polish Army, Medical Doctor of Surgery, Chairman of the Polish Military Medical Society.

[4] **Tadeusz Rogalski** (1881-1957), professor of anatomy. Research into the human nervous system and applied anatomy. Director of the Physical Education School at the Jagiellonian University. He and Professor Antoni Jurasz organized the Polish Army Medical School at the University of Edinburgh. Appointed head of the Department of Descriptive Anatomy and the first President of the Medical Academy in Krakow.

[5] **Jakub Rostowski** (1884-1971), neurologist, professor at the Jan Kochanowski University; an active member of the Polish Scientific Society Abroad during his emigration. He was Dean of the Polish Army Medical School at the University of Edinburgh from 1946 to 1949.

Hospital Pharmacy Europe Live, Birmingham, England October 29, 2013

Międzynarodowy Kongres Farmacji Szpitalnej - Birmingham, Anglia 29 października 2013 r.

Agnieszka Taracha, Michał Makles

Hospital Pharmacy, Central Clinical Hospital of the Ministry of National Defence, Military Institute of Medicine, Warsaw, Poland; Head: Małgorzata Grotowska, MPharm

Te Hospital Pharmacy Europe Live Congress was held on 29 October 2013 in Birmingham, with the focus on the problems and topics of operations and the functioning of hospital pharmacies.

The primary objective of the conferences, workshops and discussion panels was to present the role of pharmacists in the clinical practice of hospital units.

The conference had four simultaneous major panels: Security and Cost Effectiveness for Panel One and Two, respectively, whereas Panel Three and Four were workshops and discussions.

The conference was opened by Professor Arthur Lipman from the University of Utah School of Medicine (USA). The lead topic of his presentation was the stake of pharmacists in effective palliative therapy. The lecture touched upon the issues of the proper classification of pain types and the skills in precise determination of pain origins, as well as the role of pharmacists in correct selection of drugs. Clinical case studies of patients maltreated due to pain were shown. Professor Lipman also covered the issue of polypharmacotherapy and its adverse effects. When presenting the pharmacotherapy of neuropathic pain, the professor reminded everyone of the underestimated value of antiepileptics, such as pregabalin or gabapentin. The potential for use of other drugs enabling the reduction or elimination of opioid dosage was also discussed.

Doctor Linde Murdoch from St. George's Hospital in London presented a topic in therapeutic safety. Her appearance focused on the application of modern 'smart infusion pumps' in hospital wards. Smart pump technology involves the use of infusion pumps integrated with a computer system, which enable use of the data on the pumped drugs from a virtual 'drug library' for correct therapeutic performance. That systemic feedback prevents the common human mistakes occurring in drug administration via traditional infusion pumps. The showcased system of smart infusion pumps explicitly stressed the advantages in therapeutic efficacy and cost savings from shorter inpatient service. The subject of smart pumps inspired a wider follow-up presentation of the concept to the Hospital Pharmacy staff at the Military Institute of Medicine after our return home and attracted great interest of the audience.

The next lecture by Doctor Hugo van der Kuy from Orbis Medical Center in the Netherlands drew no small attention of the attendees, along with a great thrill due to the original performance (the doctor decided to depict the topic more clearly by using Edvard Munch's *The Scream*). Dr. van der Kuy showed the CLEAR investigation into the evaluation of the effect of patient's laboratory information and medical history on the quality of MR carried out by pharmacists in hospital wards.

In order to streamline the work of clinical pharmacists and increase their operating range at hospitals, Dr. van der Kuy has developed computer software which analyzes the results and records from the patient's files and finds any potential drug incompatibilities or interactions. The software runs on a set of guidelines preset as protocols. Each protocol concerns the interpretation of laboratory results; if any EBM (evidence based medicine) guidelines are exceeded, the software issues a warning concerning the specific patient's therapy.

Figure. Christine Clark MD, PhD, Editor-in-Chief of "Hospital Pharmacy Europe" with employees of the Hospital Pharmacy of the Military Institute of Medicine: Lt. Agnieszka Taracha MPharm and Michał Makles MPharm

Rycina. Na zdjęciu dr Christine Clark, Redaktor Naczelna Miesięcznika Hospital Pharmacy Europe z pracownikami Apteki Szpitalnej WIM mgr farm. por. Agnieszką Tarachą i mgr farm. Michałem Maklesem

Once they have understood the warning, the medical doctor may inspect the ordered drugs closer and correct the selection or ask a pharmacist for assistance. The operation of the software was implemented by Dr. van der Kuy as part of the SCREAM trial set between November 2013 and March 2014.

The Safety Panel closing lecture was given by a Norwegian scientist, Dr. Vagn Handlos. Dr. Handlos raised the issue of contamination of service surfaces in cytotoxic drug formulation chambers. Dr. Handlos presented mainly practical concerns towards the applied methods for detection of cytotoxic contamination on service surfaces and the circumstances which may potentially cause false positive contamination readouts.

The panel on cost effectiveness of applied therapies featured a highly interesting lecture by Professor Irene Kramer from the Medical Center of Johannes Gutenberg University Mainz, Germany The professor described mainly the diverse legal prerequisites applicable to the use of biosimilars.

Poland is among the EU member states which approve therapeutic use of biosimilars as replacements for original drugs.

Professor Kramer specifically highlighted the immunogenicity of biological and biosimilar drugs, and explained the nature of differences in that area. Thus the answer to the question made by the lecture "Can we afford not to use biosimilars?" remained inconclusive and multi-faceted.

The Workshop Panel included, among others, the implementation of the Royal Pharmacy Society standards in hospital pharmacies and wards. That workshop was hosted by pharmacists from three areas of Great Britain. They presented their proprietary methods of implementation in the hospitals in which they operated pharmacies. The presentation and its follow-up discussion showed that the prime mover for change in every pharmacy is to identify the weak spots in the chain of work and develop new methods for implementation of practice standards to eliminate the weak spots.

The workshops also focused on the essence and importance of patient compliance procedures, which apply first to the practices of post-hospitalization care and periodic follow up on compliance with prescribed drug dosage. It was stressed that application of specific guidelines helps to prevent patients from returning to hospital due to incorrect pharmacotherapy or adverse effects.

The discussion panel concerned, among other things, the cooperation between hospital pharmacists and commercial drug store pharmacists for the best pharmacotherapeutic results in patients. England is a country where bridging the gap in that cooperation has resulted in less frequent outpatient visits.

Our attendance at the Hospital Pharmacy Europe Live has confirmed our belief that England is a country which - apart many old traditions such as afternoon tea - also boasts the most advanced solutions in healthcare organization and management that should inspire changes for better.

Cardiology series: Resistant hypertension -what's new?

Cykl „Kardiologia”: Oporne nadciśnienie tętnicze - co nowego?

Katarzyna Piotrowicz, Adam Stańczyk, Beata Uziębło-Życzkowska, Paweł Krzesiński

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Beyond medications and diet: alternative approaches to lowering blood pressure: a scientific statement from the American Heart Association

Brook R.D., Appel L.J., Rubenfire M., et al. Hypertension, 2013; 61: 1360-1383

In view of the increasing number of patients with hypertension and prehypertension (division consistent with the classification of hypertension by JNC7), the American Heart Association has attempted to analyze the effectiveness of alternative antihypertensive therapies beyond standard pharmacotherapy and lifestyle changes. The methods were divided into 3 groups: 1) behavioral therapy, including meditation techniques, yoga, biofeedback and relaxation or stress reducing techniques; 2) non-invasive procedures or devices, including modification of the respiratory rate controlled with an external device and acupuncture; 3) physical activity, including aerobic, resistance and isometric exercise. The supplementary document also contained an evaluation of invasive procedures used in patients with resistant hypertension, such as baroreflex stimulation, renal denervation or treatment of sleep apnea with CPAP (continuous positive airways pressure). Systematic evaluation involved English-language publications indexed in the PubMed database between 1 January 2006 and 31 October 2011.

The available results of studies indicate a strong positive impact of aerobic and dynamic resistance exercise in addition to antihypertensive therapy (class of recommendation: I A and IIa B, respectively). Among other non-invasive methods, only techniques using biofeedback (Nb B), isometric exercise (handgrip) (lib C) and device-controlled respiratory rate (IIa B) bring additional benefits.

Among invasive methods, great expectations are associated with renal denervation; however, according to the authors, due to numerous reported effects beyond blood pressure reduction (reduced severity of sleep apnea, decreased insulin resistance) there is a need for further clinical trials and extending the follow-up period to finally determine procedure effectiveness and safety.

Recent clinical trial of hypertension management

Jennings G.L.R. Hypertension, 2013; 62: 3-7

Jennings reviewed clinical trials on the treatment of hypertension completed in the last two years, with particular attention paid to the problem of resistant hypertension, pharmacotherapy and combination of drug groups, target blood pressure and non-pharmacological treatment of hypertension.

Resistant hypertension: The author points out that, in connection with the first positive results of coronary denervation, more than 20 manufacturers of equipment to carry out such interventions have been registered. However, it is necessary to carry out additional studies comparing the effectiveness of surgical intervention with proper pharmacotherapy and an improved system of qualification of patients who may benefit from renal denervation. According to the author, indications for surgery should not be extended, and the current indications should be subject to strict verification.

Pharmacotherapy, target blood pressure values: As a supplement to the results of the ONTARGET study indicating the unfavorable effect of dual therapy blocking the RAAS, the results of a prematurely terminated ATTITUDE study were published. In this study, the combination of oral renin inhibitor (aliskiren) with angiotensin converting enzyme inhibitor was associated with a tendency to increased risk of cardiovascular death, or cardiac or renal events in patients with type 2 diabetes, chronic kidney disease and coronary artery disease (18.3% vs 17.1%; HR 1.08; 95% CI: 0.98-1.2).

The author also observed a tendency to increase the target values of blood pressure, recommended by the American Heart Association, to 140/90 mm Hg in the elderly, from the current JNC7 recommendations of 130/80 mm Hg in patients with a high risk of coronary heart disease, diabetes or chronic kidney disease, as impractical and impossible to achieve in everyday medical practice outside the drug regimen adopted in clinical trials (target blood pressure <130/80 mm Hg in patients with diabetes is still recommended in the Canadian guidelines of 2013; recommendations of the European societies indicate values <140/90 mm Hg for all patients; author's note).

Measuring, analyzing and managing drug adherence in resistant hypertension

Burnier M., Wuerzner G., Struijker-Boudier H., Urquhart J. Hypertension, 2013; 62: 218-225

In the face of an increasing number of patients with hypertension, a significant percentage of the resistant hypertension reported (~ 13% of patients with hypertension in American and Spanish studies) and the development of invasive antihypertensive therapies in this group of patients, the authors analyzed the methods for assessing patient drug adherence and the impact of this phenomenon on the effectiveness of antihypertensive therapy. The studies, which included questionnaires, retrospective evaluations of the used drug packages, electronic systems for monitoring drug use and determination of the concentrations of the drug/metabolites in the plasma or urine, indicated that only 57% of patients continue taking medicines as prescribed after 12 months of therapy, and 10-15% after five years of therapy. At the same time, increased patient compliance was observed immediately before and after a monitoring visit to the doctor. Therefore, the authors recommend increasing the frequency of monitoring visits in the group of patients with suspected irregular use of medication. American studies suggest that risk factors for non-compliance are: black race, male gender, secondary or lower education, lower economic status, and the coexistence of depression symptoms. The authors refer to the results of their studies; in the group of patients with resistant hypertension after 2 months of precise control of drug adherence, 1/3 of patients achieved normalization of blood pressure; in 1/3 of subjects improvement of control was observed, whereas in 1/3 of patients blood pressure values remained unchanged. In the latter group, a secondary cause of hypertension was diagnosed in several cases, drug doses were not optimal in some of the patients, and only a small group showed true resistance to antihypertensive therapy.

The authors also point to the fact that currently scientific societies recommend taking medicines once a day, with an emphasis on the use of combined preparations. In such situations, however, there is an increased risk of missing the dose of all medicines prescribed, compared to single drug preparations taken 2 times a day.

In reference to the invasive therapy of resistant hypertension, the authors emphasize the fact that in some studies, after renal denervation the doses of medicines were not decreased or were even increased in order to improve the control of blood pressure, which may suggest an incorrect qualification for surgery, and "resistance" resulted solely from patient non-compliance or inadequate pharmacotherapy, which indicates the need to conduct further randomized trials on the effectiveness of the intervention.

2013 ESH/ESC Guidelines for the management of arterial hypertension. The Task Force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC)

J. Hypertens., 2013; 31: 1281-1357

From among 18 new aspects of the management of hypertension, the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) in their current recommendations pay special attention to the problem of resistant hypertension and new methods of treatment. The authors emphasize the need to distinguish between true resistant hypertension and its alleged form, which most often results from the lack of drug adherence. True resistant hypertension may be due to: 1) factors related to lifestyle, such as obesity, excessive alcohol or sodium consumption; 2) long-term use of vasopressors or substances causing sodium retention; 3) obstructive sleep apnea; 4) undiagnosed secondary hypertension; 5) advanced and irreversible organ damage.

In clinical practice, taking into account patient noncompliance, the effectiveness of antihypertensive therapy can be improved by adding a mineralocorticoid receptor antagonist, even at low doses (spironolactone, eplerenone), alpha1-blocker (doxazosin), and the use of loop diuretics or amiloride instead of the previously used thiazide or thiazide-like diuretics. The earlier reports on the antihypertensive efficacy of endothelin receptor antagonists have not been confirmed.

Among the procedures of invasive treatment of resistant hypertension, renal denervation is a promising method, but the confirmation of its safety and long-term effectiveness compared with the optimal pharmacotherapy requires additional data from well-designed studies with an extended follow-up period.

An important aspect is also to understand the determinants of the effectiveness or lack of effectiveness of denervation, which will help avoid this procedure in patients who are unlikely to benefit from such treatment.

Summary

- In patients with resistant hypertension, it is recommended for the doctor to check whether the medicines currently used in multiple drug regimen decrease the blood pressure, and to stop their use in the case of minimal antihypertensive effect or lack of such effect (class of recommendations: I, level of evidence: C);
- In the absence of contraindications, the use of a mineralocorticoid receptor antagonist, amiloride and alpha1-blocker (IIa, B) should be considered;
- In the case of ineffectiveness of pharmacotherapy, invasive procedures such as renal denervation and carotid baroreceptor stimulation (IIb, C) may be considered;
- By the time of confirmation of the long-term efficacy and safety of invasive procedures, it is recommended to leave these procedures to experienced operators and limit diagnostic procedures and follow-up to specialized centers (I, C);
- Invasive procedures are only recommended in true resistant hypertension with the clinical values of systolic blood pressure ≥ 160 mm Hg or diastolic blood pressure ≥ 110 mm Hg, and elevated blood pressure confirmed by outpatient blood pressure monitoring (I, C).

Invitation to MOTIVATION for HEARTS 2014
4th Conference on Invasive Treatment of Cardio-Vascular Diseases

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Dear Sir or Madam,

We are pleased to invite you to take part in the 4th Conference on Invasive Treatment of Cardio-Vascular Diseases: "MOTIVATION FOR HEARTS 2014". The conference will be held on 27-28 October 2014 at the Military Institute of Medicine in Warsaw. It is organized jointly by the Military Institute of Medicine: Department of Cardiac Surgery, Department of Cardiology and Internal Diseases and Department of Vascular and Endovascular Surgery. It is also co-organized by the Student Scientific Associations of Cardiac Surgery, Cardiology and Vascular Surgery.

"MOTIVATION for HEARTS" is an interdisciplinary scientific meeting devoted to the state-of-the-art technology and methods used in cardiac surgery, invasive cardiology and vascular surgery, which change the clinical reality. It is dedicated to medical doctors specializing in these domains, as well as internal medicine doctors, GPs and the academic community, including students of medical schools. Among the confirmed participants are international expert lecturers from Switzerland, France, Italy and Poland (Warsaw and Zabrze). Each year a world-renowned non-medical authority is also invited to offer a lecture to support one of the conference's main goals: promoting novelty and encouraging new ways of thinking among experts of various disciplines.

The conference will feature three main scientific sessions focused on cardiac surgery, vascular surgery and invasive cardiology; one session on "Innovations and late breaking news"; and a concurrent session of student projects in the form of electronic posters. We, therefore, call on student organizations associated with cardiovascular departments to send their proposals.

We are looking forward to seeing you in Warsaw.

Best regards,

SCIENTIFIC COMMITTEE

MOTIVATION for HEARTS 2014