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Background

"Military Physician" has been published continuously since 1920, currently as a quarterly of the Military Institute of Medicine in Warsaw, Poland.

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1. Manuscripts should be prepared using the MS Word text editor and sent by e-mail or by post on a 3.5" floppy disk or a CD.

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1) Text (with references, tables and figure captions) should be uploaded as a separate file. One page of the manuscript should contain 30 lines, about 60 characters each (must be about 1,800 characters). The text must be written in Times New Roman, 12 point font and double spaced (this also applies to references, tables, captions etc.), with 2.5 cm left margin, and no right margin, i.e. with the 'flag'. Authors are asked not to format the titles, i.e., not to center or justify them, as well as not to use the tabulator or automatic numbering (both within the text and references). A new paragraph should be started from the left margin without paragraph indentation. Please do not insert blank lines between paragraphs or enumerations. Of the available typefaces, bold (semi-bold) and italics for foreign phrases may be used.

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5. Papers should be prepared carefully, in accordance with Polish spelling and with special attention to communicativeness and Polish medical nomenclature. Abstracts, keywords and figure captions translated into English should be identical with the Polish version and show an appropriate language level. Manuscripts that do not meet the criteria will be sent back to the authors for revision.

6. Each article should include the following:

1) On the first page: main title in Polish and English,

Author's or Authors' (max. 10 people) first and last names, including academic degrees, full name of affiliated institute (institutes), head of the institute (academic degree, first and last name), below an abstract (up to 15 lines) with keywords in Polish and another abstract with keywords in English, corresponding author, his/her postal address with postal code, telephone (fax) and e-mail address.

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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3) References should be presented according to the order they appear in the text. If the article has no more than four authors, all of them should be named. If there are more then a maximum of three, followed by "et al.". References should be numbered using the keyboard, please do not use automatic numbering. Examples of citations:

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Calpin C, Macarthur C, Stephens D, et al. Effectiveness of prophylactic inhaled steroids in childhood asthma: a systemic review of the literature. J Allergy Clin Immunol, 1997; 114 (100): 452-457

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The list of references should include only those publications that were used by the Author and should be reduced to 20. All references should be cited in the text and the numbers of references should be placed in square brackets. In order to avoid errors, titles should be copied from medical databases.

7. The paper should be accompanied by: a) the author's request to publish the paper with a declaration that the article has not been published before and not simultaneously submitted to any other journal, b) approval of the head of the clinic, head of the department or head of the institute in which the research has been conducted and, in the case of a study carried out in several centers, the approval of all of them, c) Declaration of Conflict of Interest, and d) acknowledgements, if applicable.

8. The Editorial Board reserves the right to correct nomenclature and stylistic errors as well as to introduce abbreviations without consultation with the Author.

9. The Author receives 1 free copy of the issue in which his or her article has been published. For further copies, contact the Editor.

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Still together or yet apart? Influence of traumatic events experienced during missions and PTSD symptoms on marital relations of war veteran

Nadal razem czy jednak osobno? Wpływ zdarzeń misyjnych o charakterze traumatycznym i objawów stresu pourazowego na relację małżeńską weteranów

Sylwia Szymańska, Malwina Kaczmarczyk, Paula Klajnowska, Ana Petrovic-Chojnacka, Radosław Tworus

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Abstract. Based on the myth of Odysseus and Penelope as well as the Homecoming Theory, the article analyses the impact of war-related traumatic events on the marital relations of Polish Task Force veterans. The paper analyses the relevant results of a study by the Psychiatry, Combat Stress and Psychotraumatology Department of the Military Institute of Medicine. The study involved a group of 30 veterans who had served actively in Iraq and Afghanistan, as well as their spouses or life partners, analyzing the changes in the veterans' family relations, such as marital communication, and the impact of the PTSD symptoms on intimacy in marital relations. The outcomes indicate that both the veterans and their spouses / life partners agree that warfare had a negative impact on their communication and intimacy.
Keywords: PTSD, veteran, family, communication

Streszczenie. Wychodząc od mitu o Odyseuszu i Penelopie oraz od Teorii Powrotu do Domu, artykuł poddaje analizie to, jaki wpływ na relację małżeńską weteranów PKW mają zdarzenia o charakterze traumatycznym, do których dochodzi w wyniku działań wojennych. Artykuł zawiera analizę wyników badań prowadzonych w tym zakresie przez zespół Kliniki Psychiatrii, Stresu Bojowego i Psychotraumatologii WIM. Badaniami objęto grupę 30 weteranów misji wojennych w Iraku i Afganistanie oraz 30 ich małżonek/partnerek życiowych. Analizowano zmiany, do których dochodzi w rodzinie weterana misji wojennych pod kątem komunikacji małżeńskiej oraz wpływu objawów zespołu stresu pourazowego na bliskość w relacji małżeńskiej. Wyniki badań wskazują, że zarówno weterani misji wojennych, jak i ich żony/partnerki życiowe zgodnie twierdzą, iż udział w wojnie wpłynął negatywnie na komunikację między małżonkami oraz na poczucie bliskości w małżeństwie.
Słowa kluczowe: PTSD, weteran, rodzina, komunikacja

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From the myth to the present

Imagine it is 1200 BC, perhaps a hot evening like one commonly experienced in present-day Turkey. Penelope, wife of Odysseus, has discovered that her beloved is going to war due to the rising conflict over beautiful Helen. Penelope has recently given birth to a son, and while this is probably not how she imagined their time together, there is little she can do. Odysseus sets off, maybe after promising his wife that he will return soon and telling her not to worry too much. Lonely Penelope brings up her son, while waiting for the end of the war and the return her husband. Years pass by, Troy is conquered, yet Odysseus does not return. Numerous suitors appear, each trying to make Penelope forget her husband. She promises that once she finishes weaving a burial shroud for her father-in-law, she will marry one of them, but until then she weaves during the day and undoes her work at night so she can remain faithful to her husband. When Odysseus finally returns after twenty years, he is so changed that Penelope can hardly recognize him. Time, war and his subsequent journey have removed the traces of the interesting man she had fallen in love with and married. After just a few days home with his wife, with restlessness and nightmares filled with the recollections disturbing Odysseus's peace, he decides to set off on another quest.

We start this with the myth of Odysseus and his faithful wife, Penelope, for a good reason, describing as it does the hardship of waiting for a husband who has left for war. It shows that sometimes in significant and unexpected moments of marital life a decision needs to be taken about going to war, and how difficult it is for the wife to oppose her husband's decision. It illustrates the difficulties spouses experience in trying to find each other again after a long absence, and also deals with post-traumatic behavioral changes. Today we know that Odysseus suffered from post-traumatic stress disorder (PTSD). Active service veterans, similarly to Odysseus, often dream about returning to the combat zone after returning home. This longing for adrenaline and balancing on the border between life and death may seem puzzling.

While the participation of Polish soldiers in active service in foreign countries is formally concluded, we need to begin examining the effect it has on their mental state. A lot has been said about PTSD resulting from military actions, and current research in Poland needs to focus on the families of the veterans, the principal source of social support for them. Neglecting this issue may lead to the same situation which left the United States helpless after the end of the Vietnam war, when the American government ignored the problems associated with the mental life of veterans and their families following the end of the military actions. Today, American therapeutic programs are among the best in the world, and involve not only the veterans of the wars in Iraq or Afghanistan, but also their families.

Aim of the article

The aim of this article is to assess the influence of the traumatic events experienced during active service and PTSD symptoms on the marital relations of the war veterans. Which PTSD symptoms pose the greatest difficulty for families of veterans? Does participation in war bring couples closer together, or does it irreversibly tear them apart? What is the effect of a stable and close marital bond on the process of recovery after the veteran returns from active service? Should veterans share their experiences in the military combat zone with their relatives, and do their families want to hear the story?

Current studies

Case studies as well as empirical studies indicate that combat trauma and post-traumatic symptoms in veterans have negative effects on their families and their marital relations [8]. Studies reveal high divorce rates [6], frequent bursts of aggression [12], problems with marital intimacy and communication [2], as well as sexual problems [14] among veterans diagnosed with PTSD, compared to those without PTSD symptoms. The mental problems of veterans participating in earlier wars (e.g. Vietnam) could in extreme cases result in homelessness and premature death [7, 3, 10], demonstrating how complicated and long is the process of adaptation following the return from war, as well as restoring mental balance.

The Homecoming theory

The homecoming theory, described in 1945 after the end of World War II, may help to understand the adaptation difficulties of a soldier returning from war to his family and home [11]. According to this theory, a soldier fighting in a war, like a traveler, is separated from his home, both in terms of space and time. Soldiers on active service, their families and friends, all have different experiences during the separation. They all undergo changes during this time apart, turning them, to some extent, into strangers by the time of the return. The discrepancy between expectations and reality may cause shock in a veteran returning from war, as well as in the family waiting for him at home.

We still know little about how veterans of current wars cope with the transfer from the military to domestic reality. Worthen et al. [1] made interesting observations based on interviews with 24 veterans who served in Afghanistan and Iraq in 2009-2011. They asked the veterans what would help them most in switching to civilian life after their return from war,

and what made adaptation difficult. Three subjects dominated in the responses, grouped according to the veteran's explanations as: "the army as a family", "normal is strange" and "looking for a new normal". The veterans referred to the army as their family, which, despite the obstacles and difficulties encountered during their service, took care of its members. Many study participants said that "the guys I served with were my family. There we shared a bond, and there was always someone to talk to." Others described the military environment in terms resembling the care provided by a family to a young child, using expressions such as "holding their hands", "safety net" and "comfort". It evokes the safe base described by John Bowlby in his attachment theory [4]. One of the veterans described in her interview how the army fulfilled its parental role by providing medical care after her return home. Only a small percentage of veterans believed that the army turned away from them during their service. They mentioned a considerable sense of betrayal, comparable to the feeling of being betrayed by a family member.

Nearly half of the interviewed veterans noticed that the structure on the military environment provided clarity and facilitated decision making. They described the military structure as something to hold on to in the chaos of war. The environment was described as "black and white"; a system in which orders were given and followed. Veterans often talked about civilian life, saying that "normal is strange". The discrepancy between the expectation that coming back home would be a pleasant return to "normal" life, and the reality in which what was previously perceived as normal was now strange, was both due to the changes in the veterans themselves as well as those which took place at home in their absence. After the return from the war, many veterans felt disconnected from relatives who did not share their combat experience. They thought that those who never went to war could not fully understand them or their experiences during active service. "I could tell stories all night, and my family probably would not be able to understand what was going on". Many families of veterans try to support them, but the emotional disconnection of veterans sometimes prevented them from accepting the help they were offered. Veterans also felt emotionally disconnected from their relatives when asked blunt questions such as "Did you kill someone?", or when their combat experience was compared to a family member's experience in a disrespectful way.

Material and methods

Versions of the Family Behavior Questionnaire developed by researchers from the Department of Psychiatry, Combat Stress and Psychotraumatology (KPSBiP) of the Military Institute of Medicine were used in the study: one for the veterans, and one for spouses / life partners. The researchers decided that life partners who were not married to the veterans could be included in the study, provided that they had lived together for at least 2 years. The questionnaire comprised key questions based on ten years of the therapeutic work of the KPSBiP research team with military mission veterans, regarding the effects of active duty on marital relationships. Some of the questions were closed, some were open. The study was voluntary and anonymous. A note made by the researchers, explaining the purpose and principles of conducting the study, was attached to each questionnaire. Thirty veterans who had served in Iraq and Afghanistan and thirty partners participated in the study.

Results

In the analyzed group of 30 couples, the mean age of the veterans was 38.7 years, while the mean age of the partners was 36.5 years. The mean duration of military service was 14.6 months. The partners of the veterans were better educated than their husbands, most of them having a university degree while most of the veterans had secondary education. The duration of acquaintance before marriage in the study subjects was 3 years and 1 month. The length of marriage was 11 years, and each of the study couples had lived separately for at least two years. The study subjects had a mean of 1.75 children, with a mean age of 13.3 months.

The study revealed that 89% of veterans and 84% of their partners declared that their marriage was happy before the active service, and the veterans declared that they could easily talk about anything with their partners (73%) or vice versa (88%). However, when the veterans were asked whether in their opinion after the return from active service they were in a closer relationship with their partners than before, 66% gave a negative response with only 55% declaring that their families coped well after their return from missions. The veterans were asked about their fears regarding difficulties in their relationship with their spouse/partner. The following statements were given: "anger and aggression prevent me from normal functioning", "frequent arguments, a nervous atmosphere, no sense of love", "mismatch", and "I am argumentative, I often get into conflicts, it irritates me when they don't do what I tell them to".

The researchers asked the veterans whether they told their partners about the combat experience: a total of 60% gave negative responses. They were asked about the reasons, and it was observed that 31% of the veterans did not talk about their active service experiences for fear that the spouse would not understand them, while 28% did not tell their spouse/partner about what they had been through to protect her as they thought that she

could not handle the truth. A total of 18% believed that their partners did not share their experience, so they should not know anything about it, while 12% thought that if their partners learned about their war experience they would see their husbands/partners as bad people, which would affect their close relationship. A total of 12% of the veterans were also afraid about the opinion of their relatives. Over 92.5% of the veterans felt that since their return from active service their behavior had changed for the worse, with the complaints primarily including the following symptoms: irritability and psychophysical tension (18%), recurring memories (18%), aggressive behavior and verbal aggression (17%), nightmares (15%) and use of alcohol as a method of self-treatment (12%). About 80% of the veterans were convinced that those symptoms adversely affected their family relationships, and 70% declared that their engagement in family life was reduced compared to before their foreign active service. Also, 70% of the veterans noticed that communication (manner and quality) between them and their partners had changed for the worse, these changes in communication being described in the following manner: "Frequent arguments turn into hours of silence, a lack of common conversation topics, the lack of awareness that causes the mental suffering giving me a sense of satisfaction that I cannot understand, and which results in guilt"; "We do not talk about everything, we often argue about small things, we do not express our feelings and hardly ever go out"; "Lack of honest conversations, lack of affection and understanding, and secrets"; "I have no communication. I isolate myself from them. I hide in silence!!!"; and "We do not talk as openly as before I went on active service. I feel like she sees a different man in me".

What does a life in a close relationship with an active service veteran look like from the perspective of his spouse or partner? Over 82% of the partners would like to hear from their husbands about what they experienced during that time; however, they were also asked why they would not want to hear about those experiences. A total of 45% of the partners of veterans would be afraid that learning the truth could adversely affect their relationships with their husbands, 36% did not want to learn the truth because they did not believe they could cope with it emotionally, and only (or maybe as many as) 9% declared that they were not interested in their husband's work. One of the subjects wrote that she "didn't know if she could cope with it herself".

The partners of the veterans were asked what "things" they would not want to know. Their responses were: "About the worst things", "about risks", "about his internal experiences with other people", "if he has the life and health of other people on his conscience", "about death, the suffering of children", "about death, the details of actions", "about betrayal", "the number of people shot, wounded", and "about many things, about his behavior in extreme situations".

As many as 84% of the partners thought that their husbands were not the same men as before the active service. They described the following changes in their husbands' behavior: "He is more stressed and loses self-control more quickly. He has trouble with sleeping, nightmares, he switches off, turns away from acquaintances"; "nervousness, lack of respect for me, general insensitivity, lack of interest, vulgarity"; "my husband is more irritable, impatient, he lacks understanding of other people; "he is more alert"; "he picks on everything"; "aggressive behavior, outbursts of anger"; "difficult in dialogue and conversation"; "he switches off"; "I've got a feeling that he is not telling me everything, he is withdrawn, can't be happy like he used to be, he's pensive, absent"; "he likes to have things his way"; and "anxiety, nervousness, physical health – pain, and impatience as a result".

In response to question about the husband's behaviors which most affect relationships with the spouse/partner and children, the partners listed: "nervousness in unexpected moments", "aggression, impatience, blaming me", and "taking decisions for everyone". A total of 59% of the partners felt that they were not a happy couple any more. One could also guess that communication (its quality and content) with the husband changed for worse (66.6% of the partners) after his return from war. The partners described the change as: "We often lose control, we can't discuss a problem together, calmly, and find the best solution"; "We can't talk calmly"; "The change consists in problems with communication. My husband is more irritable, he often can't accept, or never accepts opinions different from his own. The smallest things irritate him. His relationship with his daughter got much worse"; "When I see he's in a bad mood, I prefer not to say anything"; and "We talk less, our communication has become simpler and cold".

Discussion

A review of the literature as well as the results of studies conducted at KPSBiP demonstrate that adaptation difficulties after the return from war, and finding a place in common marital life, affect both parties: the veterans as well as their partners. It seems that the myth about Odysseus and Penelope as well as the Homecoming Theory, although created a long time ago, are still accurate in indicating the potential for disappointment for both partners when they meet again. The results of the present studies clearly demonstrate that participation in war changed the veterans. The changes affects their relatives, who have to adjust to the new circumstances, which means that they need to change. Most veterans and their partners in the study declared that before the active service they could discuss most of the subjects covered in

marriage. According to the vast majority of study subjects, after the return from active service the situation changed for the worse.

The veterans saw changes mostly in their own behavior, including excessive irritability, short temper, conflicts and aggression. Over 92.5% of the veterans in the study observed symptoms which could be suggestive of PTSD. They were aware that the symptoms adversely affected their marital relationships, as well as their relations with children. The majority of the veterans declared that their engagement in everyday family life was limited after their return from war. This could result from the fact that they did not share the experiences from the field of combat with their closest relatives. Most veterans in the study did not tell their partners about what they had experienced there, whereas their partners, despite formally declaring a willingness to hear about those experiences, admitted that they feared discovering the truth about the traumatic events in which their husbands may have participated in as victims and/or perpetrators. The veterans did not talk, because they wanted to protect their partners from the burden they carry, knowing its weight. It seems that they realized war was "dirty", whereas they wanted their partners, the mothers of their children, to be free from the mark of war. However, they continued to pay a high price for protecting individually the secret of the traumatic events. Similarly to those traumatic moments, when veterans felt left alone in scary helplessness, after their return home they felt alone with the painful memories.

Veterans do not talk, and their partners do not ask, similar to the "double wall" effect found in families who survived the holocaust [9]. If one wants to learn the story on his/her side, they usually meet a "wall" on the other. From the therapeutic point of view, however, words constitute only a small part of the communication process. We also provide our relatives with information through our movements, facial expressions, silence, and waking from nightmares.

The results of the study indicate that the partners of veterans have the greatest difficulty dealing with PTSD symptoms, including irritability and a tendency to react with anger and aggression. However, it is not consistent with the studies on PTSD effects on family life. The results of those studies [5] demonstrate that for families of PTSD patients the symptoms most difficult to cope with are avoidant symptoms, when a veteran suffering from PTSD becomes withdrawn, isolated and avoids at any cost anything that could remind him of the traumatic event. However, the more they withdraw from everyday life, the more their anger grows, and with time this may turn into aggressive behavior, including towards closest family or towards themselves (e.g. a sense of guilt, resignation or suicidal thoughts, and hazardous behavior). In order to avoid the fear and helplessness which often accompanied the veterans during combat, they use a defence mechanism to cut off any emotions. The price for blocking fear is a lack of access to warm feelings, such as love and joy or longing. This emotional block is incomprehensible for the veterans, as well as for their relatives. Often, due to a lack of knowledge, the family members treat this behavior as deliberate avoidance of engagement in family life or in a relationship with the partner.

It seems that there is a large scope for psychological education, directed both towards the veterans and their families. It is simply easier to accept something that is comprehensible and clear. Moreover, the clinical experience of KPSBiP demonstrates that work in a therapeutic group comprising veterans and civilians (including women, people of different ages etc.), despite the initial defensive approach of the veterans hiding behind the statement "only those who fought in war can understand" after some time brings therapeutic results. It appears that in revealing their individual stories of their war experiences to everyone in the therapeutic group, the veterans suddenly feel acceptance and understanding of how their partners or mothers may feel with them. Couple therapy for veterans and their partners is also important, and often results in reaching a turning point in treatment when the veterans start taking responsibility for their behavior and working on the bond in their relationships with their partners.

It has been observed that none of the partners of veterans refused to participate in a study when asked by their husband, and that veterans had a lot of respect for the questionnaires completed by their partners. It is very optimistic that even when a marital relationship leaves much to be desired, when animosity and irritation occur in the relationship, one of the partners still wants the other to be near (maybe particularly in this situation), and to live the way they used to.

Conclusions

1. Both veterans of military active service and their spouses / life partners declared that participation in war adversely affected their marital relationships.
2. Families of veterans have the greatest difficulty in dealing with symptoms like irritability or impulsive and aggressive behavior.
3. Most veterans in the study did not share their traumatic combat experiences with their life partners. They justify it by a fear of incomprehension of their experiences and by the desire to protect their families from the burden of war.
4. Most partners of veterans are afraid to learn the stories of the traumatic events in which their husbands may be presented as victims or perpetrators.

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Analysis of *Neisseria meningitidis* carriage with identification of sero- and genogroups in the environment of professional soldiers

Analiza nosicielstwa *Neisseria meningitidis* z identyfikacją grup serologicznych i genogrup w środowisku żołnierzy zawodowych

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Abstract. The article presents the carriage rates of *Neisseria meningitidis* among professional soldiers serving in the Polish Armed Forces. A microbiological examination was performed using standard methods (culture, incubation, microscopy, biochemical and automated identification with VITEK card) on 1,381 soldiers from the 10th Armored Cavalry Brigade in Świętoszów in the period January-March 2015. *Neisseria meningitidis* isolates collected from the carriers were subjected to slide agglutination (identification of serogroups), then bacterial DNA was isolated and the genogroups were determined based on the results of PCR. Within this group of soldiers, 68 were found to be carriers of *N. meningitidis*. The serogroups of 38 isolates and genogroups of 58 isolates were determined. Genogrouping was performed and the isolates were identified as belonging to group B (n=43; 63.2%), E29 (n=7; 10.3%), C (n=5; 7.4%), A (n=1; 1.5%), W (n=1; 1.5%) and Y (n=1; 1.5%). The primers used prevented determination of genogroup in 10 isolates. The 4.9% carrier rate of *N. meningitidis* in the professional soldier study group and the domination of serogroup B is comparable to the carrier rates seen in the general population of Poland and Central Europe.
Keywords: *Neisseria meningitidis*, carriage, professional soldiers

Streszczenie. Cel. W pracy dokonano charakterystyki nosicielstwa *Neisseria meningitidis* wśród żołnierzy zawodowych w Sitach Zbrojnych RP. Materiał i metody. Badania mikrobiologiczne metodami klasycznymi (hodowla, inkubacja, badanie mikroskopowe, identyfikacja testem biochemicznym oraz kartą automatyczną VITEK) wykonano u 1381 żołnierzy 10. Brygady Kawalerii Pancernej w Świętoszowie w okresie styczeń-marzec 2015 r. Wyhodowane szczepy Neisseria meningitidis pochodzące od nosicieli poddano aglutynacji szkiełkowej z użyciem zestawu surowic (identyfikacja grup serologicznych), a następnie izolowano DNA bakterii i określano genogrupy na podstawie wyników reakcji łańcuchowej polimerazy (PCR). Wyniki. Wśród 1381 żołnierzy nosicielstwo *Neisseria meningitidis* wykryto u 68 osób. Grupy serologiczne określono dla 38 izolatów, genogrupy dla 58 izolatów. Metodą genogrupowania ustalono przynależność do grupy B (n=43; 63,2%), E29 (n=7; 10,3%), C (n=5; 7,4%), A (n=1; 1,5%), W (n=1; 1,5%) i Y (n=1; 1,5%). 10 izolatów nie poddało się genogrupowaniu z zastosowanymi starterami. Wnioski. Nosicielstwo N. meningitidis w badanej grupie żołnierzy zawodowych na poziomie 4,9% z dominacją grupy B jest porównywalne z nosicielstwem występującym w populacji ogólnej Polski i Europy Środkowej.
Słowa kluczowe: *Neisseria meningitidis*, nosicielstwo, żołnierze zawodowi

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Introduction

Neisseria meningitidis is one of the main etiological factors in bacterial infections of the central nervous system, which in the form of meningitis or sepsis is referred to as an invasive meningococcal disease [1, 2]. The microorganism colonizes asymptomatically the nasopharyngeal mucosa, and carriers are the most common source of infection [3]. *N. meningitidis* carriage in the general population is estimated at 5-10% [1]. Significantly higher rates, of up to 40-80%, are observed in closed communities, such as dormitories, prisons or military units [4]. There are 12 serological groups of bacteria (A, B, C, 29E, H, I, K, L, W135, X, Y and Z). This classification is based on the antigenic differences in the capsular polysaccharides of *N. meningitidis.* Serogroups A, B, C, Y and W135 are the most frequently isolated in carriers and in invasive infections. In 30-45% of cases the serological group of the microorganism cannot be determined [5, 6]. In Europe and the Americas meningococcal infections are usually caused by groups B and C, whereas in Asia and Africa by groups A and C. In the United States, Great Britain, Sweden and Finland, an increase in meningococcal infections caused by group Y has been recently observed [1, 2]. The presence of individual serological groups changes with time [7].

Invasive meningococcal disease (IMD) is one of the most dangerous infectious diseases in the world, despite a possible early introduction of antibiotic therapy and development of intensive medical care for the patient. The disease has a very severe course, and within a few to several hours may result in death. Mortality rates are estimated at 10-13%, and in case of septic shock they can be as high as 70% [1, 8]. IMD incidence (218 cases in 2015) [9], as well as deaths due to IMD in Poland (103 cases in 2010-2014) [10], occur also in the military environment. Epidemic outbreaks in the Polish Army are rare, but they pose a risk for the health and lives of soldiers. In 2006, in the military unit in Skwierzyna, four soldiers were diagnosed with the disease, microbiologically confirmed, and two of them died [11]. In 2007, at an airbase in Warsaw, the disease was found in 15 soldiers, and two of the cases were lethal [12]. In the years 2006-2008, microbiologically confirmed cases of the disease were found in the following garrisons: Wrocław, Gliwice, Gołdap, Warszawa-Wesoła, Toruń, Koszalin and Przemyśl. In December 2011, a soldier serving in the Polish Military Contingent in Afghanistan died due to IMD.

Despite the incidence and deaths in the military environment, information on the carriage rates and characteristics of *Neisseria meningitidis* groups among Polish soldiers is very limited. A study conducted by Tyski et al. at the end of 1998 and at the beginning of 1999, involving 151 and 168 recruits, revealed that 36% and 61%, respectively, were carriers [13]. However, they were soldiers under obligatory military duty, abolished in Poland in 2009. In the environment of professional soldiers of the Polish Army only one screening study for *N. meningitidis* carriage has been performed.

In the first quarter of 2013, employees of the Department of Epidemiology and Tropical Medicine of the Military Institute of Medicine, as part of the statutory activity (research task "Assessment of the effectiveness of immunoprophylaxis in the eradication of *Neisseria meningitidis* carriage and incidence of carriage in non-vaccinated individuals in the military environment"), tested 559 soldiers serving in the 25th Brigade in Tomaszów Mazowiecki (the military unit of the soldier who died in Afghanistan in 2011), revealing carriage in 5.7% of the soldiers. Among 302 of the soldiers who were not vaccinated for meningococcal infections, 9.6% were carriers of *Neisseria meningitidis,* whereas in the group of 257 previously vaccinated soldiers only 1.2% were carriers. The eight-fold lower carriage rate in the vaccinated individuals may demonstrate the effectiveness of vaccination in gaining herd immunity [14]. However, conducting a large population study demonstrating the current prevalence of *Neisseria meningitidis* among Polish soldiers is required in order to determine the relevance of the vaccination of all professional soldiers in the Polish Armed Forces (as stipulated in the Regulation of the Ministry of National Defence of 3 February 2014 on the preventive vaccination program for professional soldiers and registration of preventive vaccinations [15]) with a tetravalent vaccine for meningococcal infections caused by groups A, C, Y, W135, and a new vaccine against meningococci group B, introduced to the EU market in January 2013.

The aim of this study was to analyze *Neisseria meningitidis* carriage and to identify serological groups and genogroups in the environment of professional soldiers of the Polish Armed Forces on a brigade basis.

Material and methods

Study group

The study involved 1381 professional soldiers from the 10th Armored Cavalry Brigade in Świętoszów, who had given their written consent and completed a questionnaire with personal details (military rank, age, sex, place of residence), information about smoking, respiratory infection symptoms, received medications and vaccinations against meningococcal infections. The soldiers, both males and females, qualified for the study were aged 20-55 years, in good health, with possible respiratory tract inflammation, but without anatomopathological abnormalities in the nasopharynx which would prevent taking a swab specimen. The biological material (nasopharyngeal swab) was collected in the winter (January-March) of 2015 on the premises of the military unit.

The research task (no. 324/WIM/2015) "Analysis of *Neisseria meningitidis* carriage and identification of serological groups in the Polish population using the example of the military environment" was approved by the Bioethical Committee of the Military Institute of

Medicine (Resolution no. 24/WIM/2014 of 18/08/2014).

Laboratory diagnostics

Identification of isolates

The collected material was transported to the microbiological laboratory of the Laboratory Diagnostics Unit of the Military Institute of Medicine (prepared using the streaking method on the microbiological medium Columbia Agar with 5% sheep blood and PoliVitex VCA3 medium, in an atmosphere enriched with CO_2 at 37℃ for 48 h). The culture obtained after incubation was assessed macroscopically, and colonies having an appearance characteristic for *Neisseria meningitidis* were isolated on Columbia Agar with 5% sheep blood. For the next 24-48 hours (depending on the growth of the colonies on the plates) the media were incubated at 37℃, in an increased CO_2 concentration. Catalase and cytochrome oxidase biochemical tests were performed. The Gram-stained preparation was assessed under a light microscope. All the cultures with positive catalase and cytochrome oxidase reactions, as well as those with a Gram-negative cocci morphology in the microscopic evaluation, were further identified on the basis of biochemical reactions. API NH biochemical kits and NH cards were used to automatically identify microorganisms with the Vitek 2 instrument (bioMerieux). The strains identified as *Neisseria meningitidis* were frozen at -20℃, using special cryo test tubes, and transported to the National Reference Centre for the Diagnostics of Bacterial Infections of the Central Nervous System (KOROUN) in Warsaw to confirm the identification, determine the serological groups, isolate the DNA and determine the genogroups of the microorganisms.

Determination of serological groups

The strains delivered to KOROUN were revived on a Columbia Agar medium and incubated for 24 hours in a CO_2 atmosphere, at a stable temperature of 37℃. Serological groups were determined using glass agglutination with a set of sera, following the manufacturer's recommendations. The specific reagents covered the following groups: A, B, C, Y, W (Remel), E29 (Bio-Rad), X and Z (Becton Dickinson).

Isolation of DNA

Chromosomal DNA preparations from meningococcal isolates were prepared using the Genomie DNA Prep Plus (A&A Biotechnology) system, following the manufacturer's recommendations.

Determination of genogroups

Genogroups were determined on the basis of PCR reaction results, with the use of the specific oligonucleotide starters: *orf-2(A), siaD(C),* s/aD(W135) and *siaD(Y)* described by Taha [16] and *siaD(B)* described by Guiver et al. [17]. The following genogroups of the isolates were determined: A, B, C, Y, W and E29.

Statistical analysis

All the statistical calculations were performed using the StatSoft Inc. (2014) STATISTICA (data analysis software system), version 12.0., www.statsoft.com, and Excel spreadsheets. Quantitative variables were characterized using the arithmetic mean, standard deviation, median, minimum and maximum value (range), and 95% CI (confidence interval). Qualitative variables were expressed as numbers and percentages (rate). The Shapiro-Wilk W test was used to verify if the quantitative variable was obtained from a population with a normal distribution. Levene's test (Brown-Forsythe test) was used to verify the equality of variances. The significance of the differences between two groups (unrelated variables model) was analyzed using the t-Student test (or Welch t-test in case of unequal variances) or Mann-Whitney U test (where the conditions for the t-Student test, or the test for variables measured on an ordinal scale were not met). Chi-square independence tests were used for qualitative variables. To find correlation, force and direction between the variables, correlation analysis was applied, using Pearson and/or Spearman correlation coefficients. A logistic regression model (single-factor and multi-factor) was used to assess the effect of selected parameters on the presence or absence of *Neisseria meningitidis* carriage. In all calculations the assumed level of significance was p=0.05.

Results

Among 1,381 professional soldiers, 68 carriers of *Neisseria meningitidis* were found (4.9% of the study group). Serological groups were determined for 38 isolates of *N. meningitidis.* A total of 5 serological groups were identified: B (n=29, 42.6%), E29 (n=5, 7.4%), A (n=2, 2.9%), W (n=1, 1.5%) and Y (n=1, 1.5%). In the case of two isolates, a poorly expressed reaction with sera A and Y occurred. Many isolates did not undergo agglutination with any of the sera (n=15, 22.1%), while others underwent polyagglutination (n=9, 13.2%) or autoagglutination (n=6, 8.8%).

Genogroups for 58 isolates were determined using the genogrouping method: B (n=43, 63.2%), E29 (n=7, 10.3%), C (n=5, 7.4%), A (n=1, 1.5%), W (n=1, 1.5%) and Y (n=1, 1.5%). Ten isolates (NG, 14.7%) did not group with the starters used (Fig. 1). The collective results of the sero- and genogrouping are presented in Table 1.

In the group of *N. meningitidis* carriers, the mean age of the subjects was 30.2 ±5.7 years (21-46 years), whereas in the control group (non-carriers) it was 32.4 ±5.4 years (21-59 years). Subjects in the control group were significantly younger than the carriers (p=0.0003). In the group of carriers, the percentage of females was 11.8%, and in the control group it was 6.9%. No statistically significant correlations between sex and the study group were found (p=0.1319). The percentage of individuals living in the country in the group of carriers

was 36.8%, and 42.5% in the control group. No statistically significant correlations between the place of residence and the study group were found (p=0.3506). The percentage of smokers in the group of carriers was 52.9%, and in the control group it was 34.3%. In the group of carriers there were significantly more smokers (p=0.0018). The percentage of lance corporals in the group of carriers was 70.6%, and 58.4% in the control group. The percentage of officers was 0.0% and 7.5%, respectively. The distribution of military ranks in the study groups was statistically significantly different (p=0.0001). The percentage of vaccinated subjects in the group of *N. meningitidis* carriers was 13.2%, and in the control group it was 18.9%. No statistically significant correlations between vaccination and carriage were found (p=0.2429) (Table 2).

In the control group (non-carriers) the mean age of the vaccinated soldiers was 34.0 ± 4.9 years (23-51 years), and in the group of vaccinated soldiers it was 32.1 ± 5.4 years (21-59 years). Subjects in the non-vaccinated group were significantly younger (p=0.0001). In the vaccinated group the percentage of females was 2.4%, and in the non-vaccinated group it was 8.0% (statistically significant difference, p=0.0019). The percentage of lance corporals in the vaccinated group was 48.0%, and in the non-vaccinated group it was 60.8% (statistically significant difference, p = 0.0025) (Table 3).

In the group of carriers the mean age of the vaccinated soldiers was 34.2 ± 2.9 years (29-38 years), and in the group of non-vaccinated soldiers it was 29.6 ± 5.8 years (21-46 years). Subjects in the non-vaccinated group were significantly younger (p=0.0033). In the group of vaccinated soldiers there were no females, in the group of non-vaccinated subjects the percentage of females was 13.6%. No statistically significant correlations between sex and vaccination were found (p=0.2396). The percentage of lance corporals in the vaccinated group was 33.3%, and in the non-vaccinated group it was 76.3% (statistically significant difference, p = 0.0126) (Table 4).

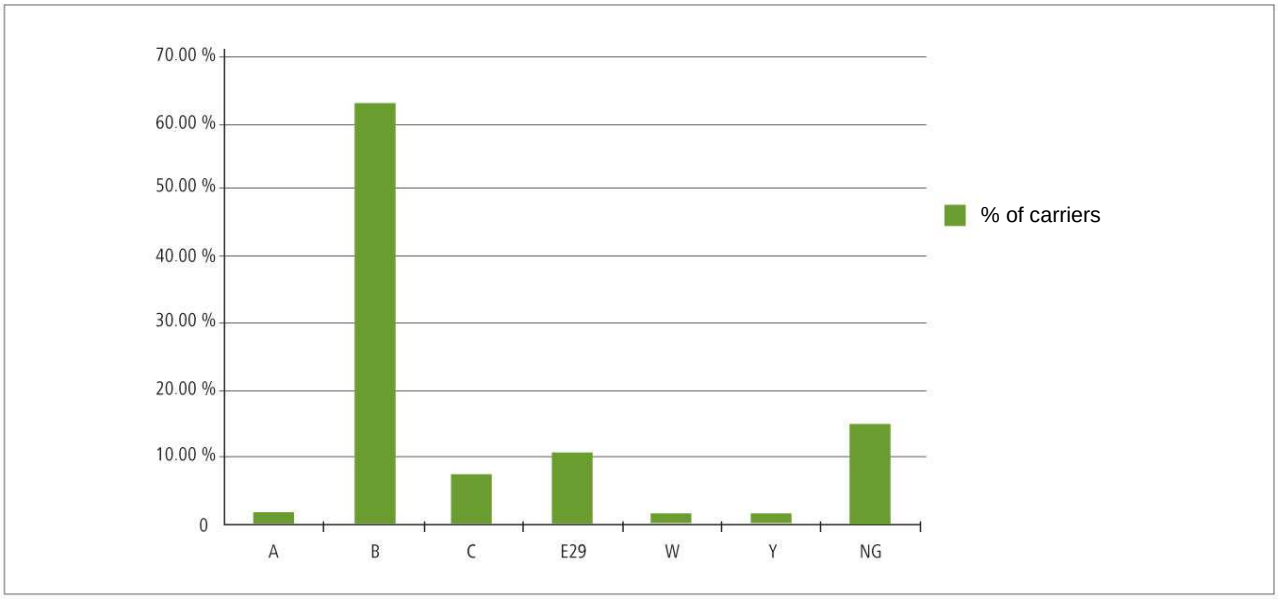

Figure 1. Percentage distribution of *N. meningitidis* genogroups in the study group of soldiers (n=68)

Rycina 1. Rozkład procentowy genogrup *N. meningitidis* w badanej grupie żołnierzy (n=68)

Table 1. Results of N. meningitidis isolate (n=68) serogrouping - in rows (monoclonal serum), and genogrouping - in columns (PCR)
Tabela 1. Wyniki serogrupowania w wierszach (surowice monoklonalne) i genogrupowania w kolumnach (PCR) izolatów N. meningitidis (n=68)

sero- /genogrouping	A	B	C	E29	W	Y	NG	total
A			1				1	**2**
autoagglutination		3		1			2	**6**
B		29						29
E29				5				**5**
polyagglutination		4	2				3	**9**
NG	1	6	2	1		1	4	**15**
W					1			**1**
Y		1						**1**
total	1	43	5	7	1	1	10	68

NG – isolates which do not group with the used methods

In single-factor and multi-factor logistic regression models two statistically significant factors were found: age and smoking. Higher age was correlated with reduced probability of *N. meningitidis* carriage. Smoking increased the probability of meningoccoci carriage (Table 5.).

Discussion

The only natural place where *Neisseria meningitidis* is found in humans is the nasopharyngeal mucosa [18]. Mucosa of the upper respiratory tract is colonized as a result of airborne transmission from an individual with meningococcal infection, or by direct contact with respiratory system secretions (drinking from a glass or smoking a cigarette touched by an infected person). The carriage of meningococci in most cases does not lead to the development of the disease; however, *N. meningitidis* colonization is a process which, in favorable circumstances (concurrent respiratory infections, dental and periodontal inflammation) may result in invasive meningococcal disease (IMD). Studies on carriage, conducted in the environment of military recruits, reveal that despite high rates of asymptomatic infections, highly virulent *N. meningitidis* strains rarely colonize the nasopharyngeal mucosa [19, 20]. The carriage rate of epidemic strains in healthy population is 1.4 - 1.6% [21]. However, in the epidemic outbreak the number of carriers of highly virulent strains may be significantly higher [22].

The carriage rates of *N. meningitidis* among the recruits of armed forces in European states are high regardless of the country. Andersen et al. [23] reported carriage in 39-47% of 1,069 Danish recruits. Studies conducted in 1,179 German recruits demonstrated that 32.6% of them were *N. meningitidis* carriers [24]. In Norway, in a group of 126 recruits, carriage was

Table 2. Socio-demographic variables in the control group (non-carriers) and carriers of N. meningitidis
Tabela 2. Dane socjodemograficzne w grupie kontrolnej (bez nosicielstwa) oraz nosicieli N. meningitidis

Sociodemographic data	Control group (n=1313)	Carriers of *N. meningitidis* (n=68)	P-value
age			
mean (SD)	32.4 ± 5.4	30.2 ± 5.7	0.0003
range	21.0 - 59.0	21.0 - 46.0	
median	32.0	28.5	
95%CI	32.1 - 32.7	28.8 - 31.6	
sex			
female	91 (6.9%)	8 (11.8%)	0.1319
male	1222 (93.1%)	60 (88.2%)	
place of residence			
country	558 (42.5%)	25 (36.8%)	0.3506
city	755 (57.5%)	43 (63.2%)	
cigarette smoker			
yes	451 (34.3%)	36 (52.9%)	0.0018
no	862 (65.7%)	32 (47.1%)	
respiratory congestion			
yes	95 (7.2%)	2 (2.9%)	0.1767
no	1218 (92.8%)	66 (97.1%)	
military rank			
lance corporal	767 (58.4%)	48 (70.6%)	0.0001
non-commissioned officer	448 (34.1%)	20 (29.4%)	
officer	98 (7.5%)	0 (0.0%)	
vaccination			
yes	248 (18.9%)	9 (13.2%)	0.2429
no	1065 (81.1%)	59 (86.8%)	

revealed in 61.9% of the study subjects [6]. Our own study, conducted among 559 professional soldiers in Poland, demonstrated that only 5.7% of them were *N. meningitidis* carriers, i.e. the carriage rates were comparable to those in the general population in the civilian environment. The most common serogroup among Polish soldiers was group B [28%) [14]. Serogroup B is still the most common cause of *N. meningitidis* carriage in the military environment in Europe. It was most frequently found in French (46%) [25], Polish (32%) [13] and German (42%) [24] recruits.

Table 3. Socio-demographic variables in subjects vaccinated with quadrivalent vaccine A, C, W-135, Y, and non-vaccinated ones in the control group (non-carriers)
Tabela 3. Dane socjodemograficzne pomiędzy szczepionymi czterowalentną szczepionką A, C, W-135,Y i nieszczepionymi w grupie kontrolnej (bez nosicielstwa)

sociodemographic data	vaccinated (n=248)	non-vaccinated (n=1,065)	P-value
age			
mean (SD)	34.0 ± 4.9	32.1 ± 5.4	0.0001
range	23.0 - 51.0	21.0 - 59.0	
median	34.0	32.0	
95% CI	33.3 - 34.6	31.7 - 32.4	
sex			
female	6 (2.4%)	85 (8.0%)	0.0019
male	242 (97.6%)	980 (92.0%)	
place of residence			
country	100 (40.3%)	458 (43.0%)	0.4416
city	148 (59.7%)	607 (57.0%)	
cigarette smoker			
yes	88 (35.5%)	363 (34.1%)	0.6760
no	160 (64.5%)	702 (65.9%)	
respiratory congestion			
yes	14 (5.6%)	81 (7.6%)	0.2832
no	234 (94.4%)	984 (92.4%)	
military rank			
lance corporal	119 (48.0%)	648 (60.8%)	0.0025
non-commissioned officer	106 (42.8%)	342 (32.2%)	
officer	23 (9.3%)	75 (7.0%)	

Table 4. Socio-demographic variables in subjects vaccinated with quadrivalent vaccine A, C, W-135,Y and non-vaccinated ones in the N. meningitidis carrier group
Tabela 4. Dane socjodemograficzne pomiędzy szczepionymi czterowalentną szczepionką A, C, W-135,Y i nieszczepionymi w grupie nosicieli N. meningitidis

sociodemographic data	vaccinated (n=9)	non-vaccinated (n=59)	P-value
age			
mean (SD)	34.2 ± 2.9	29.6 ± 5.8	0.0033
range	29.0-38.0	21.0-46.0	
median	34.0	28.0	
95% CI	32.0-36.4	28.1-31.1	
sex			
female	0 (0.0%)	8 (13.6%)	0.2396
male	9 (100.0%)	51 (86.4%)	
place of residence			
country	3 (33.3%)	22 (37.3%)	0.8187
city	6 (66.7%)	37 (62.7%)	
cigarette smoker			
yes	6 (66.7%)	30 (50.8%)	0.3758
no	3 (33.3%)	29 (49.2%)	
respiratory congestion			
yes	0 (0.0%)	2 (3.4%)	0.5750
no	9 (100.0%)	57 (96.6%)	
military rank			
lance corporal	3 (33.3%)	45 (76.3%)	0.0126
non-commissioned officer	6 (66.7%)	14 (23.7%)	
officer	0 (0.0%)	0 (0.0%)	

Apart from the serological group analysis, examining risk factors affecting occurrence of *N. meningitidis* is important in the assessment of carriage. Smoking, both active and passive, is one of the main factors predisposing to the carriage of meningococci in the nasopharynx [26]. It has been confirmed in our study, which demonstrated by logistic regression models that smoking cigarettes significantly increased the probability of *N. meningitidis* carriage. The authors also showed, consistent with information presented in global publications, that older age reduces the risk of carriage. It is reflected in a significant reduction in carriage rates among Polish soldiers currently in service (mean age of soldiers in our own studies was 30.2 ± 5.7 years).

Information about studies regarding *Neisseria meningitidis* carriage in the military environment available in the world literature is limited to one group, i.e. young, new recruits. In some European countries, including Poland, the military duty has been abolished, and as a result only professional soldiers are found in the Polish Armed Forces. Characteristic for professional military duty is increased average age of the soldiers (instead of 19-20 year old recruits, professional lance corporals start service at the age of 25-30 years or older). Soldiers within the compulsory military service in the Polish army performed 24-hour service with accommodation and mass catering on the premises of the military unit. Professional soldiers, on the other hand, perform 8-hour service in the military unit, but their accommodation and meals are outside the military environment (with the exception of on-duty service and participation in field training or military operations). Therefore, military service in Poland increasingly resembles functioning in a workplace, with risk factors similar to those in the civilian environment

Table 5. Logistic regression analysis results (single-factor and multi-factor)
Tabela 5. Wyniki analizy regresji logistycznej (jednoczynnikowej i wieloczynnikowej)

sociodemographic data	single-factor logistic regression			multi-factor logistic regression		
	assessment	odds ratio	P-value	assessment	odds ratio	P-value
age	0.09	0.92	0.0010	0.09	0.91	0.0045
sex	0.58	0.56	0.1371	0.55	0.58	0.1850
place of residence	0.24	1.27	0.3516	0.27	1.31	0.3090
cigarette smoker	0.77	0.47	0.0022	0.64	0.53	0.0116
respiratory congestion	0.95	2.57	0.1926	0.87	2.40	0.2332
military rank						
lance corporal	-	-	-	-	-	-
corporal	31.12	-	-	31.09	-	-
warrant officer	0.49	0.62	0.4225	0.71	2.04	0.3249
sergeant	0.37	0.69	0.2110	0.21	1.23	0.5490
officer	19.27	0.01	0.9975	18.76	0.01	0.9973
vaccination	0.42	1.53	0.2461	0.21	1.23	0.5844

Conclusions

The *N. meningitidis* carriage rate of 4.9% in the studied group of professional soldiers is similar to carriage rates in the general population. The dominant prevalence of group B meningococcal infections (63%) among the military carriers of *N. meningitidis* is also comparable to the rates in the general populations in Poland and Central Europe. The performed study was the first stage in the analysis of *Neisseria meningitidis* carriage in the group of professional soldiers in a military brigade unit. The second stage took place in the first quarter of 2016, and its aim was to perform further diagnostics of the same subjects due to the high changeability of *Neisseria meningitidis* colonization of the nasopharyngeal mucosa.

As carriage of meningococci can be chronic, it may persist for many months or be irregular and transient, so continuation of the studies analyzing *Neisseria meningitidis* carriage in the military environment appears to be necessary, especially in the context of the justification of immunoprophylaxis against meningococcal infections for the entire staff of the Polish Armed Forces.

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Self-esteem in patients with leukemia

Poczucie własnej wartości pacjentów chorych na białaczkę

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Abstract. Our sense of self-esteem not only forms the basis of our well-being and general satisfaction in life, but also determines our healthy relations with other people. When either health or life is at risk, patients may experience trauma leading to a significant decrease in self-esteem. To verify such a possibility in seriously ill patients (acute myeloblastic leukemia and acute lymphoblastic leukemia), a group of 41 patients was tested using semantic differential scales. Two dimensions of self-assessment: real ("I am") and ideal ("I want to be") were applied. The analysis of the result divergence shows not only a self-assessment change as a consequence of illness, but also allows the evaluation of the range and intensity of expectations for the future.
Keywords: self-esteem, real self-assessment, leukemia, expectations

Streszczenie. Poczucie własnej wartości stanowi nie tylko podstawę naszego dobrego samopoczucia i ogólnej satysfakcji z życia, ale decyduje również o zdrowych relacjach z innymi ludźmi. W sytuacjach zagrożenia zdrowia i życia pacjenci mogą przeżywać traumę, powodującą znaczne pogorszenie samooceny. W celu weryfikacji wystąpienia takiej możliwości u pacjentów ciężko chorych (ostra białaczka szpikowa i ostra białaczka limfatyczna) grupę 41 pacjentów przebadano z użyciem przymiotnikowych skal dyferencjału semantycznego. Zastosowano dwa wymiary samooceny: realną („ja jestem") i idealną („ja chcę być"). Analiza stopnia rozbieżności wyników wskaże nie tylko na zmianę samooceny wskutek choroby, ale pozwoli również ocenić zakres i nasilenie oczekiwań wobec przyszłości.
Słowa kluczowe: poczucie własnej wartości, białaczka, samoocena realna, oczekiwania

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Introduction

The need for high self-esteem and its confirmation

Most of us have a strong need to perceive ourselves as a wise and decent person, and we also tend to constantly improve the results of the evaluation. In order to achieve this, we are prepared to distort reality. Clearly, we do it in moderation, according to our abilities, self-assessment, and an evaluation of the social environment. As a result of that distortion of reality and our own experiences, our image of reality becomes inadequate, and we lose the opportunity to learn from our mistakes. The need to perceive ourselves as a good and intelligent person is very strong; therefore, the urge to underestimate or ignore our shortcomings, and excessively emphasize our merits is also significant. We believe success to be our achievement, whereas in case of failure we notice numerous aspects beyond our control [1, 2].

Self-esteem may be global, refer to personality as a whole (I am a good person), or be specific, regarding individual personality traits (appearance, certain abilities). The stability of self-esteem varies, both with respect to people, and features.

People need to respect themselves, and they attempt to maintain a positive self image. High self-esteem affects not only their well-being, but also their functioning [3].

Numerous studies confirm that people with positive self-esteem are more optimistic, have an internal sense of control, and are more persistent, even in difficult situations or during negative experiences and failures [4, 5].

Self-esteem protects an individual from the existential anxiety stemming from the awareness of one's mortality, limitations and the fragility of human life.

Sources of self-esteem

Certainly there are numerous factors that contribute to self-esteem, and their significant for

different individuals may vary. Generally, studies concentrate on three sources of self-knowledge.

Reflected assessment is of great importance, i.e. using our own evaluation and knowledge about how the environment evaluates us (reflected self). Other people act as mirrors in which we see ourselves. More detailed studies demonstrate, however, that self-esteem is more associated with how we believe other people perceive us than with what they actually think.

Our self-assessment is based on comparisons with others, especially with people we perceive as similar to us in different aspects, or important to us. Therefore, the similarity and the position of an individual in terms of closeness and importance determine the significance of the comparisons and the criteria of their significance.

We assess ourselves and our behavior on the basis of observation and interpretation of our own behavior, i.e. through self-perception. This applies primarily to experiences associated with our successes and failures.

Leukemia is a disease with such an unambiguously negative connotation, that already at the moment of diagnosis it becomes a traumatic experience, possibly decreasing one's self-esteem.

Research questions

1. How high is self-esteem in chronically ill patients with a high level of fear about their health and life?
2. In which dimensions of self-esteem do patients treated for leukemia want to be different than at present?
3. Which features of self-assessment do they believe to be the most important and closely related?

Material and methods

The study involved 41 patients diagnosed with a form of leukemia. All subjects were adults, treated at the Department of Internal Diseases and Haematology of the Military Institute of Medicine in Warsaw in the years 2012-2015.

Semantic differential adjective scales were used in the present study. The theoretical premises for the semantic differential were presented in 1952 by Ch. E. Osgood [6][1]. The aim of this technique is to measure connotative meaning, here denoting a set of features, collectively described by a given name, but without unambiguous determination of the scope of that name. The connotative meaning exceeds the denotative meaning of a term, and simultaneously contains certain evaluation preferences [7]. Therefore, connotative meaning is not the same for different people. This understanding of connotative meaning can be referred to as psychological meaning, as it is a form of personal preference, a presentation of a personal attitude not only on a cognitive level, but also an emotional one.

The semantic differential technique is based on the concept of the representational mediation process [8] and the model of semantic space created by a set of such mediation processes. Each term has a multidimensional space in which it has a beginning (zero point), an n-dimensional character created by the epithets used to describe it, usually mono- (good) or bi-polar (good – bad) adjectives. The direction of the vector on each scale indicates the type (positive – negative) and intensity of assessment (intensity of reactions evoked). The distance between the ends of vectors in this space indicates the degree and scope of semantic similarity of the terms studied [9, 10].

The list of enclosed characteristics is prepared and their intensity is determined to establish the connotative meaning or to learn about the subject's assessment. Adjective scales are the most frequently used, but other epithets or description methods may also be applied (children may provide assessment by attributing colors to objects, describing objects or referring to favorite objects).

The forms used should represent three dimensions: assessment (value), strength and activity. Value is the most important dimension, and the greatest differentiating scales for this dimension were: "good", "wise", "pretty"; for the strength dimension it was "strong", and in the activity dimension "quick" and "active".

Semantic differential is not a ready, standardized tool. However, all the scales covering all three dimensions should be used, although assessment in the value dimension is always the dominant one. Terms used in tests should be carefully selected so that they are unambiguous and well-known to the subjects.

Normally, 10-12 scales are used, creating a continuum with and odd number of degrees, depending on the aim of the study, age and intellectual level of the subjects (usually 5-9 degrees).

The real dimension in the study, similarly to other studies of this type, is represented by the assessment of the concept "I am", whereas the ideal dimension is represented by the assessment of the concept "I want to be" [2].

STATISTICA software was used to analyze the

[1] The first studies in Poland were presented in 1974 by J. Czapiński (1974) and M. Studnik (1974).

[2] Based on my own experiences with testing self-assessment using semantic differential scales I concluded that the American (and not only) analysis of the assessment of the concept "I would like to be" in Polish conditions is too distant from the possible dimension of one's ideal self-assessment. Assessment of the concept "I want to be" is much more effective.

data, and is available on the Military Institute of Medicine website. The software was used to calculate the means, standard deviations, and significance of differences between both assessments of the patients in the study (Student's t-test) and correlation coefficient (Pearson's r-coefficient).

Results and discussion

The study subjects performed the self-assessment in both the real and ideal dimensions. The obtained results were statistically analyzed to determine the significance of differences between the real and ideal assessments, as well as the level or correlation between individual assessments.

A person who is ill loses, to a large extent, the sense of self-esteem (scales 10 and 11) due to the shock of the diagnosis, especially in relation to a difficult disease. Consecutive expressions indicating a strong need to change oneself are characterized by a high level of expectation: I definitely want to be more cheerful, strong, pretty and active, as well as calm and wise.

Two assessments, however, are interesting, as the patients not only declared the lack of a need for change, but also the intensity of ideal assessments was slightly lower than that of the real ones: I want to be less emotional and less hard-working. Maybe this was an expression of the need to reduce the tension resulting from the present situation, as well as of a moderate disapproval for spending too much time on work in the past? Maybe one should have functioned with less emotion, and more comfort?

In the majority of the self-assessment scales used the patients declared the need for significant change: in seven of them the significance of differences was above 0.000. This fact may raise doubts if such considerable changes are possible, regardless of the health status; however, is it possible to accept the limitations associated with treatment and its consequences, when expectations so significantly exceed the present situation?

Clearly, each patient used different ways of coping with difficulties. Also, each had a different life situation, and received varied levels of support from the people around. Therefore, the final outcome was a highly individual matter, as well as one that was deeply personal. However, a considerable increase in superficial, infrequent contacts could be observed, particularly with deteriorating health status. Moreover, increasingly often an intensification of the feeling of loneliness occurs in chronically ill patients.

A strong correlation between two dimensions: good and wise (r = 0.52) could be easily observed, as well as their high level of unambiguity (SD = 0.61 and 0.67). Therefore, a wise person cannot be mean, or conversely: a good person cannot be stupid. A metaphysical question can be raised here: is stupidity immoral in the common perception? It should be emphasized that the assessments were performed by individuals in a situation where there was a particular threat to health and life.

The dimension of "good" even more strongly correlated with the assessments of the scales "friendly", "hard-working", "healthy" and "valuable". It is noteworthy that "good" was not closely related to the dimensions "calm" and "strong".

In the expectations expressed in ideal assessments (I want to be), the strongest correlation was found between the assessments "good" and "wise". Patients often want to answer the question: "How did I become so sick, what stupid thing did I do, what couldn't I be good at?" This might have been expressed in the self-assessment, where the scales "wise" and "good" so strongly correlated. A wise person cannot be bad, just as a good person cannot be stupid.

On the other hand, one's own activity is strongly correlated with a sense of power. Patients treated with consecutive courses of chemotherapy or preparing for transplantation of bone marrow stem cells know perfectly well weakness, difficulty with daily functioning and the sense of helplessness.

Cheerful people are considered friendlier. People prefer contacts with those who are cheerful. However, it is not easy to be happy in sickness, so it is probably difficult to be cheerfully friendly, even with close ones. Patients are aware they need change, but they do not have sufficient strength or reason to express contentment; hence the assessment scales related to the disease gave: they felt sick, not pretty, not calm, weak, and also not very wise

Conclusions

1. Self-assessment in the real dimension in severely ill hematological patients was lowered primarily in the assessment scales related to the disease: they feel sick, not pretty, not calm, weak, but also not very smart. As a result, their self-esteem is definitely reduced (the global score of real assessments is significantly different than the "ideal I": p>0.000.

Table 1. Averaged results and comparisons for real and ideal self-assessment in hematological patients (N=41)
Tabela 1. Wyniki średnie i ich porównanie dla samooceny realnej i idealnej pacjentów hematologicznych (N=41)

assessment scales		I am		I want to be		Differences between the averages	difference rank	t	P
1	good	5.03	0.61	5.43	0.59	0.40	9	3.33	0.002
2	wise	4.50	0.67	5.65	0.61	1.15	6	9.69	0.000
3	cheerful	4.67	1.31	5.95	0.86	1.28	3	6.00	0.000
4	pretty	4.07	1.21	5.32	1.15	1.25	5	5.47	0.000
5	strong	4.50	1.22	5.77	0.96	1.27	4	6.56	0.000
6	active	4.82	1.43	5.62	0.86	0.80	7	3.17	0.003
7	calm	4.42	1.16	5.07	0.88	0.65	8	3.17	0.003
8	hard-working	5.27	1.30	5.17	0.86	0.10	11	0.46	not significant
9	friendly	5.47	0.97	5.75	0.83	0.28	10	1.49	not significant
10	healthy	3.30	1.87	5.72	0.99	2.42	1	6.48	0.000
11	valuable	4.82	0.83	6.17	0.80	1.35	2	8.97	0.000
12	emotional	5.92	0.65	5.82	0.74	0.10	12	0.68	not significant
total score		56.70	7.53	67.05	5.28	10.35		8.07	0.000

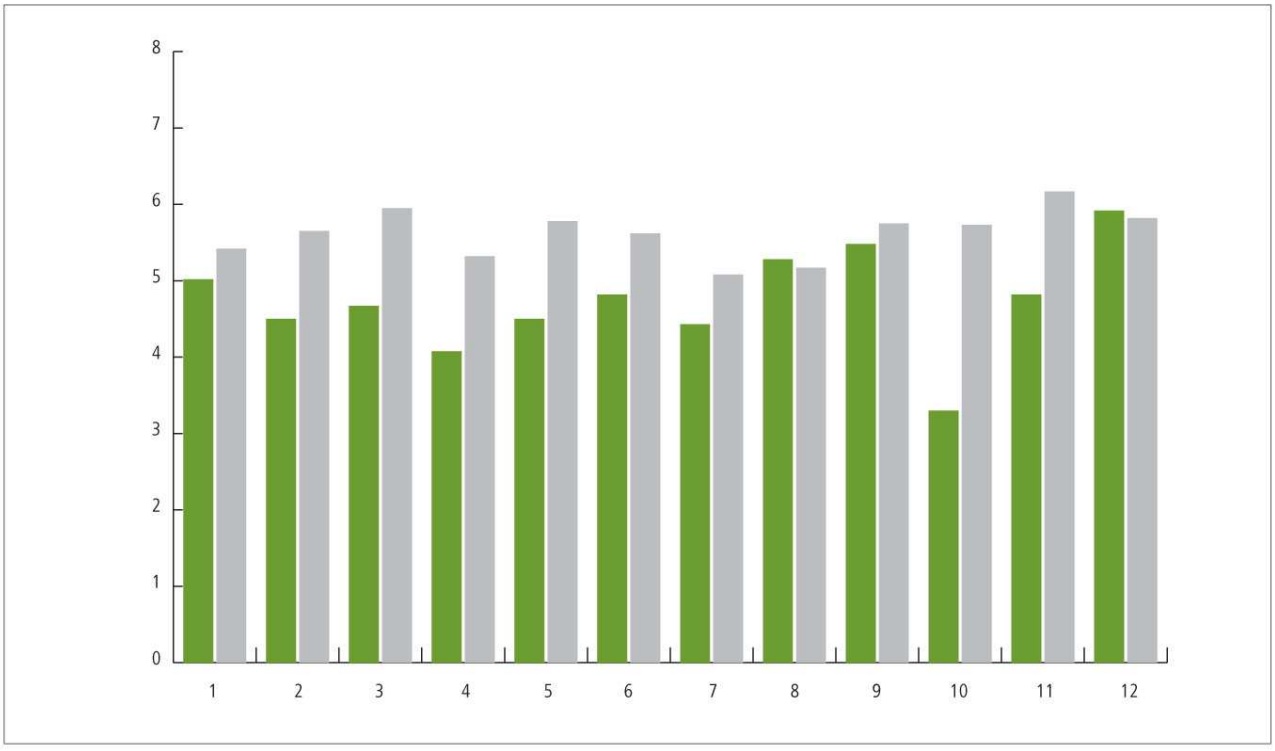

Figure 1. Average results for the real (dark columns) and ideal (light columns) self-assessment of patients with diagnosed leukemia

Rycina 1. Wyniki średnie samooceny realnej (pierwsze, ciemne stupki) i idealnej (drugie) u pacjentów z rozpoznaną białaczką (N =41)

Table 2. Correlations between particular dimensions of real self-assessment in patients with diagnosed leukemia
Tabela 2. Korelacje poszczególnych wymiarów samooceny realnej pacjentów z rozpoznaniem białaczki

scales	good	wise	cheerful	attractive	strong	active	calm	hard-working	friendly	healthy	valuable
wise	0.52										
cheerful	0.45	**0.50**									
attractive	0.33	**0.20**	**0.36**								
strong	0.02	**0.03**	**0.21**	**0.40**							
active	0.35	0.25	**0.36**	0.09	**0.34**						
calm	0.20	**0.24**	**0.24**	0.18	**0.36**	**0.54**					
hard-working	0.65	**0.33**	**0.27**	0.22	**0.23**	**0.64**	0.52				
friendly	0.69	0.55	**0.45**	0.12	**0.20**	**0.31**	0.66	0.57			
healthy	0.60	0.28	0.22	**0.03**	**0.14**	**0.06**	**0.06**	0.27	0.54		
valuable	0.55	**0.42**	**0.34**	0.53	**0.33**	**0.07**	**0.05**	0.18	**0.41**	**0.34**	
emotional	0.45	**0.49**	**0.27**	0.48	**0.14**	**0.26**	0.28	0.35	0.57	**0.08**	**0.39**

Table 3. Correlations between particular dimensions of ideal self-assessment in patients with diagnosed leukemia
Tabela 3. Korelacje poszczególnych wymiarów samooceny idealnej pacjentów z rozpoznaniem białaczki

scales	good	wise	cheerful	attractive	strong	active	calm	hard-working	friendly	healthy	valuable
wise	0.76										
cheerful	0.06	0.25									
attractive	0.54	0.48	**0.27**								
strong	0.13	**0.12**	**0.53**	0.59							
active	0.32	**0.08**	**0.41**	0.53	**0.72**						
calm	0.13	0.28	**0.29**	**0.03**	**0.32**	**0.37**					
hard-working	0.45	**0.07**	**0.01**	**0.30**	**0.05**	**0.43**	0.18				
friendly	0.14	0.22	**0.71**	0.22	**0.31**	**0.15**	0.35	**0.10**			
healthy	**0.11**	0.28	**0.16**	0.14	0.25	0.58	0.57	**0.49**	0.29		
valuable	0.05	**0.17**	**0.70**	**0.40**	**0.70**	**0.53**	**0.05**	**0.21**	**0.70**	**0.03**	
emotional	0.17	**0.08**	**0.03**	0.39	**0.44**	**0.53**	0.68	**0.40**	**0.13**	**0.51**	**0.18**

2. Ideal self-assessment differed significantly from the real self-image. In nine out of the twelve scales the differences were so pronounced ($p>0.003$), that they were impossible to implement
3. System of value changes due to disease: the correlations between the moral dimension (good) and wisdom increased considerably (the correlation coefficient increased from 0.52 to 0.76). Moreover, it is difficult to be active when one is feeling weak ($r = 0.72$). When self-esteem is decreased due to disease, it is difficult to be cheerful, strong and friendly, although these are the most important assessments of the ideal image.
4. Patient support should concentrate on increasing their tolerance and understanding of adverse reactions to chemotherapy, while also on maintaining hope for a significant improvement of health and life quality in remission, or after the treatment.

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Perception of disease etiology and prognosis in hematological patients

Ocena etiologii choroby i jej rokowania przez pacjentów hematologicznych

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Abstract. The connotation of terms like "leukemia" and "myeloma" is quite explicitly negative in society. Upon diagnosis of disease, negative feelings arise not only in the patients themselves but also among their nearest and dearest (diagnostic shock).
Later, as time passes and the therapy is undertaken, an adaptation process begins - partly as a result of personal defensive strategies and resources. An additional supportive factor is the possibility of stem cell transplant in the near future. The subject of this study, involving patients (N=50) treated after diagnosis of leukemia or multiple myeloma, was to identify the expectations and beliefs related to factors influencing the effectiveness of the treatment process, perspectives and the need for information, not only about the treatment itself but also its side effects (awareness of risk) and perspectives.
Key words: hematological diseases treatment, assessment on prognosis, leukemia, multiple myeloma

Streszczenie. Konotacja pojęć „białaczka" i „szpiczak" jest społecznie dosyć jednoznacznie pejoratywna. W chwili rozpoznania choroby rodzą się negatywne uczucia nie tylko samego pacjenta, ale i jego najbliższych (szok diagnozy). Potem jednak, z biegiem czasu i podjętej terapii, następuje proces adaptacji, między innymi na skutek uruchomienia własnych strategii obronnych i posiadanych zasobów osobistych. Dodatkowym czynnikiem wsparcia jest pojawiająca się dla wielu pacjentów w nieodległej perspektywie szansa na przeszczepienie komórek macierzystych. Przedmiotem prezentowanych badań pacjentów (N = 50) leczonych po rozpoznaniu białaczki lub szpiczaka plazmocytowego było określenie ich oczekiwań i przekonań co do uwarunkowań skuteczności samego procesu leczenia, rokowania dla każdego z nich oraz potrzeby posiadania informacji na temat nie tylko leczenia, ale również jego skutków ubocznych (świadomość zagrożenia) i rokowania.
Słowa kluczowe: leczenie chorób hematologicznych, oceny rokowania, białaczka, szpiczak plazmocytowy

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Introduction

Most of us share a strong belief, even if we are not always aware of the fact, that the world is a just place, where people get what they deserve. Therefore, being good and honest is the proper choice for life, as everything comes back to us in the right proportions. Many people believe that even if justice is not served in this life, we still have eternity at our disposal. In short, everyone, sooner or later, will receive exactly what they deserve, and as much as they earned [1, 2].

Almost all of us are convinced that we are good people. Not necessarily perfect, because everyone sometimes reveals a weakness or has a bad day, faces a difficult situation or meets the wrong people. This is not only understandable, but obvious, and can be explained by more or less concrete factors beyond our control. If we add to this the effect of genes, still difficult to determine, a completely forgotten early childhood, the dozens of neurotransmitters functioning in our brains, and a thousand of other poorly investigated or even ignored factors, we can blame even large mistakes on something beyond ourselves. This is how we protect our positive self-image. More than that, we believe that: 'if I were in charge, the world would be a much fairer, better place, without many problems, especially diseases, poverty and

catastrophes.

Then suddenly, always at an inconvenient moment, we find we have a neoplasm, leukemia, Hodgkin's lymphoma, or myeloma. No, not somebody somewhere else, not even someone nearby, but us. An error, a misunderstanding. A false test result. An inadequate doctor. A search for an answer to a difficult question starts: Why did I get sick? What did I do? Did I inherit any propensities? Will treatment help, and on what/who does it depend? Should I look for information, or is it better not to know? Finally, though, the most difficult question: How much time have I got? [3].

Many physicians and therapists avoid those subjects [4] for different reasons. The most frequent ones include:

- a belief that the patient does not want to know the truth; a fear of causing pain, doing harm, causing a shock; a belief that the patient, knowing the truth about his or her disease, will lose the will to live or fight for their health; in short: a belief that the patient will lose hope,
- a fear of the patient's reaction,
- a fear of one's helplessness in this situation,
- a fear associated with the anticipation that the patient will commit suicide,
- a fear of being rejected by the patient,
- a fear of realizing one's own mortality,
- the belief that I cannot do this properly, because nobody taught me how, and the belief that a communication specialist should do it [5, 6].

Aims of the study

This study examines the subjective beliefs of patients regarding the conditions for therapeutic effectiveness, and thus the prognosis as well as the need to receive information about the diagnosis and about the side effects of relevant procedures. The following research questions were formulated:

1. According to severely ill patients, what are the conditions for effective treatment of their disease? Do these conditions depend on the patient, on others, or maybe on factors beyond man's control?
2. How do patients assess their prognosis?
3. How much do they want to know about their disease, its treatment and possible risks?

Material and methods

The study involved 50 subjects (28 females and 22 males) diagnosed with a form of acute leukemia or plasmacytic myeloma. All patients were diagnosed and treated hematologically for the first time. The study was conducted at the Department of Internal Diseases and Haematology of the Military Institute of Medicine in Warsaw in the years 2014-2016. The study was conducted during the first days of hospitalization.

A short and original questionnaire was developed for the study to assess the attitudes of hematological patients towards their treatment and prognosis. Due to the scale used, it is possible to present the results in a quantitative manner and thus to analyze them statistically. The content of individual statements is based on many years of observation and therapy of patients in the Department of Haematology, Military Institute of Medicine. The study results may be compared with the results of other patient groups, and thus enable consideration of changes occurring during treatment. The study was conducted anonymously, the study subjects completing the questionnaire on their own, voluntarily.

Results

The results obtained by the study subjects were high, and in the majority of cases the mean values exceeded or were close to 4 on a 5-point scale [Table 1]. The highest scores were attributed to the need for information about the diagnosis, course of treatment and prognosis. The analysis of the result distributions in individual categories is presented in Tables 2-4.

The greatest consistency in the responses was related to the significance of the role of the physician and the medications, with 82% of the study subjects sharing this opinion. Also, the majority of subjects (62%) believed that the role of individual lifestyle and personal investment play a significant role in the therapeutic process.

Most of the treated hematological patients (54%) did not believe in the significance of random determinants (fate).

The hematological patients in the study had different beliefs regarding the importance of genetic characteristics and predispositions (36% believed they were important, 18% had no opinion on the subject, and 24% were not convinced that this factor affected the disease).

46% of the study patients saw the role of supernatural powers in disease development, 24% did not believe this factor was of importance, and 18% of patients had no opinion on the subject.

QUESTIONNAIRE

Instructions: *There are several statements below for you to agree with or not.*
On a scale of 1 to 5, indicate how much you agree with each statement, writing the chosen number in the empty box.
Be honest in your responses, or do not do the questionnaire.
The points on the scale mean:
1 - I completely disagree,
2 - I quite disagree,
3 - I don't know, I can't say,
4 - I quite agree,
5 - I agree completely.

1. My recovery depends to a large extent on my lifestyle

1 2 3 4 5

2. My recovery depends to a large extent on physicians and medications

1 2 3 4 5

3. My recovery depends primarily on fate, destiny

1 2 3 4 5

4. Human health and life are determined to a large extent by genes

1 2 3 4 5

5. My recovery depends mostly on supernatural powers (God)

1 2 3 4 5

6. I believe that I have many good years ahead of me

1 2 3 4 5

7. My disease is completely curable

1 2 3 4 5

8. I want to be informed about the diagnosis and treatment

1 2 3 4 5

9. I want to be informed about the side effects of the treatment

1 2 3 4 5

10. I want to have an accurate prognosis

1 2 3 4 5

Table 1. Averaged results and standard deviation obtained by hematological patients (N=50) in particular items of the questionnaire
Tabela 1. Wyniki średnie i odchylenia standardowe uzyskane przez badanych pacjentów hematologicznych (N = 50) w poszczególnych itemach zastosowanego kwestionariusza

evaluated items	M	SD	Rank
assessment of conditions associated with the treatment of one's disease			
My recovery depends to a large extent on my lifestyle	3.73	0.88	**2**
My recovery depends to a large extent on physicians and medications	4.23	0.98	**1**
Everyone's life is already determined (fate, destiny)	2.93	1.14	**5**
Human health and life is determined to a large extent by genes	3.03	1.29	**4**
My recovery depends mostly on supernatural powers (God)	3.31	1.24	**3**
assessment of prognosis			
I believe that I have many good years ahead of me	4.47	0.88	**1**
My disease is completely curable	2.67	1.37	**2**
expectation of information			
I want to be informed about the diagnosis and treatment	4.73	0.65	**2**
I want to be informed about the side effects of the treatment	4.90	0.31	**1**
I want to have an accurate prognosis	4.50	1.15	**3**

Table 2. Distribution of results in the disease determinant assessment
Tabela 2. Rozkład wyników w ocenie uwarunkowań choroby

disease treatment determinants	I agree completely		I quite agree		I don't know		I quite disagree		I disagree completely	
	N	%	N	%	N	%	N	%	N	%
lifestyle	6	12	25	50	14	28	3	6	2	4
physician and medications	25	50	16	32	5	10	4	8	0	0
fate, destiny	4	8	12	24	8	16	24	48	2	6
genes	6	12	12	24	13	26	4	8	9	18
supernatural powers	4	8	19	38	9	18	6	12	6	12

Table 3. Distribution of results in the perspective assessment
Tabela 3. Rozkład wyników w ocenie rokowania

assessment of prognosis	I agree completely		I quite agree		I don't know		I quite disagree		I disagree completely	
	N	%	N	%	N	%	N	%	N	%
I will live for many years	32	64	8	16	8	16	1	2	1	2
my disease is completely curable	6	12	4	8	17	34	10	20	13	26

Another list (Table 3) presents the beliefs of hematological patients regarding prognosis. Here we encounter a certain peculiarity, because

- the **majority of patients with leukemia or myeloma believed that they still had many years of life ahead of them (80%),** and only 4% declared that they did not have much time left, whereas 16% could not or did not want to express their opinion on the subject,
- **only 20% were convinced that their disease could be completely cured,** 34% had no opinion on possible recovery, and 46% perceived their disease as incurable.

Table 4. Need for information
Tabela 4. Oczekiwanie informacji

need for information	I agree completely		I quite agree		I don't know		I quite disagree		I disagree completely	
	N	%	N	%	N	%	N	%	N	%
about the diagnosis	34	68	9	18	5	10	1	2	1	2
about the side effects	36	72	7	14	6	12	1	2	0	0
about the prognosis	32	64	8	16	5	10	3	6	2	4

The study subjects were surprisingly consistent in declaring the need to receive information about the diagnosis of their disease, possible side effects, and on the most difficult subject in oncological and hematological diseases, i.e. the prognosis. The majority of patients (>80%) wanted to know everything about the diagnosis, treatment and possible prognosis[1]. Outcomes of this study are only partly consistent with other studies [7, 8], and the 'need for information' ratio in the present study is higher.

Conclusions

- Patients definitely attributed the greatest role in the treatment of hematological disease to the physician's care and to their lifestyle. Using, although not necessarily consciously, the ingratiation strategy (getting into the staff's good graces) in order to gain more interest and affection may be of importance.
- Despite a lack of hope for complete recovery, the majority of patients diagnosed with leukemia or plasmacytic myeloma were convinced they had many years of life ahead of them. In support therapy many of them indicated the important justification, and sometimes necessity, for their further existence.
- The majority of the study patients (>80%) wanted accurate information regarding their diagnosis and possible side effects of the treatment. Also the majority expressed the need for information about the prognosis; however, in this case they usually expected to learn the truth in smaller doses, adapted to their individual ability to accept it.

1 Based on a review of 1160 reports. An analysis of studies found in 274 articles. They all refer to patients diagnosed with neoplasms [*cf* 9, 10].

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Application of hyperbaric oxygen therapy for the treatment of non-healing wounds following traumatic amputation in a soldier from Afghanistan - a case report

Zastosowanie tlenoterapii hiperbarycznej w leczeniu trudno gojącej się rany po amputacji urazowej u żołnierza z Afganistanu – opis przypadku

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Abstract. This case report presents a 40-year-old soldier from Afghanistan who suffered extensive blast injury to both lower extremities. The postoperative period was complicated by phlegmon and the need to repeat an amputation. In order to continue the treatment the patient was transported to "10. WSZKzP". After successive debridement the patient was sent to the Hyperbaric Oxygen Therapy Centre. A total of 30 sessions of HBOT 2.5 ATA/90 minutes were performed. During the treatment a remarkable improvement in the healing of the wound with no sign of inflammatory processes was observed.
Key words: amputation, phlegmon, difficult wounds, hyperbaric oxygen therapy

Streszczenie. W pracy przedstawiono przypadek 40-letniego żołnierza z Afganistanu. W wyniku wybuchu doznał on rozległych obrażeń obu kończyn dolnych. Przebieg pooperacyjny powikłany ropowicą tkanek miękkich i koniecznością dwukrotnej reamputacji. W celu kontynuacji leczenia pacjenta przetransportowano z Afganistanu do 10. WSKzP Po kolejnym chirurgicznym opracowaniu rany pacjenta skierowano do Centrum Hiperbarii Tlenowej. Wykonano 30 sesji HBOT 2,5 ATA/90 minut. W trakcie terapii obserwowano znaczną poprawę gojenia rany i ustąpienie klinicznych oznak stanu zapalnego.
Słowa kluczowe: amputacja, ropowica, trudno gojące się rany, tlenoterapia hiperbaryczna

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Introduction

Hyperbaric oxygen therapy is a method of supplying increased amounts of oxygen to damaged tissue and organs. During a session in a hyperbaric chamber, the patient breaths 100% oxygen at an increased pressure (>1 ATA).

At sea level blood plasma oxygen concentration is approximately 3 ml/L. In order to maintain normal cellular metabolism, tissues at rest require about 60 ml of oxygen per 1 liter of blood. When the patient is breathing 100% oxygen at a pressure of 3 atmospheres, the amount of blood plasma oxygen increases to nearly 60 ml per liter, which covers the entire tissue requirement, without using the oxygen transported with the hemoglobin. This is very important in patients with carbon monoxide poisoning, or those with severe anemia [1]. By stimulating neoangiogenesis, tissue hyperoxia also provides benefits to patients with infected, difficult

to heal wounds. Increased amounts of serum oxygen increases its availability for tissues and organs, especially those with reduced perfusion, reducing the damaged and necrotic area, stimulating collagen synthesis, with a bactericidal effect through the production of free oxygen radicals. During therapy with hyperbaric oxygen the blood vessels constrict, which reduces edema and leukocyte adhesion, and leads to their degranulation.

Possible complications during HBO may be classified as: complications due to pressure-induced injury (e.g. pressure-induced damage to the otitis media, paranasal sinuses or lungs), complications associated with oxygen toxicity (CNS, lungs), and adverse reactions regarding eyes, or limitations due to claustrophobia and closed-space anxiety (therapy in a chamber). Complications associated with properly applied hyperbaric therapy are very rare, usually mild and transient. The most common one is pressure-induced injury to the ear and sinuses. Episodes of cerebral oxygen toxicity in the form of generalized seizure are very rare. No significant abnormalities are found in pulmonary function tests in patients undergoing long-term therapy [2].

Case report

On 14 June 2012, as a result of the explosion of an explosive device, a 42-year-old soldier (M.Z.) suffered extensive injuries to both lower limbs. The patient was transported to the Polish Field Hospital in Ghazni, where both lower limbs were amputated: the left one at 1/2 of the distal tibia, with stabilization of the tibial fractures using the Hoffman device, while on the right side enucleation at the knee joint was performed, with stabilization of the femoral fracture (Hoffman device). In November 2012 purulent complications were found in the right thigh stump. The following microorganisms were grown in microbiological tests: *Proteus mirabilis, Staphylococus aureus MRSA* and *Actinomyces Israeli.* It was not possible to perform blood cultures for the above pathogens. On 10 December 2012 a wide opening, cleansing and rinsing of the right thigh stump area was performed. Despite changing the dressing daily, or even twice daily, it was necessary to shorten the stump to the fracture gap, and remove the stabilizing plate. Later, due to phlegmon, the limb was re-amputated in the American Field Hospital in Afghanistan, just below the lesser trochanter. On 13 October 2013, the patient was re-admitted to the Polish Field Hospital in Ghazni due to active inflammation with purulent fistula on the line of the surgical scar (results of microbiological cultures were negative). On 28 October 2013 a wide opening was performed and the source of reaction was found: two thick plaited threads, which were removed during the procedure. In the cultures collected from the wound *Proteus mirabilis* was grown, an alert pathogen indicating multiple resistance to antibiotics (resistance to all antibiotics was demonstrated, including chloramphenicol, tigecycline and aztreonam). Surgical treatment was used, i.e. to insert gauze with antiseptics (without effect), then an improvised, and later original VAC dressing was used (from 10 November 2013). The wound started to heal, after 18 days the Biseptol and Taromentin were discontinued. In the course of treatment, during surgical procedures of pus drainage the patient experienced two sudden cardiac arrests (on 29 and 30 October). The most probable causes included administration of 0.5% bupivacaine to the extradural space, bacteremia and intraoperative blood loss (approx. 1,500 ml). As a result of resuscitation, spontaneous circulation and respiration was restored, without subsequent loss of consciousness or awareness. The patient was discharged in a generally good condition and without fever. Internal and neurological tests did not reveal any abnormalities. The patient received continuous extradural analgesia of 0.25% bupivacaine at a dose of 4 ml/h, administered in lumbar section L3-L4. The discharge report from the Field Hospital in Ghazni contained information about a paradoxical reaction to extradural bupivacaine.

As continuation of the treatment in the Polish Field Hospital in Ghazni was not possible, the patient was qualified for medical evacuation to Poland, where he was transported on 26 November 2013. After admission to No. 10 Military Teaching Hospital in Bydgoszcz, the patient's general condition was stable, the respiratory and circulatory function was efficient, and the stump of the lower left limb was healed. In the right lower limb stump an open wound was covered with VAC dressing. The patient was admitted to the Department of Orthopaedics and Trauma Surgery of Motor Organs. No anaerobic bacteria were found in cultures of *Proteus mirabilis, Klebsiella pneumoniae ssp ESBL* (+) from the wound. Laboratory tests demonstrated CRP 18.56 mg/l, CSR 10, PCT concentration (N58) 0.2 ng/ml; other tests: complete blood count, glycaemia, ionogram, creatinine, coagulology revealing no abnormalities.

Figure 1. Wound before starting treatment with hyperbaric oxygen

Rycina 1. Rana przed rozpoczęciem leczenia tlenem hiperbarycznym

Figure 2. Wound before starting treatment with hyperbaric oxygen

Rycina 2. Rana przed rozpoczęciem leczenia tlenem hiperbarycznym

On 28 November 2013, due to phlegmon of the right thigh stump, a procedure under general anesthesia was performed. A VAC drain and sponge grown into the soft tissue were removed from the wound in the right thigh. After rinsing of the wound and removal of the fibrin, the stump was left open. The wound treatment was continued at the Orthopaedics Department. During hospitalization at the Department of Orthopaedics, *Proteus mirabilis* was still grown from the wound cultures, and laboratory tests from 12 December 2013 revealed CRP concentration of 132.38 mg/L.

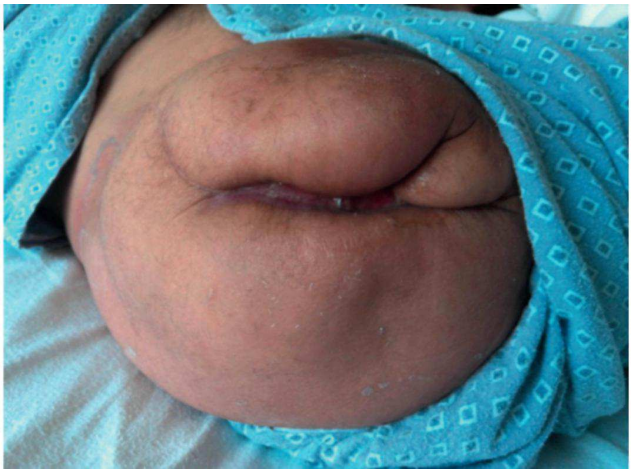

Figure 3. Wound during treatment with hyperbaric oxygen at the end of the therapy

Rycina 3. Rana podczas leczenia tlenem hiperbarycznym pod koniec terapii

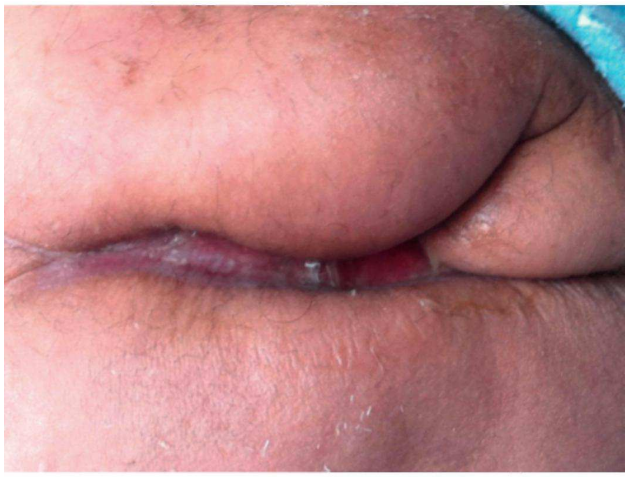

Figure 4. Wound during treatment with hyperbaric oxygen at the end of the therapy

Rycina 4. Rana podczas leczenia tlenem hiperbarycznym pod koniec terapii

On 13 December 2013, the attending physician from the Department of Orthopaedics and Trauma Surgery of Motor Organs referred the patient to the Hyperbaric Oxygen Therapy and Wound Treatment Centre for hyperbaric treatment. On the same day the patient was qualified for therapy, and on 16 December the first session took place. The patient tolerated well the 100% oxygen, and learned the technique of equalization of pressure in the ears and sinuses. Figures 1 and 2 present the wound before the hyperbaric oxygen therapy.

On admission of the patient to the Hyperbaric Oxygen Therapy and Wound Treatment Centre, the size of the wound on the right lower limb stump was 180 x 40, without fibrin or necrosis at the bottom. The patient was

initially qualified for 15 oxygen therapy sessions. Due to the beneficial effects and significant improvement in healing, the therapy was continued, and the patient received a total of 30 sessions at 2.5. ATA, 90 minutes each. During the treatment in HBOT, the patient confirmed he was in pain, although he refused analgesics. At the end of the therapy the pain subsided. Figures 3 and 4 present photographic documentation prepared during the therapy.

Results

1. A significant improvement in healing of a difficult to heal wound was obtained.
2. Pain symptoms in the amputated limb subsided.

Discussion

Hyperbaric oxygen therapy (HBOT) is a method for the supportive treatment of wounds that are difficult to heal. It consists of the administration of 100% oxygen in a hyperbaric chamber, which results in increased oxidation of tissues and organs. HBOT initiates the process of tissue neovascularisation, as well as eradicating bacteria in the wound. Treatment of difficult to heal wounds is usually long, and thus requires long-term financing. Introducing hyperbaric oxygen therapy to the therapeutic process reduces treatment duration, reduces costs, and in many cases protects the patients from complications such as general systemic infections or re-amputation.

It should be emphasized that hyperbaric oxygen therapy constitutes a supportive therapy, and it cannot be used as an alternative to surgical treatment or advanced local treatment, including antibiotic therapy. It is relevant mainly to wounds which are difficult to heal, infected acute or subacute wounds, or chronic wounds [3]. Due to direct inhibition of anaerobic bacterial growth, as well as stimulation of the antibacterial properties of white cells in fighting aerobic bacteria, hyperbaric oxygen therapy is an important element supporting the treatment of wound infections. If the patient's organism does not respond within 48 hours to surgical treatment of the wound combined with targeted antibiotic therapy, hyperbaric oxygen therapy should be considered in the therapeutic process [4]. According to data from the literature, HBOT helps to reduce the number of limb amputations, as well as increasing survival, including the rate of distant survivals [5]. Unfortunately, there is a lack of sufficient reports that clearly confirm the significant role of hyperbaric oxygen therapy in the treatment of complicated wounds which are difficult to heal, which indicates the need for further clinical studies [6].

Conclusions

- It is the authors' opinion that hyperbaric oxygen therapy was an important element supporting the treatment of the infected wound of a post-amputation right thigh stump.
- Hyperbaric therapy in the described case was a method supporting the effective treatment of a wound which was difficult to heal.
- The authors believe that introducing hyperbaric oxygen therapy to a treatment plan should be considered early, within 48 hours, in cases of unsatisfactory effects of the treatment of an infected wound that is resistant to antibiotic therapy and surgical procedures.

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A 41-year-old female with Frey's syndrome, developed as a side effect of partial parotidectomy, successfully treated with a single application of botulinum toxin - a case report

Przypadek 41-letniej kobiety z objawami zespołu Łucji Frey, rozwiniętego jako powikłanie parotidektomii częściowej, leczonego z powodzeniem jednorazową aplikacją toksyny botulinowej

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Abstract. Frey's syndrome (gustatory sweating) is a common complication of parotidectomy. Its clinical picture includes excessive perspiration and redness of the skin in response to stimuli inducing salivation. Its symptoms occur in the area innervated by the auriculotemporal nerve. The paper presents the case of a 41-year-old patient without chronic diseases, after removal of the superficial lobe of the right parotid gland, for 1.5 years suffering onerous sweating around the right auricular and temporal area, appearing during meals. Following the examination, augmented by the iodine-starch test (Minor test) and after ingestion of food, and considering the interview data, the patient was diagnosed with auriculotemporal syndrome. She was qualified for treatment with botulinum toxin type A injections. The area of increased sweating was injected with 10 mU BTA, without complications. During the follow-up period, four weeks after the injections, the patient reported complete relief from the symptoms. In order to verify the effectiveness of treatment the Minor test was performed again, confirming the subsidence of the perspiring. Numerous treatment methods have been reported, which vary in effectiveness and intervention effectiveness. To prevent the syndrome from developing, surgical methods consisting of placing a flap separating the operated area from the skin are crucial. Using these methods secondary to the extended syndrome is not as efficient as in the prophylaxis. It appears that for Frey's syndrome the treatment of choice should be the application of botulinum toxin type A. The biggest disadvantages of such a therapy are cost and the need for repeat injections.
Key words: Frey's syndrome, auriculotemporal syndrome, botulinum toxin type A, iodine-starch test

Streszczenie. Zespół Łucji Frey (pocenia smakowego) jest często występującym powikłaniem parotidektomii. Jego obraz kliniczny to nadmierna potliwość i przekrwienie skóry w odpowiedzi na bodźce indukujące wydzielanie śliny. Objawy dotyczą obszaru unerwionego przez nerw uszno-skroniowy. W pracy przedstawiono przypadek 41-letniej pacjentki bez chorób przewlekłych, po usunięciu płata powierzchownego ślinianki przyusznej prawej, z trwającą od około półtora roku uciążliwą potliwością okolicy usznej i skroniowej prawej pojawiającą się podczas spożywania posiłków. Po badaniu otolaryngologicznym poszerzonym o wykonanie testu jodowo-skrobiowego (test Minora) po prowokacji pokarmem, uwzględniając dane z wywiadu, u pacjentki ustalono rozpoznanie zespołu uszno-skroniowego. Została ona zakwalifikowana do leczenia iniekcjami z toksyny botulinowej typu A. Obszar wzmożonej potliwości ostrzyknięto 10 mU BTA, bez powikłań. Po 4 tygodniach od zabiegu pacjentka zgłaszała całkowite zniesienie dolegliwości. W celu weryfikacji skuteczności zabiegu ponownie wykonano test Minora, potwierdzając ustąpienie potliwości. Wymieniane są liczne, różniące się skutecznością i inwazyjnością, metody leczenia. W zapobieganiu rozwojowi zespołu główną rolę odgrywają metody zabiegowe -mechanizm ich działania polega na umieszczeniu płata oddzielającego powierzchnię operowaną od skóry. Stosowanie tych metod wtórnie do rozwiniętego zespołu nie jest tak efektywne, jak w profilaktyce. Wydaje się, że terapią z wyboru rozwiniętego zespołu powinno być stosowanie toksyny botulinowej. Największe zastrzeżenia budzi jej koszt dla pacjenta oraz konieczność powtarzania iniekcji.
Słowa kluczowe: zespół Łucji Frey, zespół uszno-skroniowy, toksyna botulinowa typ A, test jodowo-skrobiowy

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Introduction

Frey's syndrome is characterized by profuse, onerous perspiration and skin redness due to hyperemia. It occurs during meals and in situations stimulating salivation. The symptoms usually occur in the area innervated by the auriculotemporal nerve. The syndrome is a common complication of proidectomy, and it develops within a few weeks to a few months following the surgery [13, 15, 24].

The first reports of auriculotemporal syndrome date back to the 18th century (authors such as Katsemsky [1740], Dupuy [1816] and Baillarger [1853] are mentioned in the literature). Polish achievements in the history of discovering the syndrome is worth emphasizing, especially the role of a Polish neurologist of Jewish origin, Łucja Frey. In 1923 Frey described a case of a young man, initially injured in the area of the mandibular angle. After the wound had healed, the man experienced the feeling of warmth and sweating on the cheek on the injured side during meals. More importantly, Frey was the first to suggest the pathomechanism behind the gustatory sweating [8].

The post-operative pathomechanism of Frey's syndrome has not been fully understood. According to a commonly adopted hypothesis, it is a result of pathological re-innervation of parasympathetic fibers in the auriculotemporal nerve (incorrect connections between postganglionic parasympathetic fibers from the auricular ganglion located along the auriculotemporal nerve pathway, and postganglionic parasympathetic fibers of the sweat glands and cutaneous vascular plexus). As a result, stimuli inducing salivation, i.e. food, the smell of food or even thinking about food, cause pathological sweating and skin redness in the preauricular area [7].

Therapy using botulinum toxin type A is an effective [11] and minimally invasive method of treatment of auriculotemporal syndrome (Frey's syndrome). Unfortunately, its availability in Polish otolaryngological practice is still very limited. As in all types of excessive sweating, treatment of gustatory sweating with botulinum toxin type A is based on the physiological mechanism of sweating, depending on acetylcholine released by the synaptic endings. Botulinum blocks the function of the SNAP-25 protein, necessary for the process of acetylcholine release from presynaptic endings, thus blocking the stimuli responsible for sweat secretion by the sweat glands [12].

Case report

A 41-year-old female patient, in generally good condition, not receiving permanent medication, visited the hospital clinic due to onerous sweating during meals. The sweating occurred primarily in the auricular and temporal area. The patient complained about the necessity of constant wiping the area during meals, and the unpleasant smell caused by the sweat. The above symptoms led to withdrawal from social life, due to the embarrassing nature of the problem. The patient had a scar near the mandibular angle. She mentioned removal of the superficial lobe of the right preauricular parotid gland two years before, due to multiform adenoma. The symptoms developed about 7 months after the surgery. The medical documentation revealed postoperative peripheral paralysis of the facial nerve, which subsided spontaneously.

An iodine-starch test (Minor test) was performed to determine the area of increased sweating. The test consists of the application of iodine over a given area, and dusting it with potato starch. The areas of hyperhidrosis gradually change the color to black. In the syndrome diagnostics, the test needs to be accompanied by a provocation trial, i.e. by providing food.

Figures 1-3 present the test procedure: 1 – applying iodine, 2 – covering the area with starch, 3 – checking the result approx. 2 minutes after the ingestion of food; the red line shows the area of increased sweating (colored in black). The medical history received from the patient and the test results both supported the diagnosis of Frey's syndrome.

The patient was presented with various therapeutic options, from the least invasive ones to a surgical procedure. Having considered her own expectations and learning about the potential complications associated with different methods, the patient chose a therapy using botulinum toxin injections.

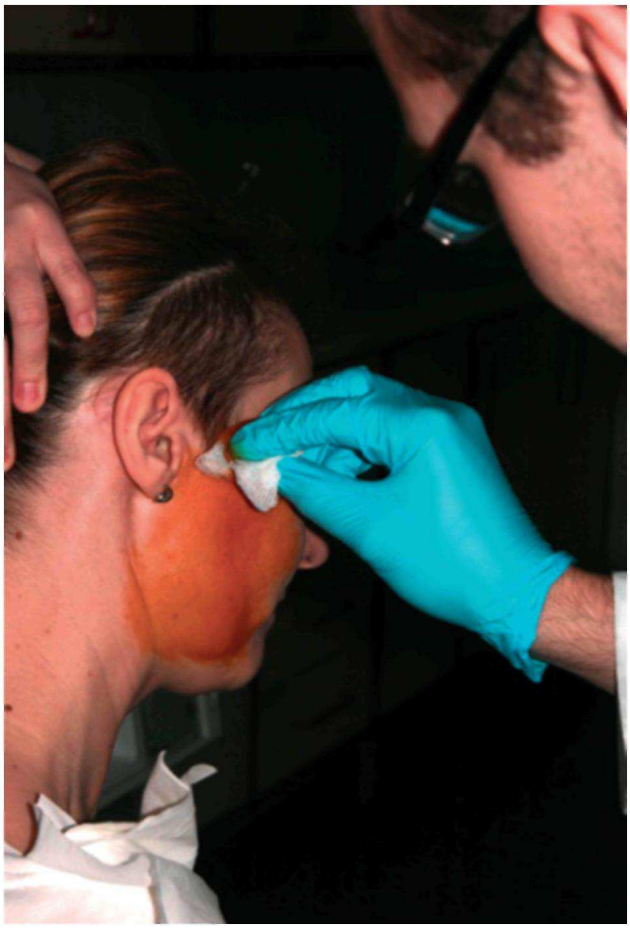

Figure 1. Application of iodine to the examined area

Rycina 1. Naniesienie jodyny na okolicę badaną

Figure 2. When dry, the area was covered with a layer of starch

Rycina 2. Po wyschnięciu jodyny obszar pokrywany jest warstwą skrobi

Figure 3. Patient after ingestion of food - dots mark the area of excessive sweating (stained black)

Rycina 3. Zdjęcie pacjentki po spożyciu pokarmu - kropkami zaznaczono obszar o wzmożonej potliwości (wybarwiony na czarno)

The area of hyperhidrosis was determined using the Minor test. Next, the skin was anaesthetized with a cream containing 2.5% lignocaine and 2.5% prilocaine. After a time period sufficient for the onset of the anesthesia, a total dose of 10 mU of botulinum toxin was injected subcutaneously in the outlined area. There were no complications during the procedure. The patient reported complete disappearance of the symptoms, and satisfaction with the effects of the therapy. In order to confirm the effectiveness of the procedure, another iodine-starch test was performed about 4 weeks after the injections, before and after the food ingestion test (Figure 4 – before ingestion of food, Figure 5 – after ingestion of food). The test confirmed the very good therapeutic effects of locally administered botulinum.

Discussion

Gustatory sweating syndrome is a very common complication of parotidectomy. Although the statistical data are not clear, in approximately half of the patients following parotidectomy have positive results from the Minor test after food provocation, and about 20% of the patients complain about the symptoms of the syndrome [11, 13, 15, 18, 24].

The intensity and onerousness of the symptoms determine the need and type of treatment. Therapeutic options vary as to their tolerability, invasiveness and effectiveness. It appears that topical therapies are the easiest to use, and these include antiperspirants (mostly based on an alcohol solution of aluminum chloride), onerous due to the high irritation potential. Ointments with cholinolytic agents (with 3% of scopolamine content), used in the past, have been recalled due to the large .

Figure 4. Area affected by hyperhidrosis before ingestion of food. Status after botulinum toxin injections

Rycina 4. Zdjęcie pokazuje okolicę dotkniętą nadpotliwością przed prowokacją pokarmem. Stan po iniekcjach toksyny botulinowej.

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Figure 5. After food ingestion. The area does not stain – no excessive sweating in the examined region. Status after botulinum toxin injections.

Rycina 5. Zdjęcie po prowokacji pokarmem. Jak widać, obszar się nie wybarwia – brak nadpotliwości w badanym regionie. Stan po iniekcjach toksyny botulinowej.

spectrum of adverse reactions.There are also reports of using cosmetic preparations with glycopyrrolate as being products that support the therapy of facial hyperhidrosis [10]; however, their effectiveness is limited. Other topical therapies include ionophoresis, with confirmed effectiveness in reducing excessive sweating (not studied in the syndrome therapy) [5].

Therapy using botulinum toxin A injections is a popular and increasingly common therapy of hyperhidrosis in general, as well as in Frey's syndrome. It is well-tolerated, safe and relatively minimally invasive [17]. The disadvantages of the therapy include its cost (it is non-refundable for this indication), and temporary effect, which entails the necessity of repeating the treatment, and possible tachyphylaxis after subsequent injections. The former is indisputable, although the latter risk is not so real.

The duration of the sweat-blocking effects of botulinum is individual, and ranges from 4 months to even 2 years, in rare cases, and using large doses of botulinum [26] (it should be emphasized that not all reports justify using high doses [9]). It is also important that, according to the study results, tolerance to the drug used in the therapy for excessive sweating does not occur [23]. Moreover, in a recently published study Lecouflet demonstrated that the therapeutic effect of botulinum toxin injection lasts longer with subsequent injections [14]. The therapy is well-received by patients and it has been demonstrated to have a positive effect on the quality of life, at least in the short-term [3]. Studies on the use of botulinum toxin in the treatment of Frey's syndrome revealed its high effectiveness in symptomatic therapy [1, 6], and even suggested its inhibiting effects on the process of pathological re-innervation and development of the syndrome [25]. Pomprasit and Chintrakarn suggest that botulinum injections should be considered a therapy of choice in Frey's syndrome [21]. It is consistent with opinions presented in other articles, although the need for further studies is often mentioned [2].

Surgical procedures play a major role in the prevention of the syndrome (prophylaxis during paroidectomy), but they are also justified in its therapy. Their principal mechanism consists in placing a flap separating the operated area from the skin. To prevent the occurrence of the syndrome, different auto-and allogenic materials are used, and using a lobe from the sternocleidomastoid muscle is a popular method. In a systematic review from 2013, Liu et al. indicate the proven high effectiveness of this method in reducing the incidence of postoperative auriculotemporal syndrome (a 67% reduction in the relative risk of developing the syndrome). Benefits of the method include easy performance, without any extra incision, and the length of the flap, which allows the entire area to be covered. Some of the studies demonstrated the positive aesthetic effect of completing the tissue deficit following parotidectomy, and the low risk of complications, including necrosis or accessory nerve injury [16]. As demonstrated in the metaanalysis by Zeng et al. in a systematic review, using AlloDerm® as a covering flap is effective (reducing the relative risk of the syndrome by 85%, and the risk of symptomatic syndrome by 68%) and safe. Some studies also presented its positive cosmetic effect, and reduced rates of salivary fistulas [28]. In comparing the two methods, the muscular flap technique is definitely less costly than AlloDerm®. It appears that a similar effect could be obtained by covering the operated area with a facial superficial musculoaponeurotic system (SMAS) [20], free transplantation of abdominal fat to the operated area [4], dermal transplantation, transplantation of a flap from the temporo-parietal fascia, or using a method whose role in the therapy has not been established yet: covering the surface with the patient's platelet-rich-plasma [22]. The same methods can be used as secondary therapeutic methods in a developed syndrome, although their effectiveness is not as certain

as in case of preventive use [27]. Methods consisting of nerve destruction, such as resection of the auriculotemporal nerve, neurectomy of the tympanic nerve, or removal of the skin affected by the syndrome are not used any more.

Conclusions

In summing up, it appears that according to the majority of the published study results, botulinum toxin therapy should be a therapy of choice in the treatment of Frey's syndrome; however, the availability of this method in Poland is limited.

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Extended iatrogenic groin lymphorrhea after a saphenectomy - a case report

Przedłużony jatrogenny chłonkotok pachwinowy po safenektomii – opis przypadku

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Abstract. Latrogenic damage of the lymph structures after cardiosurgical and thoracosurgical procedures are relatively well-known. However, reports of such consequences in the groin are rare. Treatment of lymphorrhea depends on the intensity and location of the damage to a lower extremity. The paper presents the case of a patient with lymphorrhea caused by a saphenectomy. The patient was qualified for reoperation, which resulted in the effective cessation of lymphorrhea.
Keywords: saphenectomy, lymphorrhea, treatment

Streszczenie. Jatrogenne uszkodzenie struktur chłonnych po operacjach kardiochirurgicznych oraz torakochirurgicznych są stosunkowo dobrze znane. Następstwa uszkodzenia układu chłonnego w okolicy pachwiny są jednak przedmiotem nielicznych doniesień. Leczenie chłonkotoku zależy od stopnia jego nasilenia oraz lokalizacji miejsca uszkodzenia układu limfatycznego kończyny dolnej. W poniższej pracy przedstawiono przypadek pacjenta, u którego doszło do powstania chłonkotoku w następstwie przebytej safenektomii. Pacjent został zakwalifikowany do powtórnego leczenia chirurgicznego, w wyniku którego uzyskano skuteczne zatrzymanie chłonkotoku.
Słowa kluczowe: safenektomia, chłonkotok, leczenie

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Introduction

There are few reports of iatrogenic injury of the lymphatic structures following cardiosurgical and thoracosurgical procedures in the literature. Even fewer reports can be found about such injuries in general surgery, especially with respect to the lower limbs, although lymphorrhea after procedures performed in the groin area occurs in 10-15% of cases. The most frequently described lymphorrhea is that from a wound following classic and minimally invasive procedures on the femoral and popliteal artery, as well as reconstruction procedures combined with implantation of a vascular prosthesis [1, 2].

From the anatomical perspective, the superficial inguinal lymphatic nodes are located in the femoral triangle, on the fascia lata, and there are usually 10-15 of them. Two groups of nodes are distinguished: the vertical chain, along the end section of the saphenous vein, and the horizontal chain, located along the superficial iliac circumflex vein. Such localized lymphatic structures can easily be damaged during surgical procedures performed in this area [3].

Persisting profuse lymphorrhea may result in complications dangerous for the patient, such as electrolytic disorders, loss of tissue fluid, hypoalbuminemia, peripheral edemas, wound infections and many others. Intraoperative diagnosis of superficial inguinal lymphatic node injury is very difficult, and the first symptoms usually occur several hours after the surgical procedure in the form of excessive light-colored wound content leaking into the dressing.

Lymphorrhea treatment depends on the intensity and location of the damaged lymphatic system. Conservative treatment methods for lymphorrhea from a wound in the groin include compression therapy, lymphatic cistern punctures and negative pressure therapy. Patients who do not benefit from conservative treatment and develop clinical symptoms due to constant loss of lymph are qualified for surgical treatment. This includes suturing of the damaged vessels or lymphatic node, electrocoagulation of the surrounding tissues, and placement of a muscle flap. Unfortunately, none of the methods provides satisfactory effects, so other solutions improving the results of lymphorrhea treatment are being sought.[4, 5]

Case report

A 79-year-old patient was admitted to the department of general surgery in September 2015 for a planned surgical treatment of varicose veins in the lower left extremity, due to venous insufficiency. The medical history demonstrated that the patient was treated for arterial hypertension and ischemic heart disease. After an interview and physical examination the patient was qualified for a surgical procedure.

Under subarachnoid anesthesia, VSM stripping in the lower left limb was performed, the insufficient perforator vein was treated, and varicose veins were removed using a cryo probe. No complications were observed in the post-operative period. The patient was discharged in a generally and locally good condition.

The patient returned to the hospital surgical clinic 8 days after the surgical procedure for a follow-up procedure. The wound was healing properly, cutaneous sutures were removed, and the wound was punctured, obtaining 70 ml of wound content. Ciprofloxacin and dexketoprofen were recommended prophylactically, as well as pressure dressing for the wound. Within the next 10 days the patient reported leakage of light-colored, serous fluid from the wound, at a volume of about 300-350 ml/d. Despite the pressure dressing, the local condition did not improve.

A lymphoscintigraphic examination confirmed lymphorrhea in the left groin, and maintained symmetrical lymphatic drainage from the injection site to the iliac lymph nodes.

Due to profuse, chronic lymphorrhea, on day 20 after the saphenectomy the patient was qualified for reoperation. The groin wound was revised, the presented lymph node was sutured, and the wound bed was subjected to argon plasma coagulation and covered with a Tachosil patch (measuring 9.5 x 4.8 cm, Takeda). A pressure dressing was also applied to the wound. After the surgery, the lymphorrhea began to decrease, the patient was discharged on day 2 following the procedure with the recommendation to maintain the pressure dressing. Over the next 14 days the patient regularly returned for a follow-up in the hospital surgical clinic. On day 7 following the surgery the cutaneous sutures were removed, on day 10 the leakage stopped completely, and the wound healed properly.

Discussion

Most postoperative lymphorrheas in the lower extremities subside spontaneously after 7-14 days. The first step in the treatment for prolonged lymphorrhea is use of a pressure dressing. Due to impaired healing of the postoperative wound concurrent to lymphorrhea, in this group of patients a wide spectrum antibiotic therapy is usually applied (3rd generation cephalosporins, metronidazole) [2, 6].

In the described case the lymphorrhea occurred many hours after the surgical procedure, with the skin wound healing properly. However, due to the increasing fluid volume in the bag on the thigh, the wound was punctured, and 70 ml of lymph was drained. Within the next 2 days the wound opened in the medial part, and despite application of a pressure dressing, the amount of lymph continued to increase to approximately 350 ml/day.

Additional imaging tests are necessary to properly diagnose lymphorrhea, the most popular being lymphangiography. This is an invasive method, exploring the lymphatic leakage site and the course of the lymphatic vessels. It is recommended in the diagnostics of prolonged lymphatic leakage in patients resistant to treatment [4, 7]. Yamagami reported that in 80% of patients with a lymphatic fistula located on the neck the fistula closed after administration of Lipidol. Another method of lymphorrhea assessment, more advanced and minimally invasive, is lymphoscintigraphy. Radionuclide Tc-95 is administered orally and intravenously, then the locations of tracer accumulation are observed with the use of a gamma camera [8].

In the discussed case lymphoscintigraphy was performed, enabling the diagnosis of lymphorrhea, and locating the site of damage of the lymphatic system in the left groin.

If compression therapy is ineffective, further treatment of lymphorrhea is complex and largely depends on the intensity of the symptoms and the site of the damage. In the case of damage to the inguinal lymphatic structures, it is recommended (apart from pressure dressing) to puncture the postoperative wound, or to use negative pressure therapy on the wound. Abai reports in his studies that the time for the occurrence of lymphorrhea in patients treated exclusively with negative pressure therapy is reduced to 14 days [6, 9].

Surgical treatment should be considered in patients who do not respond to conservative therapy. Nowak reports that this group includes patients with lymphorrhea of >500 ml/day, persisting for over 7 days, with low fistulas and complicated inflammation. Surgical treatment then includes puncture of the damaged area, or electrocoagulation of the surrounding tissues. Unfortunately, these methods do not always provide satisfactory results, so research is being conducted to develop other therapeutic methods.

In the treatment of lymphorrhea, Iłżecki uses Tachosil, a hemostatic material placed in the

postoperative wound. The material contain fibrinogen and thrombicin on a collagen matrix, which dissolve upon contact with fluids (e.g. lymph), penetrate the wound and initiate the physiological process of blood coagulation. In the group of patients treated with Tachosil the lymphorrhea stopped after 3 days on average, while in the group of patients treated conventionally after 8 days on average. Using this material reduces the hospitalization period, costs of treatment and accelerates healing, thus reducing the risk of bacterial superinfection of the postoperative wound [1, 4].

In the case of the patient we treated, during revision of the wound the lymph node was punctured, the wound bed was coagulated, and the wound was dressed with Tachosil. On day 10 after the surgery the lymphorrhea subsided completely, and the wound healed properly.

Conclusion

Damage of the lymphatic structures during surgical procedures in the inguinal area is difficult to diagnose intraoperatively, as well as in the early perioperative period before the end of hospitalization. In nearly 60-80% of patients the lymphorrhea subsides spontaneously, as a result of compression therapy alone, while in others surgical treatment is required. Tachosil is increasingly often used as a therapeutic option, since it improves treatment outcomes.

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Primary non-Hodgkin lymphomas of the nasopharynx - two case reports

Pierwotne nieziarnicze chłoniaki nosogardzieli - opisy 2 przypadków

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Abstract. The nasopharynx is rarely affected by primary NHL. Morphologically and radiologically they can imitate other malignant tumors or non-neoplastic processes; therefore, in the course of diagnosis the symptoms of nasal cavity, non-Hodgkin lymphoma should be considered. The paper presents two cases of primary non-Hodgkin lymphoma of the nasopharynx. The applied immunochemotherapy resulted in complete remission lasting 3 and 5 years.
Key words: primary non-Hodgkin lymphoma of nasopharynx

Streszczenie. Chłoniaki nieziarnicze rzadko przebiegają z pierwotnym zajęciem nosogardzieli. Morfologicznie i radiologicznie mogą naśladować inne nowotwory złośliwe lub procesy nienowotworowe. Dlatego w toku diagnostyki objawów ze strony jamy nosowej należy uwzględniać chłoniaki nieziarnicze. W pracy przedstawiono 2 przypadki pierwotnych chłoniaków nieziarniczych nosogardzieli. Zastosowana immunochemioterapia przyniosła całkowitą remisję trwającą 5 i 3 lata.
Słowa kluczowe: pierwotne nieziarnicze chłoniaki nosogardzieli

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Introduction

Non-Hodgkin lymphomas are neoplasmic diseases characterized by the clonal proliferation of the lymphoid cells corresponding to various differentiation stages of normal lymphocytes B, T, or natural killer cells (NK) [1]. They can be found in all areas of the organism, including outside the lymphatic system, in the head and in the neck. Extranodal lymphomas of the head and neck constitute 10% of all the non-Hodgkin lymphomas, and 30% of extranodal lymphomas [3].

Diagnosis of primary non-Hodgkin lymphoma of the sinuses, nasal cavity or nasopharynx at an early stage is rare, as the lesions develop in their anatomical spaces, and tumor growth towards the adjacent structures does not result in any symptoms at an early stage of the disease. The symptoms occur only when the tumor grows to a considerable size, sometimes resulting in destructive changes in the nose or central part of the faciocranium. They may also be suggestive of other diseases of the nose, head or neck. Patients often ignore some of the symptoms, trying "household" therapies, which delays proper diagnosis. Other reasons for late diagnosis include low incidence of this type of disease, and the lack of experience by the physician. This paper presents two cases of primary non-Hodgkin lymphomas of the nasopharynx.

Case 1

A 37-year-old, non-smoking patient was admitted to the Department of Otolaryngology for diagnostics of a tumor-like pharyngeal lesion. He reported purulent catarrh lasting 5 weeks, rhinophonia and snoring, without improvement after applied antibiotic therapy. Physical examination of the oral cavity (on the posterior wall of the pharynx) revealed a large tumor with a smooth surface. Rhinoscopic examination demonstrated a tumor-like lesion in the left nasopharynx.

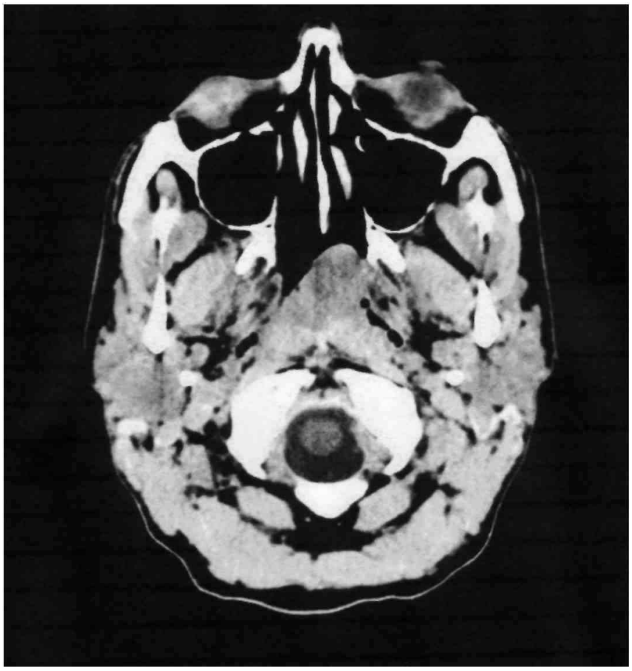

Figure 1. Solid tissue structure in the nasopharynx on the left

Rycina 1. Lita struktura tkankowa w części nosowej gardła po stronie lewej

Computer examination of the paranasal sinuses revealed a pathological, solid tissue structure measuring 42 x 24 x 30 mm, partially adherent on the left side to the soft palate structures, blocking the airways on the left side of the posterior nasal apertures. Tomography did not reveal any destruction of adjacent bone structures. The paranasal sinuses were normally pneumatized, without any pathological intracranial lesions. An angiographic examination demonstrated a solid tumor in the pharyngeal roof, and in the nasopharynx and oropharynx, measuring 43 x 26 x 33 mm. The common, internal and external carotid arteries did not present morphological lesions or impaired blood flow. Positron emission computed tomography (PET-CT) revealed a solid tumor of the pharyngeal roof and the nasopharynx and oropharynx, measuring 44 x 26 x 38 mm, with increased 18F-FDG metabolism, SUV max. 16.8. The tumor infiltrated the nasopharyngeal cavity, and reached the palatal arch on the left side, extending to the retropharyngeal space. The patient was qualified for a surgical procedure. Histopathological examination of the tumor tissue revealed infiltration of neoplastic cells corresponding to non-Hodgkin diffuse large B cell lymphoma (DLBCL).

The basic laboratory tests presented the following results: WBC 10.25 x 10^3/µl, NEUT 8.45 x 10^3/µl, LYMPH 1.05 x 10^3/µl, RBC 5.23 x 10^6/µl, HGB 15.3 g/dl, HCT 43.7%, MCV 81.6 fl, PLT 351 x 10^3/µl, sodium 138 mmol/l, potassium 4.7 mmol/l, glucose 97 mg/dl, creatinine 1.0 mg/dl, urea 29 mg/dl, calcium 9.9 mg/dl, AST 20 U/l, and ALT 22 U/l. Disease stage based on the Ann Arbor classification was IE.

The patient was qualified for R-CHOP chemotherapy (rituximab 375 mg/m^2, cyclophosphamide 750 mg/day 1, doxorubicin 60 mg/day 1, vincristine 2 mg/day 1, prednisone 100 mg/day 1-5, with doses according to the body surface). The patient received 6 courses at 3-week intervals.

The CT scan after the chemotherapy demonstrated complete regression of the tumor mass. After the chemotherapy, the patient was scheduled for radiotherapy (total dose of 4,000 cGy/t on the nasopharynx). No significant toxicity was observed after chemotherapy or radiotherapy.

Approximately 6 weeks after the therapy, a follow-up CT examination of the paranasal sinuses was performed, and revealed complete remission of the disease. The patient has been under the supervision of the Haematological Clinic for 5 years, in complete remission.

Case 2

A 47-year-old female patient, a chemical laboratory employee, a smoker for 20 years (smoking one packet of cigarettes a day) had a paranasal sinusitis (1.5 years previously) with expectoration of green sputum with blood. Due to the lack of improvement after antibiotic therapy, the patient visited an otolaryngologist who requested computed tomography of the sinuses. The test revealed a small, left convex deviation of the bony nasal septum. The patient was referred for nasal septum surgery. After the procedure, the patient experienced recurrent inflammation of the palatine tonsils (angina). During one of the infections the patient found a painless tumor 3 cm in diameter, on the left side of the neck, near the mandibular angle. Concerned about this fact, the patient went to laryngological emergency department. Ultrasound of the cervical lymph nodes revealed in the left upper cervical vascular space several enlarged lymph nodes with preserved sinus, the largest one measuring 32 mm, and individual lymph nodes (up to 17 mm) on the right. The patient was diagnosed with tonsillitis and lymphadenitis on the left side. Antibiotic therapy was initiated.

Due to the lack of improvement, the patient again visited the laryngological emergency department, where a tomographic examination of the head and neck was requested. The test revealed pathological tissue measuring 65 x 32 x 54 mm instead of the right tonsil, located from the level of posterior nasal apertures on the posterior pharyngeal wall to the base of the C1 body, with modelling of the posterior and left wall of the oropharynx.

Figure 2. Pathological tissue on back wall of pharynx on the left

Rycina 2. Patologiczna tkanka na tylnej ścianie gardła postronnie lewej

The tumor almost completely closed the air passage of the nasopharynx at the level of posterior palate, narrowing it to 3 mm. The CT examination of the head did not demonstrate any pathological lesions in the brain, cerebellum or meninges. The patient was referred to the Department of Otolaryngology, where samples for histopathological examination were collected during a surgical procedure. The test revealed infiltration of cells from a diffuse, large B cell lymphoma (DLBCL). The patient was referred to the Department of Haematology of the Military Institute of Medicine.

A PET-CT examination revealed a tissue mass of 62 x 27 mm instead of the tonsil, from the level of posterior nasal apertures on the posterior pharyngeal wall to the base of the C1 body, with modelling of the posterior and left wall of the oropharynx, and increased 18 F-FDG metabolism, SUV max. = 22.5.

Trepanobiopsy did not reveal infiltration of lymphoma in the bone marrow. Thoracic X-ray did not demonstrate changes in the lungs, heart or the vascular trunk. The result of basic laboratory test were as follows: WBC 3.78x10^9/l, NEUT 2.22 x 10^3/μl, LYMPH 0.92 x 10^3/μl, RBC 4.06 x 10^{12}/l, HGB 12.5 g/dl, HCT 38%, MCV 93 fl, PLT 221 x 10^9/l, Na 141 mmol/l, potassium 4.7 mmol/l, glucose 79 mg/dl, creatinine 0.6 mg/dl, urea 32 mg/dl, calcium 9.7 mg/dl, AST 15 U/l, ALT 13 U/l, and LDH U/l. Disease stage based on the Ann Arbor classification was IE.

The patient was qualified for R-CHOP chemotherapy (rituximab 375 mg/m^2, cyclophosphamide 750 mg/day 1, doxorubicin 60 mg/day 1, vincristine 2 mg/day 1, prednisone 100 mg/day 1-5, with doses according to the body surface). The patient received 6 courses with subsequent radiotherapy (total dose of 4,000 cGy/t on the nasopharynx). No significant toxicity was observed during the therapy. A follow-up examination (performed 6 weeks after the treatment) revealed complete remission of the disease. The patient has been under the supervision of the Haematological Clinic for 3 years, in complete remission.

Discussion

Primary non-Hodgkin lymphomas of the nasopharynx and paranasal sinuses constitute a heterogeneous group of neoplasms [4]. Analysis of the incidence of different subtypes demonstrated the dominance of non-Hodgkin lymphomas deriving from the T cell lines in the nasal cavity, and non-Hodgkin lymphomas derived from the B cell lines in the paranasal sinuses [3]. T cell lymphomas of the nasal cavity are associated with progressive ulceration of the mucosal membrane in the nasopharynx, and they usually infiltrate the adjacent structures, leading to necrosis, primarily of the palate. Primary non-Hodgkin lymphomas from the B cell line are found mostly in the maxillary sinus and ethmoidal sinus, and they grow in the form of locally malignant tumors with expansion to (infiltration of) the eye socket, bone and soft tissue of the cheek and lower frontal cranium [4]. Non-Hodgkin lymphomas of the nasal cavity and sinuses occur at all ages, with peak incidence in the 6th decade of life, most often in male patients [2]. The most frequent clinical symptoms in the early stages include: feeling of nasal congestion, mucous-purulent secretion, recurrent bleeding from the nasal mucosa, headache and edema of the face, cheek or nose (usually monolateral) [5]. In more advanced stages of the disease clinical symptoms related to infiltration or pressure to the adjacent tissue structures occur: exophthalmos, visual disturbance, secondary paralysis of the cranial nerves due to tumor extension to the orbit or cranium. Due to local inflammatory reactions or the presence of large necrotic areas, in certain cases it may be difficult to obtain relevant material for histopathological testing [6]. In our patient (case no. 1) the first symptoms included: purulent catarrh, rhinophonia and snoring. The tumor in the oral cavity was visible in the physical examination already at early diagnostic stages. The patient visited the Department of Haematology with a diagnosis approximately 2 months after the first symptoms.

In the second case, the patient visited the Department of Haematology approximately 1.5 years after the symptoms occurred. Radiological examinations ordered at the beginning of diagnostic process did not reveal any changes suggesting a neoplastic disease. When related symptoms occurred, or antibiotic therapy proved ineffective, the patient sought the help of a specialist many times. The final effect of the cooperation between the patient and physicians was diagnosis at an early disease stage.

To evaluate advancement of a primary non-Hodgkin lymphoma of the nasopharynx and paranasal sinuses, imaging tests are necessary: classic radiological

examination, computed tomography examination and, in certain cases, a positron emission computed tomography test (PET-CT).

Imaging tests enable one to assess the stage of infiltration as well as the destruction of the adjacent tissue and bony structures, and they may suggest the best site for a surgical biopsy. Morphologically and radiologically, lymphomas of the nasal cavity and sinuses are difficult to differentiate from other malignant neoplasms or non-neoplastic processes. Due to their rare incidence, no standard of optimal treatment has been established. Outcomes of numerous clinical observations indicate that the most optimal treatment is multidrug chemotherapy (in case of the presence of CD20 antigen, combined with the monoclonal antibody anti-CD20) and radiotherapy. In both presented cases chemoimmunotherapy was applied with subsequent radiation therapy. The time to complete remission of the diseases in our patients, 5 and 3 years, respectively, confirms the effectiveness of such treatment. Good prognostics in primary non-Hodgkin lymphomas include: young age, early diagnosis, and lack of generalized symptoms (fever, reduced body weight, night sweating). A large study conducted at the M.D. Anderson Cancer Center (Houston, USA) involving 70 patients with lymphomas of the sinuses and nasal cavity demonstrated a 5-year survival rate of 52% [3].

Early diagnosis and accurate assessment of the disease stage are the basis for proper and effective therapy. Another important element in the diagnostics and treatment is accomplishing full cooperation between an otolaryngologist and hematologist, which enables suitable diagnostics and therapy, as well as the achieving of complete, long-term remission in patients.

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Rapidly progressive glomerulonephritis with the presence of ANCA antibodies and concurrent type 3 autoimmune polyglandular syndrome - a clinical case report

Gwałtownie postępujące kłębuszkowe zapalenie nerek z obecnością przeciwciał ANCA, towarzyszące autoimmunologicznemu zespołowi niedoczynności wielogruczołowej typu 3 - prezentacja przypadku klinicznego

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Abstract. Type 3 autoimmune polyglandular syndrome is characterized by the coexistent failure of several endocrine organs. The most common are hypothyroidism and pernicious anemia (39%) and/or type 1 diabetes (20-30%). There are rare reports of cases with more than three autoimmune diseases. This paper describes the case of a female patient with APS-3, and rapidly progressive renal failure in the course of small vessel-vasculitis with the presence of pANCA. Treatment with corticosteriods and cyclophosphamide resulted in the relief of symptoms, improved kidney function and lower levels of pANCA <0.5 III/ml. Seeking another autoimmune disease in the case of new clinical problems in a patient with APS-3 can help to improve the diagnosis. This is a very rare case of the coexistence of vasculitis in an active APS-3.
Key words: autoimmune polyglandular syndrome type 3, vasculitis, ANCA, hypothyroidism, diabetes mellitus type 1

Streszczenie. Autoimmunologiczny zespół niedoczynności wielogruczołowej typu 3 (APS-3) charakteryzuje się występowaniem niewydolności kilku narządów wydzielania wewnętrznego. Najczęściej stwierdza się niedoczynność tarczycy oraz niedokrwistość złośliwą (39%) i/lub cukrzycę typu 1 (20-30%). Opublikowano nieliczne doniesienia o przypadkach z więcej niż trzema chorobami autoimmunologicznymi. W pracy opisano przypadek chorej z APS-3 oraz szybko postępującą niewydolnością nerek w przebiegu zapalenia małych naczyń z obecnością przeciwciał pANCA. W wyniku zastosowanego leczenia glikokortykosteroidami oraz cyklofosfamidem uzyskano ustąpienie dolegliwości, poprawę czynności nerek i zmniejszenie stężenia przeciwciał pANCA <0,5 IU/ml. Poszukiwanie kolejnej choroby o podłożu immunologicznym w przypadku wystąpienia nowych problemów klinicznych u chorego z APS-3 może mieć kluczowe znaczenie dla ustalenia rozpoznania. Opisany przypadek to bardzo rzadkie współwystępowanie zapalenia naczyń w aktywnym APS-3.
Słowa kluczowe: autoimmunologiczny zespół niedoczynności wielogruczołowej typu 3, zapalenie naczyń, ANCA, niedoczynność tarczycy, cukrzyca typu 1

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Introduction

Autoimmune polyglandular syndromes (APS) are diseases involving the failure of a number of endocrine organs. According to the Neufeld and Blizzard classification, there are four types of APS, depending on inheritance and the presence of certain autoimmune disorders [1-3]. APS-1 is inherited in an autosomal recessive pattern, the first symptoms already being observed in early childhood, with persistent candidosis of the mucosa being associated with hypoparathyroidism and adrenal insufficiency. In APS-2, polygenic inheritance is involved, it appears between the ages of 30 and 40 years, being associated with autoimmune thyroid disease, adrenal insufficiency (70%) and type 1 diabetes (>50%). In APS-3, despite the immunological thyroid disease, crucial for the diagnosis, type 1 diabetes and/or pernicious anemia, additional autoimmune disorders develop, unrelated to the endocrine system. However, adrenal insufficiency or candidosis of the mucosal membranes, typical for APS-1 and APS-2, are not found [1-4]. In APS-4, at least two autoimmune diseases are found which do not meet the criteria for other APS syndromes [1, 3].

This study presents a clinical case of a female patient with APS-3 and glomerulonephritis in the vasculitis of the small and medium-sized vessels, with the presence of ANCA antibodies.

It is believed that APS-3 is inherited polygenically, probably in an autosomal dominant pattern, with incomplete penetration. Genes regulating the immune response play an important role in the pathogenesis of the syndrome, although the exact mechanisms and factors determining the combinations of certain diseases have not been discovered [4]. APS-3 usually occurs in middle-aged patients, more often in females. We do not have precise data regarding incidence, but it is estimated that approximately 30% of patients with autoimmune disease of the thyroid may suffer from APS-3; it may affect 5% of females and 1.5% of males in the general population [1, 4]. Diagnostic criteria require confirmation of autoimmune disease of the thyroid, and at least one of the following: type 1 diabetes (20-30%), pernicious anemia (39%), and vitiligo or alopecia areata [3]. There have been reports of concurrent: sarcoidosis, coeliac disease, Sjógren's syndrome, rheumatoid arthritis, myasthenia gravis, autoimmune hepatitis, leukopenia, spontaneous thrombocytopenic purpura, hypogonadism and gastric neuroendocrine neoplasms [1-4]. The presented case illustrates a rare combination of vasculitis and active APS-3.

Case report

A 75-year-old female with APS-3 in the form of Hashimoto disease, long-term type 1 diabetes, pernicious anemia and vitiligo was admitted to the Department of Internal Diseases, Nephrology and Dialysis of the Military Institute of Medicine in Warsaw due to a quickly progressing renal failure.

The patient suffered from numerous chronic diseases: from a young age treated with intensive insulin therapy due to type 1 diabetes, with numerous complications, such as retinopathy, nephropathy in a so far stable G3b period of chronic renal disease, and generalized atherosclerosis. The patient was treated for arterial hypertension, stable coronary disease after intravascular interventions: PTCA MB FDB with implantation of DES in 2009, chronic cardiac failure in class II NYHA. Due to pernicious anemia (gastroscopic examinations revealed atrophic gastritis) the patient received intramuscular B_{12}. Thyroid insufficiency was treated with levothyroxine in a replacement therapy. Due to vilitigo, the patient used locally prophylactic products with UV filters.

In mid-2014, the patient's condition suddenly deteriorated, arterial pressure significantly increased, edema of the lower limbs intensified, and daily diuresis decreased. On admission to the department at the end of June and beginning of July 2014, the patient was in a generally moderate condition, with a reported loss of appetite, increasing exertional dyspnea, edema of the lower limbs hindering mobility, loss of pressure control (despite intensified therapy, values of up to 200/110 mm Hg were observed). Recently the patient had not observed any hematuria macroscopically, denied pain in the lumbar section and dysuria, had no fever. A physical examination revealed obesity: BMI 34.7 kg/m^2, vilitigo on the skin of the limbs and torso, massive edemas of the shins, numerous crackling sounds over the lungs on auscultation, especially in the lower field of the left lung, regular cardiac activity, soft and painless abdomen, without other abnormalities. Laboratory tests demonstrated increased concentration of creatinine from the stable value in recent years: 1.6 mg/dl (eGFR 33 ml/min/1.73 m^2), to 3.7 mg/dl (eGFR 13 ml/min/1.73 m^2) on admission to the department, to a maximum of 5.0 mg/dl (eGFR 9 ml/min/1.73 m^2). Additional tests revealed normocytic anemia with Hb 9.8 g/dl, MCV 87 fi, CSR 105 mm/h, normal CRP concentration - 0.6 mg/dl, normal leukocytosis and white blood cell smear. General urinalysis demonstrated hematuria: isomorphic and partially dysmorphic erythrocytes loosely covered the high power field. Proteinuria of 692 mg/day. Urinary tract infection was excluded. In abdominal ultrasound: left kidney with uneven outline, moving during inhalation, approx. 109 mm long, partially bifid, parenchymal thickness of 13-16 mm, containing a hyperechogenic lesion of 3.5 x 4 mm in the lower pole, possibly a hemangioma.The right kidney with smooth outline, moving during inhalation, approx. 118 m long, parenchymal thickness of 12-14 mm, without focal lesions. Parenchyma in both kidneys had increased echogeneity. Due to the sudden onset of symptoms, and long-term type 1 diabetes, broad differential diagnostic tests were performed, thrombosis of the renal veins was excluded, the urine and serum protein immunofixation

tests did not demonstrate monoclonal gammapathy, concentrations of C3 and C4 complement components were normal, and the virological panel revealed a history of hepatitis B. After a consultation with an urologist, the patient was qualified for cytoscopy, which did not demonstrate any pathologies in the urinary bladder. During hospitalization intensive conservative treatment was applied, the arterial pressure control was improved, daily diuresis of approx. 2-3 liters was restored, peripheral edemas were reduced, with high concentrations of creatinine and urea. The results of the autoimmune tests demonstrated high values of MPO-ANCA antibodies: 109 IU/ml (positive result criterion is >5.0 IU/ml), enabling final diagnosis and implementation of treatment.

Due to the lack of the patient's consent, a renal biopsy was not performed. The complete clinical picture, especially elements of the nephrotic syndrome, led to a diagnosis of glomerulonephritis in the course of vasculitis of the small vessels with the presence of ANCA antibodies. As no symptoms from other systems or organs were found, the inflammation was confirmed to be limited to the kidneys. The patient did not demonstrate any upper respiratory symptoms, she denied coughs, bloody sputum, while imaging tests: thoracic x-ray and HRCT, did not reveal changes specific for systemic vasculitis. Articular pain was characteristic for degenerative disease in their course and character. No skin lesions were found, apart from long-time present vitiligo. After exclusion of inflammatory foci, the patient was qualified for immunosuppressive treatment: she received three doses of methylprednisolone 500 mg *i.v.,* then prednisone 30 mg in gradually decreasing doses, and cyclophosphamide *i.v.* at 3-4 week intervals, at a dose adjusted to her age and level of renal insufficiency (six pulses of 750 mg were administered, a total dose of 4.5 g, 2.5 g/m^2 body surface). After obtaining remission, maintenance treatment was introduced using azathioprine 2 x 50 mg and prednisone at a dose of 5 mg. The patient has been under the supervision of the department for 20 months, and during the last hospitalization her general condition was good, renal function was stabilized at the level of chronic renal disease in stage G3b, as before the sickness, creatinine concentration was 1.4 mg/dl and GFR was 39, urinalysis revealed limited proteinuria (0.22 g/day), without hematuria. Control concentration of pANCA antibodies was 0.5 IU/ml (negative result limit <3.5 IU/ml). Hb concentration was also normalized to 13 g/dl. Pharmacotherapy enabled satisfactory control of the arterial hypertension. No peripheral edemas were observed. Presently the patient complains most about chronic vertigo, pain symptoms in the course of the degenerative disease of the spine, complications of diabetes, especially visual disturbance and recent exacerbation of the coronary disease.

In the treatment to maintain remission, with prednisone at a dose of 5 mg/day, the glycemic control has improved, and HbA_{1c}ratio is 7.6%.

Despite the risk of possible complications associated with cyclophosphamide therapy, neutropenia did not occur, the patient required antibiotic therapy only due to a mild urinary infection, and antifungal treatment for a yeast infection of the oral cavity. No severe respiratory infections or septic complications were observed.

Discussion

ANCA-associated vasculitis (AAV) belongs to a heterogeneous group of diseases in which the inflammation affects the walls of vessels of different sizes. Current consensus from the 2012 Revised International Chapel Hill Consensus Conference Nomenclature of Vasculitides [CHCC2012] distinguishes between the inflammation of large, medium and small blood vessels [5]. AAV is a necrotic inflammation of the small, and often medium, vessels, with or without small amounts of immunological deposits in the affected tissues (so-called *pauci-immune vasculitis).* Four syndromes are distinguished: granulomatosis with polyangiitis (GPA), microscopic polyangiitis (MPA), eosinophilic granulomatosis with polyangiitis (EGPA) and renal-limited vasculitis (RLV) [5]. AAV is found in males slightly more often than in females, usually between the 5th and 7th decade of life. Incidence is estimated at 15-23 cases/million citizens. In at least 90% of patients cANCA antibodies are found, directed against serine proteinase 3 (PR3-ANCa) or pANCA directed against myeloperoxidase (MPO-ANCA). For RLV found in the described patient, more typical is MPO-ANCA (70% of patients), less often PR-3 ANCA. There are also reports of cases meeting the criteria of rapidly progressive glomerulonephritis with necrotizing inflammation of glomerular capillaries and so-called paucimmune vasculitis in the studies of renal bioptate without the presence of ANCA in the serum [6].

Etiology is unknown. The role of genetic factors is considered, as well as abnormal expression of the genes responsible for potential immunological imbalance, environmental factors, infections or exposure to certain chemical compounds.

Vasculitis is characterized by high variability. Although in most patients the dominant symptoms involve the respiratory system, kidneys and skin, any organ can be affected in the course of the disease, including the central nervous system. The factors which determine such varied courses of vasculitis are not known. Renal involvement is the most common organ manifestation of AAV, observed in 90% of MPA patients, 80% of GPA patients, and 45% of EGPA patients. As mentioned before, the kidneys can be the only organ involved in RLV [6].

The course of AAV include rapidly progressive glomerulonephritis with hematuria, non-nephrotic proteinuria, reduced daily diuresis and quickly growing indicators of nitrogen retention. Renal biopsy is a golden standard in diagnostics, but in the case of the described patient it could not be performed. The stage of advancement determined on the basis of biopsy has a prognostic value [6]. Active inflammatory processes may quickly lead to irreversible renal damage, and necessitate renal replacement treatment; therefore, early diagnosis and initiation of treatment is of great importance.

Renal failure in AAV adversely affects prognosis, so it

requires comprehensive therapy. GKS therapy in a gradually reduced dose is recommended as first-line treatment, combined with cyclophosphamide at doses adjusted to the patient's age and level of renal damage. In certain cases using plasmapheresis should also be considered. After obtaining remission (after approx.3-6 months of using cyclophosphamide), maintenance treatment with low GKS dose and azathioprine is recommended, or, in the case of advanced renal damage, with mycophenolate mofetil. Rituximab is becoming increasingly popular in the treatment of AAV, especially in recurrent, resistant to standard treatment AAV. The benefit of this medication is reduced risk of secondary neoplasms or fertility disorders [7, 8]. However, the costs of the therapy limit its use. Also, there is no data available on the distant effects of rituximab in the treatment of AAV.

In currently used treatment patterns, complete remission is obtained in 75% of patients, and partial remission in 90%. Prognosis has improved in the last five years, although 80-90% of patients experience chronic complications, and 5-year survival is over 70% [9]. In the case of rapidly progressive glomerulonephritis, the time of introducing therapy is crucial.

The prevalence of AAV in the population of APS-3 patients is unknown, and the number of publications and reports on the concurrence of both syndromes is limited. Also the mechanism resulting in the development of AAV in the course of APS-3 has not been discovered. Doubtlessly, APS-3 predisposes the development of other autoimmune diseases. It is suspected that over 25% of patients with one autoimmune disease are already suffering, or will suffer in the future from other disorders due to autoaggression [10]. It was demonstrated that the occurrence of thyroid insufficiency alone in AAV is 3.7 times more frequent than in the general population, and among females with AAV it is even 5.6 times more common [11]. Studies suggest increased frequency of autoimmune thyroid insufficiency in patients diagnosed with AAV, especially in the presence of MPO-ANCA. It is suspected that the structural homology of myeloperoxidase and thyroid peroxidase may trigger cross reactions [12]. However, the majority of authors do not support this theory, and emphasize the role of polygenic disorders which impair the regulation of immunological processes, including the abnormal activity of T lymphocytes [11]. The population of regulatory T cells (TREG) which inhibit proliferation of autoaggressive lymphocytes raises high interest in the pathogenesis of autoimmune diseases. Abnormal survival, or the reduced number or impaired function of TREG may result in uncontrolled expansion of autoaggressive lymphocytes. The reduced number of TREG was demonstrated in patients suffering from multiple sclerosis, myasthenia gravis or functional disorders in rheumatoid arthritis. Their role is also suggested in the pathogenesis of APS-3 [2, 13]. The pathogenetic relationship between APS-3 and AAV is not known. We also do not know what rate of patients with thyroid insufficiency and vasculitis in the presence of MPO-ANCA have in fact unrecognized autoimmune polyglandular syndrome of type 3.

In the diagnostics of APS-3 the authors of studies do not recommend performing a specific antibody panel, but suggest individualization of procedures depending on the clinical symptoms, or reducing the number of tests to the most common diseases, i.e. coeliac disease, Sjógren's syndrome, type 1 diabetes or pernicious anemia. If the test results are negative, more screening tests may be considered every 2-3 years [1, 4]. In patients with type 1 diabetes the monitoring of TSH concentration is recommended to detect early thyroid disease. Children should be tested once a year, adults every 5 years [4].

The therapy for APS-3 consists in balancing the hormonal deficits, and treatment depends on comorbidities: diet in colic disease, insulin therapy, diet and correction of cardiovascular risk factors in type 1 diabetes, and supplementation of vitamin B_{12} in pernicious anemia.

Prognosis depends on the clinical course; it is good for those cases limited to thyroid insufficiency and pernicious anemia, whereas in concurrent type 1 diabetes, rheumatoid arthritis or other serious immune disorders it is significantly worse.

Conclusion

The treatment of patients with APS-3 requires a multidisciplinary approach and the cooperation of many specialists: endocrinologist, gastrologist, diabetologist, rheumatologist and hematologist. The treatment is individualized, and it consists in reducing hormonal disorders and specific therapy for existing diseases, always with consideration of the risk-benefit profile of the therapy. Searching for another autoimmune disease in the case of new clinical problems in patients with APS-3 may be of key importance for prognosis and survival improvement. The article presents a very rare case of vasculitis with the presence of ANCA antibodies in the course of active APS-3.

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Gastric wall necrosis as a long-term complication following laparoscopic gastric banding

Martwica ściany żołądka z perforacją jako odległe powikłanie laparoskopowej operacji założenia regulowanej przewiązki żołądkowej

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Abstract. Bariatric surgery is one of the fastest developing branches of surgery today. The aim of bariatric surgery is the treatment of morbidly obese patients who have undergone inefficient conservative therapy. Among the available bariatric procedures, laparoscopic adjustable gastric banding (LAGB) is frequently performed and its complication rate is 2.2% [1, 2]. This paper presents the case of a severe complication involving gastric wall necrosis in a patient after laparoscopic gastric banding. Such complication occurs rarely and for that reason the standard treatment has not been established.
Keywords: morbid obesity, laparoscopic gastric banding, bariatric surgery

Streszczenie. Chirurgia bariatryczna to obecnie jedna z najszybciej rozwijających się dziedzin zabiegowych. Celem operacji bariatrycznych jest leczenie otyłości olbrzymiej u chorych, u których metody zachowawcze nie przynoszą zadowalających efektów. Często stosowaną metodą jest laparoskopowe założenie regulowanej opaski żołądkowej (laparoscopic adjustable gastric banding - LAGB). Odsetek powikłań okołooperacyjnych wynosi 2,2% [1, 2]. W pracy przedstawiono przypadek wystąpienia ciężkiego powikłania w postaci martwicy ściany żołądka u chorej po przebytej operacji założenia regulowanej przewiązki na żołądek. Opisywane powikłanie występuje rzadko i z tego względu brak jest jednolitych standardów postępowania.
Słowa kluczowe: otyłość olbrzymia, regulowana przewiązka żołądkowa, chirurgia bariatryczna

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Introduction

The gastric banding procedure consists in installing an adjustable silicone band in the area of the gastroesophageal junction. Its aim is to limit the amount of consumed food (restrictive procedure), and it is used in the treatment of obesity. The operation is usually performed using a laparoscopic technique (LAGB). It is considered a technically simple procedure, associated with a low rate of perioperative or distant complications compared to "open" procedures [3]. The most frequent surgical complications of LAGB include: extension of the upper gastric reservoir (4.8%), penetration of the band into the gastric lumen (1.1%), ulceration of the gastric mucosa, complications associated with a band port (leakage, infection, displacement) (4.1%), gastrointestinal obstruction [4] and esophageal distension [5]. Rare complications include gastrointestinal hemorrhage and gastric perforation [3]. Generally, the mortality rate following LAGB is 0.53% [6]. The presented case demonstrates a long-term complication, i.e. gastric wall necrosis with simultaneous perforation.

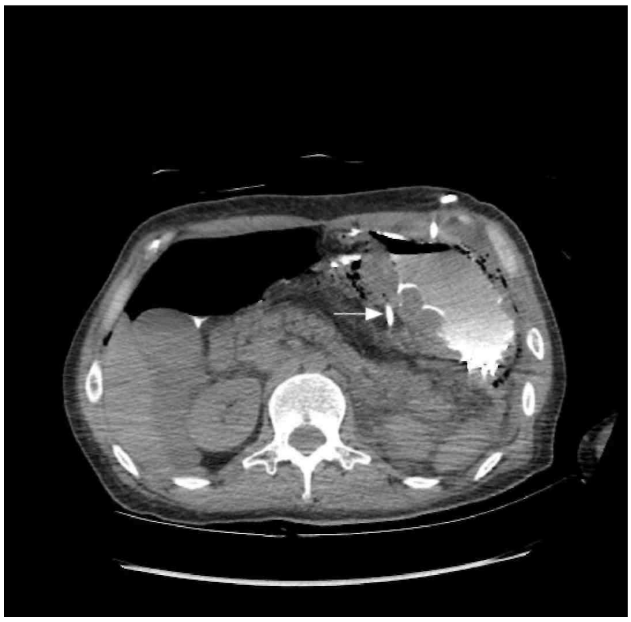

Figure 1. Pre-op abdominal CT scan - free gas in right subphrenic region, arrow indicates gastric band

Rycina 1. TC jamy brzusznej przed operacją – widoczny m.in. wolny gaz w jamie otrzewnej. Strzałką oznaczono przewiązkę.

Case report

A 39-year-old female with a history of laparoscopic gastric banding in 2011 and emptying of the band cuff in February 2015 was transferred on 30/10/2015 to the Department of General, Oncological, Metabolic and Thoracic Surgery of the Military Institute of Medicine in Warsaw from another hospital, with symptoms of gastrointestinal obstruction. For two weeks before the hospitalization the patient reported weakness, abdominal pain, vomiting after meals and oliguria. Imaging diagnostic tests at WIM included an abdominal CT, which revealed gastrointestinal perforation. An abdominal ultrasound examination demonstrated a significant amount of intestinal gas in the abdominal cavity, fluid collection with compartments in the lower abdomen, and free fluid near the upper pole of the left kidney. Due to suspected gastrointestinal perforation and the quickly deteriorating condition (decreasing blood pressure, disturbance of consciousness, and anuria) the patient was scheduled for urgent laparotomy (Fig. 1). During the operation, full-wall necrosis with extensive perforation was revealed, as well as migration of the band to the antral area, and full torsion of the gastric body and fundus around the band (Fig. 2). The band and the port were removed, and complete gastrectomy was performed (Figs. 3-4). Intestinal-esophageal anastomosis using the Roux-en-Y technique was performed to restore continuity of the alimentary tract. After the surgery, the patient required therapy at the Clinical Intensive Therapy Unit of the Military Institute of Medicine, due to the symptoms of shock. After stabilization of the patient's general condition, she was transferred to the intensive surveillance room at the Department of Surgery, where the treatment was continued. The patient's condition improved quickly, and no leakage in the alimentary tract was found. On day 10 of the treatment the patient was discharged in good condition.

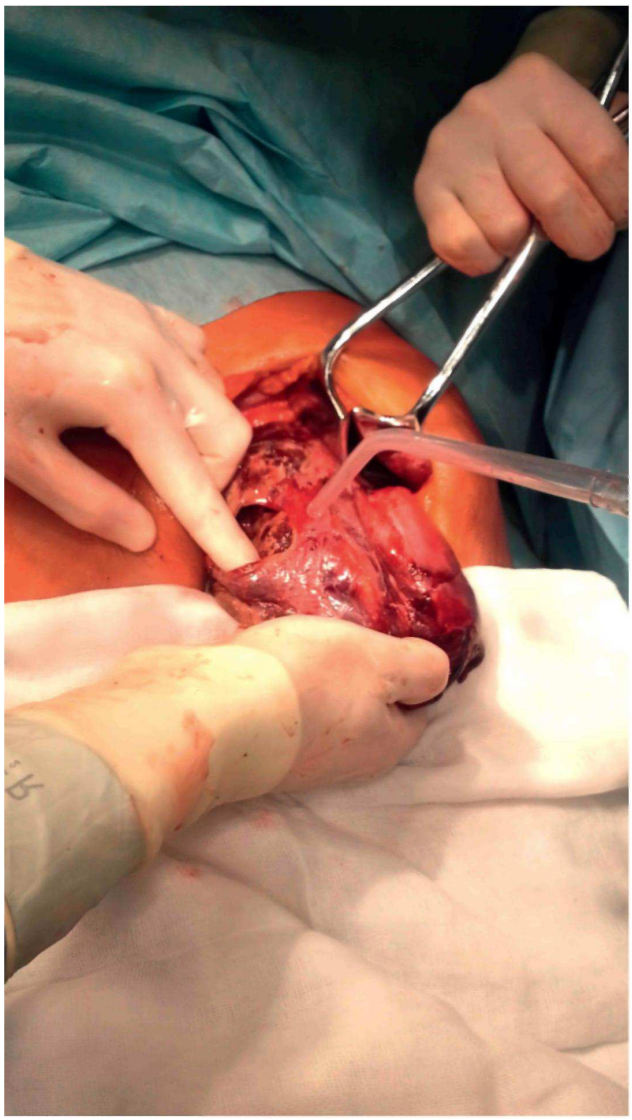

Figure 2. Intraoperative view of perforated gastric wall

Rycina 2. Śródoperacyjny obraz żołądka z otworem perforacji

Discussion

A severe surgical complication following a LAGB procedure in the form of gastric wall necrosis is rare, due to the rich arterial vascularization of the stomach [7]. In the medical literature for the years 2001-2011, 16 cases of gastric wall necrosis following a LABG procedure were described. In 6 of these, gastrectomy was required while in the remaining 10 less extensive procedures were sufficient [8]. Ischemia may be caused by a too closely placed band, intussusception of gastric mucosa into the duodenum (the band creates the front of the intussusception), band displacement, suspension of part of the stomach on the band, gastric torsion and gastric distension over the band [8]. In the presented case it is likely that several of the above complications occurred.

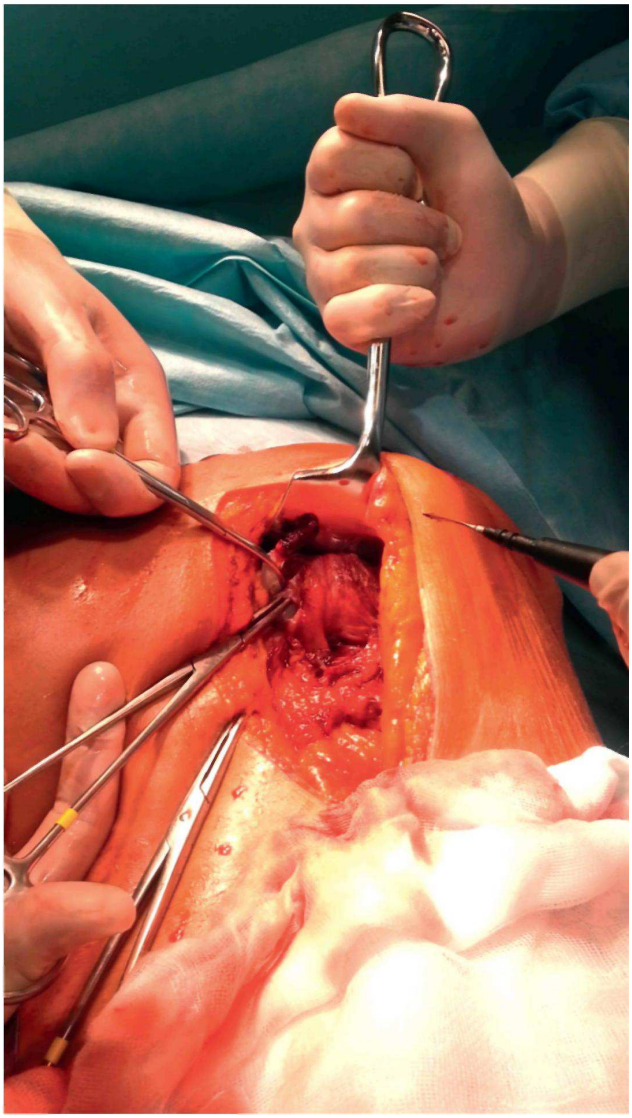

Figure 3. Removal of the gastric band

Rycina 3. Usuwanie przewiązki żołądkowej

Primarily, the band might have migrated to the antral region, then, as a consequence of enlargement of the reservoir proximal to the band, this part of the stomach became more flexible, which resulted in its torsion around the band, resulting in obstruction, gastric wall necrosis and perforation. Such complications are unpredictable, and they tend to occur at a long interval after the primary banding procedure [8]. In case of "acute stomach" symptoms in patients after LAGB surgery, performing imaging examinations is necessary to exclude or confirm the presence of complications. It appears that in ambiguous diagnostic situations, when the symptoms of obstruction occur, the choice method is exploratory laparoscopy or laparotomy, which enables final diagnosis and proper treatment of existing complications.

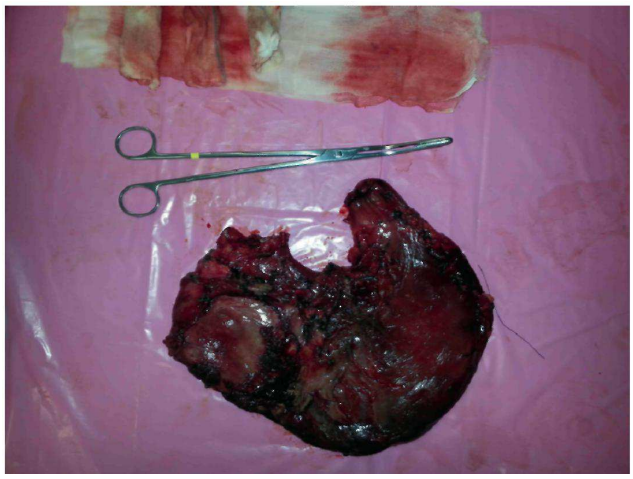

Figure 4. Resected stomach

Rycina 4. Żołądek po wycięciu

The therapy of gastric wall ischemia includes emptying of the band cuff, moving or removal of the band [9], gastric resection, and, in certain cases, gastrectomy.

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Medical support for diving by the Polish Armed Forces. Personnel, training and legal considerations

Zabezpieczenie medyczne nurkowań w Polskich Siłach Zbrojnych. Uwarunkowania kadrowe, szkoleniowe i prawne

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Abstract. Despite the implementation of modern regulations regarding medical support for diving in the Polish Armed Forces, organizational deficiencies and especially personnel shortages may have a negative impact on the safety of military divers. The authors of the article analyze the causes and recommend potential solutions to this problem
Key words: safety, military diving, Polish Armed Forces, medical support

Streszczenie. Mimo regulacji prawnej dotyczącej zabezpieczenia medycznego nurkowań w Sitach Zbrojnych RP niedostatki organizacyjne, a przede wszystkim braki kadrowe, mogą mieć istotny negatywny wpływ na bezpieczeństwo nurków wojskowych. Autorzy artykułu analizują przyczyny i wskazują sposoby rozwiązania tego problemu.
Słowa kluczowe: bezpieczeństwo, nurkowanie militarne. Polskie Siły Zbrojne, zabezpieczenie medyczne

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Decompression is a set of pathological symptoms occurring either immediately or after a certain period following a dive. The symptoms are caused by the presence of gas bubbles in the body of a diver resulting from tissue desaturation or pulmonary barotrauma.

The only method of causal treatment of decompression is therapeutic recompression, which should be launched as quickly as possible after a decompression event is diagnosed.

In 8-11% of cases, irreversible sequelae (mostly concerning the nervous system) occur despite immediate and properly conducted treatment.

If there is a delay in recompression, the risk of complications and sequelae increases with time.

Introduction

Divers who perform underwater tasks for the Armed Forces have had a long history of diving with a low accident rate since the beginning of the Second Polish Republic (II RP). In comparison with commercial and leisure divers, since the SCUBA set was invented by Gagnan, Dumas and Cousteau, the accident rate for the Polish Army, especially the number of fatal accidents, has significantly decreased. Since the foundation of the first Polish military divers school in Hel, and then, after World War II, the Polish Military Diver Training Centre, the level of training has been very high, which has extensively affected the safety of underwater tasks [1].

The second important factor involves the military regulations that govern performing underwater task within the Polish Armed Forces. Although the regulations are criticized for their restrictiveness, they ensure safety during the performance of tasks. The third factor that affects the level of safety is medical support, which consists of well-trained medical personnel and

equipment. Although the most specialized equipment (hyperbaric chambers) is generally available, the numbers of health staff able to support diving are decreasing.

Legal considerations

Medical support for diving is regulated by the following documents:

Regulation of the Ministry of National Defence of 21 June 2012, on the safety conditions for performing underwater tasks in organization units subordinated to or supervised by the Minister of Defence. Dz. U. [Journal of Laws] 2012, item 810 [2],

- *Instrukcja zabezpieczenia medycznego nurkowania i prac podwodnych w Marynarce Wojennej* [Instruction for medical support for diving and underwater works in the Navy]. Navy Command, Gdynia 2013, Navy Ref. No. 1372/2013 [3],
- Defence standard "*Badania medyczne w wypadkach nurkowych*" [Medical examination in diving accidents]. Ref. No. NO-07-A026:2001 [4],
- *Zasady zabezpieczenia medycznego nurkowań głębokich*. [Rules for medical support for deep dives]. Navy 872/82 [5],
- *Przepisy nurkowania* [Rules of diving]. Navy Command, Gdynia 1984, Navy Ref. No. 913/84 [6],

Although the above documents were created at different times and by different experts, they are compatible with each other and create a coherent organizational framework. They help to organize medical support, ensuring safety while performing underwater tasks. They are also compatible with other documents that govern performing underwater works in the Polish Armed Forces [7-9]. The Instruction for medical support for diving and underwater works in the Navy, mentioned in point 2, was created for the Polish Navy. However, due to the reorganization of commanding and removal of individual commands for different types of military forces, it now applies to the entire Polish military.

The definitions included in the above-mentioned documents:

- medical support for diving and underwater works means the entirety of the procedural, planning and organizational actions and objectives aimed at: ensuring safety and health protection of Polish Navy divers exposed to threats immediately before, during, and after diving, as well as while performing underwater works (tasks) and ensuring proper health conditions of service and proper rest for the teams of divers,
- ensuring primary premedical and medical aid for divers who have had a diving accident, or other diseases (injuries) connected with diving and underwater works (tasks) at the site of their occurrence,
- providing divers with the possibility of treatment in qualified health centers involving the prevention of potential sequelae following a diving accident and other diseases connected with diving and/or underwater works (tasks).

Officers involved in medical support for diving

The responsibility for medical support lays with the diving manager, who is trained in the pathophysiology of diving, among other things. However, the entirety of support depends on having qualified medical personnel. According to the above-mentioned documents, medical support should be carried out by qualified healthcare personnel, consisting of one (or more) of the following people, depending on the type of diving.

Diving physician officer

The diving physician officer has the highest qualifications in order to support all types of diving performed in the Polish military. In spite of the slightly misleading name, the diving physician officer does not have to be an officer of the Polish military as he/she may be a civilian, e.g. a physician who is a civilian employee of the army or someone bound to a military unit with a civil contract. The required qualifications of a diving physician officer are as follows: medical specialty (anesthesiology and intensive care, emergency medicine, transport medicine, or marine military medicine), fitness for diving or military service in a hyperbaric environment, certified by *Wojskowa Komisja Morsko-Lekarska* [Military Marine Medical Board] (in the case of a civilian physician: a certificate in accordance with the Underwater Works Act [10] and the Regulation of the Ministry of Health [11, 12]) and requirements connected with the Labor Code and the Occupational Medicine Act, along with the associated regulations [13], a completed course in hyperbaric and diving medicine, as well as a completed course in conducting hyperbaric medical procedures. The Defence Standard also requires completion of practical training.

To obtain the qualifications of a diving physician officer it is necessary to have several specialties.

- .**Anesthesiology and intensive care:** This specialty is currently in deficit, and the training time is 6 years. The authors suppose that it is included in the normative documents (similarly to emergency medicine) only due to the fact that it was mentioned in the Underwater Works Act as especially predisposed for diving support [10]. However, a closer look at the program for this specialty [14] proves that it is by no

means predisposed. In the current program of this specialty, hyperbaric therapy is just briefly mentioned. Moreover, there is no information in the program on the physiology of diving and diseases connected with diving (the previous, single-stage specialty program was similar). A separate problem is that the physicians who manage to obtain this specialty rarely remain in service.

- **Emergency medicine:** A specialty with a training time of 5 years, also in deficit. The specialty program only briefly mentions hyperbaric therapy and there is no information about divers' diseases [15]. According to the authors' experience, cases requiring the specialized actions of an anesthesiologist or an emergency medicine specialist in diving accidents are rather causal than regular, so adding those two specialties to the list of requirements of obtaining the highest qualifications to support diving is unfounded.
- **Transport medicine:** As part of the change to the specialization system into a single-stage system, transport medicine replaced several pre-existing specialties: marine and tropical medicine, aviation medicine, railway medicine and marine military medicine. Over the decade-long period of single-stage specialties, this specialty was obtained by several dozen people in Poland, including several military physicians. However, it has not gained the popularity of the previous ones, such as marine military medicine or aviation medicine. The specialty program of transport medicine included important information about hyperbaric medicine and diseases connected with diving. They were widely covered during the specialization process in military centers. Experts in the field of transport medicine are much more predisposed to diving support than, for example, anesthesiologists. Currently, after another change of the specialization system and a return to double-stage specialties, e.g. a modular approach (the basic module and the specialized module), transport medicine has been removed, while marine and tropical medicine has been restored. Thanks to the efforts taken by representatives of the military in the board which created the specialization system, the specialized module includes even more elements related to diving and hyperbaric medicine [16].
- **Marine military medicine:** The last specialty on the list of preferred specialties is already history. It existed until the first reform of the medical specialization system. In most cases, the training took place in military institutions. The program for this specialty was the same as the program for "civilian" marine and tropical medicine; however, it included numerous elements that are essential for a military physician, including extensive knowledge of diving. Undoubtedly, it was the best substantively prepared specialty for physicians who support diving. Unfortunately, even though over 100 people obtained it, there are currently only a few such officers remaining in service. This is hardly surprising, as the last marine military medicine exam session took place at the end of the previous century.

Diving physician

This position is defined only in the Instruction, and, indirectly, in the Defence Standard [3, 4], while it is not to be found in the Regulation of the Ministry. The requirements are defined in the same manner as in the case of the diving physician officer, with the exception of the necessity to have a particular specialty. A diving physician is required to have any other specialty, so it must be assumed that a physician without a specialty cannot support dives.

Among the requirements for all members of the qualified health care personnel, there is a necessity of completing diving and hyperbaric medicine training, as well as a hyperbaric treatment training. Such training was always conducted at the Department of Marine and Hyperbaric Medicine of the Military Institute of Medicine (formerly Chair and Department of Marine and Tropical Medicine of the Military Medical Academy) in cooperation with the Department of Underwater Technology of the Navy Military Academy. For a long time, however, courses for physicians and professional health care personnel have not been organized. Despite the existence of educational programs, initiatives by training centers are effectively blocked by such problems as financial issues, and especially a lack of candidates for training due to the significant decrease in staffing levels in military health care personnel. In the near future a number of serious problems will occur, such as a lack of professional military health care staff able to conduct training. Such training enriches the standard knowledge possessed by every physician with complementary knowledge which, in turn, with the support of practice under the watchful eye of a more experienced colleague, as mentioned in the Defence Standard [3, 4, 8], allows the safe provision of qualified medical help in the case of a diving accident, and, above all, to provide medical diving support.

Paramedic

The paramedic is a very useful person in a medical support team. Although, in fact, in the case of medical support performed by a physician with emergency, or anesthesiology and intensive care specialties the qualifications overlap, the presence of a paramedic increases the effectiveness of a rescue operation. Physicians, except those having the afore-mentioned specialties, do not generally update their knowledge of reanimation and resuscitation, they do not train with dummies, nor do they train to perform tracheostomy and intubation. This is why the qualifications of a paramedic

are invaluable for the emergency procedures in the first period after a diving accident. Also later, during the hyperbaric procedures, paramedics do very well, accompanying patients inside the hyperbaric chamber and supporting the physician, who has higher treatment coordination capabilities and who remains outside the chamber.

Nurse

In the medical support of dives and in the first phase of providing aid in diving accidents, the nurse's role is of a secondary and auxiliary nature. Currently, the authors do not know of any cases of dives medically supported by nurses. They are gradually being replaced by paramedics, which is a very positive tendency from the point of view of an injured diver.

Problems connected with medical support for diving

Diver's qualifications or ability to perform tasks in overpressure conditions.

Providing aid in diving accidents often requires medical personnel to accompany the injured diver in the enclosed interspheres of decompression chambers, where the physician or paramedic is exposed to the same high pressure as the treated diver. Therefore, medical personnel should have appropriate health qualifications that allow them to work under such conditions. However, these qualifications do not have to be the same as those required for divers, because medical personnel do not perform dives in a water column, yet it must be possible for them to be present in a decompression chamber during therapeutic recompression [17]. Under military service conditions, it is difficult to meet those requirements. The first obstacle in acquiring certified fitness for performing medical support for diving is the necessity of obtaining a certificate of fitness for service as a diver or in overpressure conditions. Unfortunately, a significant number of professional health care employees do not meet the health requirements necessary to receive a positive opinion and to renew it every year [17]. The introduction (partly due to the efforts of the authors of this article) of the possibility of obtaining a certificate of fitness for military service in overpressure conditions instead of obtaining a certificate of fitness for military service as a diver have allowed the extending of the group of candidates suitable for diving medical support. It would also be reasonable to verify the requirements concerning certificates for the diving service, because some of these date back 60 years - to the period of the Warsaw Pact (for example, those concerning eyesight impediments) and do not fit the modern conditions and diving technology whatsoever. Military diver qualifications are possessed by a very small (several people) group of military physicians and are mostly obtained due to the passion for diving and the personal interest of the physicians. Nowadays, as in most of military units, there is lack of physicians and the small group of those in service are burdened by many other duties, so there is practically no possibility of seconding a physician to the course for junior divers, which lasts over 3 months. The revision of the provisions concerning specializing military physicians are intended to organize the process of gaining professional qualifications. However, it also makes it difficult for general military commanders to find enough time for physicians to conduct specialization courses, not to mention diver's courses, as there are many projects requiring medical support. Another staff problem is the Job Description Sheet provisions. Currently, only the physicians serving in the Polish Military Diver Training Centre and in the Support Ship Unit, as well as in some units of the Special Forces have the possibility of obtaining the military diver's qualifications. It is slightly easier for paramedics who, serving in the corps of warrant officers, non-commissioned officers and marines, obtain certificates of fitness for diving and are often sent to diver's training courses, depending only on their location of service.

It should also be emphasized that civilian physicians generally possess neither diver's qualifications nor a certificate of health fitness for diving (in this case in accordance with a relevant Regulation of the Ministry of Health [11, 12] and other regulations cited above). The only exception is a very small number of retired military physicians who support the commanders of military units that lack their own professional personnel. Staff shortages give rise to the practice of hiring physicians (or other medical personnel) for a couple of hours from civilian institutions that provide medical services, yet do not meet the requirements stated by the documents concerning diving support. This, unfortunately, is an attempt to bypass the regulations, which raises concerns of a professional and legal nature.

Courses

Dedicated courses for professional health care personnel have not been conducted recently for a number of different reasons. Especially concerning in recent years is the fact that there are problems with filling vacant posts, which applies both to learners and, more recently, to lecturers. The learners (military physicians), if seconded to the courses by their commanders, openly admit a readiness to attend them, yet do not plan to pass the exam and obtain the qualifications for diving physician, for example, because they are burdened with duties concerning diving support in their places of service, mostly without any gratification. In the case of paramedics, this problem, fortunately, does not exist yet, and if they were to be seconded to the courses by their commanders, they express a readiness to pass the exam and obtain the qualifications.

Hyperbaric centers

The Act on Medical Activity states that "military health care only supports and provides first aid. Treatment is carried out by health care establishments bound by

contract with the National Health Fund, which includes diver treatment procedures" [18]. It is worth noting that the removal of the military health care system, which took place some time ago, made it much more difficult to provide aid in diving accidents. It should also be recalled that the most recent recommendation concerning support for diving and the behavior in case of a diving accident is aimed at the maximum reduction of the time between the moment of the accident to the performance of therapeutic recompression, even using transport chambers. Transport by an ambulance crew or an air ambulance crew does not yet solve the problem. The aim of the transport is defined by the dispatcher who may, for example, have no knowledge of the existence and necessity of therapy at a hyperbaric center (Konin 2014), a hyperbaric center can refuse admission of a patient with a serious risk to life (Olsztyn 2014) or with a return of symptoms of decompression after prior treatment (Gdynia, Polish Military Diver Training Centre). In Poland, among the existing hyperbaric centers (or, more precisely, hyperbaric oxygen therapy centers) only some of them are bound by contract with the National Health Fund, and if they are, these are mostly contracts for treatment with use of hyperbaric oxygen in pathological processes, rarely for treatment in diving accidents. The structure of the chambers and technical conditions also restrict the possibilities of use, and a signed contract do not compensate the costs of readiness and 24-hour on-call duty. Moreover, in many cases, having a contract and having actual treatment capacities are two different things. Aside from the afore-mentioned cases of refusal to admit a patient, three very important elements should be underlined: qualifications of the medical personnel, qualifications of the hyperbaric chamber operating staff and technical capacities of the hyperbaric chamber. Unfortunately, the majority of centers have signed a contract with the NHF without at least one of the above-mentioned elements. In the case of physicians, the most frequent problem is a lack of knowledge about diseases connected with diving, a lack of skills concerning diagnosis of those diseases and using relevant treatment procedures, dependent on a disease, the condition of the patient, and the type of diving the diver performed. In Poland, only three hyperbaric centers have a qualified team of physicians. Unfortunately, the organization of on-call duties does not always guarantee, despite the capacities and qualifications of the team, performing at the proper time all procedures of admission, diagnosis and treatment of patients after diving accidents. When it comes to the technical personnel of hyperbaric centers, they are mostly employees who have had on-the-job training concerning operating the chamber, in most cases organized by its supplier instead of by a qualified decompression chamber operator. Therefore, the personnel have no knowledge about the procedures for the maintenance of the chamber, which is obligatory during use to the pressure required in the treatment of diseases connected with diving. In most cases, the chambers are purchased by health care units for hyperbaric oxygen treatment. These chambers may be not structurally adapted to the treatment procedures required in diving accidents, especially to the proper speed of compression and expansion, as defined in treatment tables, and to the proper overpressure value. The problem could be solved by placing a chamber that meets the requirements of diving accident treatment, as well as those of NHF, in Navy Hospital No. 7. This would solve the issue of observation of patients after receiving their first hyperbaric aid at the site of the diving accident, and of the following treatment compressions. According to the knowledge of the authors, the Military Institute of Aviation Medicine currently has the technical capabilities to carry out hyperbaric therapy, being probably the only place in the world where a hyperbaric chamber is located next to hypobaric chambers. The second similar place is the Department of Underwater Technology of the Navy Military Academy (ZTPP AMW) which, in fact, does not have a hospital base, but the technical capabilities of the hyperbaric complex, as well as the qualifications of the personnel, allow treatment of all, even complex and collective, diving accidents. The problem is that ZTPP AMW is not a health care center. In the authors' opinion, the best solution to the problem of medical support for dives (in particular, deep and saturation dives) would be to create one center which would use the knowledge and experience of already existing centers, such as the Navy Military Academy or Military Institute of Medicine, as well as to ensure the possibility of comprehensive treatment of diving accidents, and constitute a place of research work and training for medical and technical personnel of all sorts of military units that use diving techniques.

Qualified first medical aid

In the case of diseases and diving accidents that represent a risk to the health or life of an injured diver (decompression sickness and pulmonary barotrauma), if reanimation and resuscitation is not necessary, the only possible form of help is therapeutic recompression [2, 3, 19, 20]. The legislators approving the normative documents mentioned at the beginning of this article have rightfully placed upon the diving units of the Polish Military an obligation to have a hyperbaric chamber at the site of diving.

The initiative of the commanding officer of the Polish Army Diver Training Centre triggered the issuing by the Head of the former Military Health Care Inspectorate (IWSZ) an interpretation based on current medical knowledge, and, in particular, on caring about the health and life of military divers, defining rapidly undertaken therapeutic recompression as qualified first medical aid. Especially given the fact that, according to the normative documents, in many cases treatment is initiated by the diving manager. The decision of the Head of IWSZ should be included in the Regulation of the Ministry of Defence.

Physicians

Currently, the greatest problem in the majority of the military units where dives are performed is the lack of qualified physicians. The approximate number of

physicians with documented (military course) qualifications are presented in table 1.

The situation in which only one officer (moreover, of pre-retirement age) has the qualifications needed to support all types of diving performed within the Polish military cannot be considered normal, and there are many causes of this situation. First of all, the increasing deficit of military physicians due to the removal of the Military Medical Academy, decreasing ratings and worsening ratio of military wages compared with the same positions in civilian healthcare. It may put an end to the almost 100-year history of safe dives in the Polish military and squander the legacy of several generations of military diving physicians. It may also waste many years of scientific work and training of Polish military scientists, among other physicians, on the increasingly advanced diving technology that is implemented in the Polish military. This problem will become highlighted during the implementation of the project for a new rescue vessel for the Polish Navy. There is, however, some hope in rebuilding the medical staff in military healthcare with graduates of the Military Medical Faculty of the Medical University in Łódź and Military Academy of Land Forces in Wrocław. However, those young officer-physicians are only at the beginnings of their professional careers, and their training (even basic) requires time, appropriate training center and funds.

Actions undertaken in order to legally sanction the functioning of healthcare institutions in the Polish Armed Forces (an amendment to the Act on Medical Activity and following from two proposed regulations), extending the entitlements of medical personnel and creating a training and coordination center, create a chance of normalizing many issues connected with medical support for diving in the military. The highest priorities should include:

- .amending the Regulation of the Ministry of Defence of 23 December 2010, by extension of the scope of services that can be provided during the training for diving, including therapeutic recompression at the site of the accident,
- creating in Gdynia the largest group of military divers in Poland, a medical scientific-training center (similar to the former Department of Marine and Tropical Medicine of Military Medical Academy) at the academic level, which would be responsible for the training of diving physicians and, at the same time, constitute the aim of their professional and military career path.This it would require the creation of the required number of posts for senior officers for the facility,

Table 1. Number of physicians providing medical support during diving in the Army, the Special Forces and the Navy
Tabela 1. Liczba lekarzy zabezpieczających nurkowania w Wojskach Lądowych, Wojskach Specjalnych i Marynarce Wojennej

Type of military physicians	Navy	Special Forces	Army
diving physician officer	**0**	0	1
diving physician	**1**	1	0
supporting physician (without qualifications)	**8**	no data	no data

- creating a military Hyperbaric Therapy Centre with a training function, equipped with a hospital and diagnostic base,
- optimal use of existing human resources by organizational and structural changes and cooperation between units,
- reappointment of retired diving physicians willing to return to service and share their knowledge with younger colleagues,
- creating a clear professional career path, and a motivational system for physicians who will obtain the qualifications for medical support for diving,
- maintenance (except the amendments concerning the status of nurses, medical specialties and the addition of obligatory practical training under the watchful eye of a qualified physician) of the records in the normative documents concerning medical support for diving,
- relevant changes in the regulations concerning examination laws for divers,
- legislation changes concerning already functioning institutes and research centers, enabling development of a center able to support and train medical personnel for the Polish Armed Forces, financed by the national budget.

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Thrombotic microangiopathies (thrombotic thrombocytopenic purpura, hemolytic uremic syndrome) - diagnostics and treatment difficulties

Mikroangiopatie zakrzepowe (zakrzepowa plamica małopłytkowa/ zespół hemolityczno-mocznicowy) -trudności diagnostyczne i lecznicze

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Abstract. The current state of scientific knowledge and progress in thrombotic microangiopathy (TMA) treatment are discussed. Loss of the antithrombotic properties of endothelium in the small vessels due to damage remains the primary reason for the TMA development manifested by thrombocytopenia and hemolytic anemia (with schistocyte presence in the blood smear). Thrombotic thrombocytopenic purpura (TTP) is caused by a deficiency of ADAMTS13 metalloproteinase, which degrades the large von Willebrand factor (vWF) multimers. In typical hemolytic uremic syndrome, endothelium is damaged by the bacterial Shiga toxin. Atypical hemolytic uremic syndrome is caused by the excessive (60%) activation of the complement, caused by mutation. Prognosis in typical HUS depends on the mutation type. The paper presents the most recent treatment guidelines, including the use of monoclonal antibodies. Plasma exchange remains the primary treatment of TTP; however rituximab is recommended in severe and refractory TTP. Use of eculizumab has almost completely replaced daily plasmaphereses in aHUS treatment. Preventive therapy is sufficient in most cases of typical HUS.
Key words: hemolytic uremic syndrome, thrombotic thrombocytopenic purpura, hemolytic anemia

Streszczenie. Omówiono dotychczasowy stan wiedzy i postępy w leczeniu mikroangiopatii zakrzepowych (MZ). Podstawową przyczyną rozwoju MZ jest utrata właściwości antytrombogennych śródbłonka drobnych naczyń w wyniku uszkodzenia. Małopłytkowość i niedokrwistość hemolityczna (z obecnością schistiocytów w rozmazie krwi obwodowej) to klasyczne objawy MZ. Zakrzepowa plamica małopłytkowa spowodowana jest niedoborem metaloproteinazy ADAMTS13, która rozkłada wielkocząsteczkowe multimery czynnika von Willebranda. W typowym zespole hemolityczno-mocznicowym śródbłonek drobnych naczyń uszkadzany jest najczęściej przez bakteryjną shigatoksynę. Natomiast patomechanizmem atypowego zespołu hemolityczno-mocznicowego jest nadmierna aktywacja układu dopełniacza, w 60% spowodowana mutacjami. Rokowanie w atypowym HUS zależy od typu mutacji. Przedstawiono najnowsze wytyczne dotyczące leczenia MZ, w tym wykorzystanie przeciwciał monoklonalnych. Podstawowym leczeniem TTP pozostaje wymiana osocza. W ciężkich i opornych na leczenie postaciach TTP zaleca się stosowanie rytuksymabu. Wprowadzenie do lecznictwa ekulizumabu wyparło codzienne zabiegi plazmaferez leczniczych. Typowy HUS wymaga w większości przypadków jedynie leczenia zachowawczego.
Słowa kluczowe: zespół hemolityczno-mocznicowy, zakrzepowa plamica małopłytkowa, niedokrwistości hemolityczne

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Introduction

Thrombotic microangiopathies (TMA) constitute a heterogeneous group of diseases of complex etiology, characterized by the formation of thrombi in the small blood vessels. It leads to ischemia and dysfunction of the organs supplied by those vessels. The most common forms of TMA include thrombotic thrombocytopenic purpura (TTP) and hemolytic uremic syndrome (HUS). Two forms of HUS are distinguished: one associated with infection, usually with the bacteria *Escherichia coli,* which produce a harmful toxin, and an atypical one resulting from the complement system dysfunction. The introduction of monoclonal antibodies to the treatment significantly improved prognosis in this group of patients.

Epidemiology

Thrombotic microangiopathies (TMA) are rare diseases, the most common of which is HUS. The prevalence of 2 per 100,000 people in the general population [1, 2] is observed primarily in children (6 per 100,000) and elderly patients [3], and peak incidence is observed in summer [4, 5]. A temporary increase in HUS incidence is reported during *Escherichia coli* epidemics. During the last European epidemic in Germany in 2011, 22% (845 cases) of patients infected with *Escherichia coli* strain O104:H4 developed HUS, and 36 deaths were reported [6]. The incidence of atypical form of the hemolytic syndrome, which accounts for 10% of HUS cases, is estimated at 2.1 per 1,000,000 per year [5, 7, 8]. The disease usually presents in childhood, with the exception of aHUS, developing in the course of the mutation of complement factor I (CFI) or factor C3, which occur in adults [9]. Annual TTP incidence in the USA is 3.8 per 1,000,000 per year [10, 11], 60% of patients are female, and peak incidence is observed in individuals aged 20-40 years [5].

Pathogenesis

Thrombotic microangiopathies are caused by the loss of antithrombogenic properties by damaged endothelium. At the site of damage, blood platelets are mobilized and coagulation cascade is initiated, which results in thrombi in the lumen and walls of the small blood vessels. As a consequence, microcirculation and organ perfusion are impaired. Organ ischemia is exacerbated by increasing hemolytic anemia due to erythrocytes pushing through the changed vessels. Kidneys are particularly susceptible to damage in TMA, which is attributed to specific blood flow, with high shear stress at the boundaries of arteries and arterioles. Endothelium of the renal vessels, as well as podocytes, mesangial cells and renal tubular epithelium, are characterized by a high density of ceramide receptors (Gb3), which can adsorb also the Shiga toxin [1, 3, 12, 13]. Moreover, the kidneys contain CD36 receptors, which bind blood platelets with the damaged endothelium. The renal tubular epithelium is additionally damaged by the toxic effect of the heme released from damaged erythrocytes [14]. Typical HUS is usually caused by verotoxin (Shiga toxin), and is associated with concurrent diarrhea. HUS-inducing verotoxin is mostly produced by enterohaemorrhagic *Escherichia coli* strain 0157:H7, less often by other etiological factors (other strains of *Escherichia coli:* 026, 045, O103, O104, 0111, 0121, 0145, *Streptococcus pneumoniae, Shigella dysenteriae, Citrobacter freundii* and *Bordetella pertussis)* [15]. It is noteworthy that about 30% of aHUS cases are preceded by diarrhea. There are two Shiga toxins, 56% homologous: Stx1 and Stx2 [13]. During the epidemic in 2011 in Germany, a clear correlation between HUS and the Stx2 toxin was observed [6]. By damaging the intestinal epithelium, the Shiga toxin penetrates into the systemic circulation. It releases von Willebrand factor (vWF) and chemokines, which damage the vascular endothelium [15]. According to Zumbrun, a diet rich in fiber predisposes the development of HUS. Following a fiber-rich diet leads to a reduction of commensals in the colon, which creates space for the growth of *Escherichia coli* 0157:H7 [16]. Atypical HUS develops on the basis of excessive and uncontrolled complement activation via the alternative pathway [17, 18].

The disease occurs in a sporadic and a familial form. Sporadic aHUS may be drug-induced (quinine, ticlopidine, clopidogrel, cyclosporine A and tacrolimus, interferon gamma and beta), it may be secondary to systemic diseases (systemic lupus erythematosus, antiphospholipid syndrome, systemic sclerosis), or occur as a complication in pregnancy (HELLP syndrome) [3]. According to Fakhouri, 75% of cases develop in the postpartum period, usually during the next pregnancy [19]. aHus may also occur in patients after organ transplantation. There were also reports of aHUS following acute pancreatitis, operations, injuries and intravascular administration of contrast medium [11]. In approximately 60% of patients, inherited or acquired abnormality complement components are found [20]. The most common ones include inhibiting mutations of inhibitory components of the complement system (approx. 60%), factor H (15-30%), its co-factor, factor I (5-14%), and CD 46 (membrane co-factor protein - MCP) (5-14%) - a molecule found on the surface of a cell. In approximately 15% of cases mutations are found that activate component C3, factor B of the complement or thrombomodulin.

In approximately 4-14% of cases autoantibodies neutralizing and inactivating factor H are found. It is interesting that the disease manifests in only 50% of given mutation carriers [21, 22]. Presently it is believed that familial aHUS will manifest only in the case of mutation, predisposing haplotypes and triggering factors [23]. The occurrence of atypical hemolytic syndrome in most patients is preceded by upper respiratory tract infection and fever, and in 30% of cases by diarrhea [24].

TTP is based on excessive activation of blood platelets by large multimers of von Willebrandt factor (vWF). Physiologically large vWF multimers are degraded by ADAMTS13 metalloproteinase into small multimers which do not activate blood platelets [23, 25, 26]. In TTP, the activity of ADAMTS13 is reduced.

There are two forms: acute – autoimmune, with ADAMTS13 antibodies (Moschcowitz syndrome), and the form inherited in an autosomal recessive pattern, chronic, with a genetic defect (Upshaw-Schulman syndrome). The autoimmune form is more common, and concurrent with other autoimmune diseases [3]. The inherited genetic mutation of ADAMTS13 metalloproteinase (Upshaw-Schulman syndrome) constitutes 5% of TTP cases, and typically manifests in childhood [27]. ADAMTS13 activity in adult individuals is 50-100% [26]. Numerous clinical conditions, including cirrhosis, uremia, acute inflammations, disseminated intravascular coagulation and disseminated neoplasm may be associated with reduced ADAMTS13 concentrations [25, 28]. Reduced concentrations of ADAMTS13 is also observed in neonates, pregnant women and convalescents following a surgical procedure [25].

Clinical image and diagnostics

TMA onset is usually sudden, and 70% of cases are preceded by infection, pregnancy or use of medications. Patients complain about significant weakness and fatigue [29]. Test results which suggest thrombotic microangiopathy and enable introduction of treatment include:

- sudden hemolytic anaemia with schistiocytes in peripheral blood (anaemia, increased activity of lactate dehydrogenase – LDH, hyperbilirubinemia, reduced haptoglobin concentration),
- thrombocytopenia.

Typical HUS is usually associated with an *Escherichia coli* infection. The infection develops after approximately 3 days following consumption of infected food [30]. HUS usually occurs within 2 weeks after the onset of infection symptoms [31]. In the course of HUS, in approx. 60% of cases acute renal failure is observed, which requires renal replacement therapy for 10 days on average (6-15 days) [32, 33]. In as many as 50% of HUS cases the involvement of CNS may be found, manifested by disturbances of consciousness, fits of epilepsy, hemiparesis or coma [31, 34]. CNS involvement is an important mortality risk factor in HUS [31].

HUS due to pneumococcal infection is characterized by a more severe clinical course (75% of patients require renal replacement therapy), and is associated with higher mortality rates [33, 35]. About 50% of atypical cases of the disease are preceded by infection, mostly gastroenteritis with diarrhea (approx. 30%) [19, 24, 36] or upper respiratory infection (17%) [7]. In the case of aHUS 60% of children and 80% of adult patients require implementation of renal replacement therapy [9]. About 10-30% of cases are associated with the involvement of CNS (8% of adults and 16% of children) and the cardiovascular system, manifested by disturbance of consciousness, seizures, cerebral stroke and focal syndromes [37]. Cases of peripheral dermal necrosis have also been reported [38].

TTP was previously described primarily as a pentad of symptoms: thrombocytopenia, hemolytic anaemia, renal failure, neurological disorders and fever, but classic pentad is found only in 5% of patients [20]. The following neurological disorders are frequent clinical manifestations of the disease: headache and vertigo, focal deficits, disturbance of consciousness. Concurrent symptoms include petechiae, abdominal pain and fatigue [3, 11], as well as less common renal failure and hypertension [11, 27]. TTP may also be associated with cardiac complications: myocardial infarction, cardiac failure, arrhythmia and cardiac shock [39]. Hemolytic anaemia is characterized by erythropenia, reticulocytosis, increased activity of lactate dehydrogenase (LDH), increased concentration of bilirubin and reduced concentration of haptoglobin, as well as negative Coombs test results [27]. Moderate thrombocytopenia of approximately 100 thousand/mm^3 is usually found in HUS. Simultaneously, acute renal failure is more pronounced. In TTP, the platelet count is lower, usually 10-30 thousand/mm^3 [40]. Diagnosis of HUS is based on the complete clinical picture and the presence of infection [41] with a toxigenic strain [42] confirmed by stool culture, positive PCR for the Shiga toxin in the stool [43], or serological diagnostics for *Escherichia coli* 0157and other strains [44]. Diagnosis of aHUS is based primarily on the assessment of the complement activity: concentrations of C3 and C4, factor H, factor I, and factor H antibodies in the serum [45]. Due to a sensitivity and specificity of approximately 70%, the diagnosis should not be made merely on the basis of C3 concentration [43, 46, 47], but upon consideration of the complete clinical picture and when serum ADAMTS13 activity is <10% [23, 45]. The serum is collected before plasmapheresis. However, according to Payvandi, in one third of cases TTP may not be associated with reduced ADAMTS13 activity [48]. It is worth emphasizing that treatment before testing the ADAMTS13 activity may result in false-negative results (administration of even 1 unit of fresh frozen plasma may normalize the activity of ADAMTS13 metalloproteinase). Diagnosis of aHUS or TTP may be suggested by the presence of similar symptoms in family members, but genetic mutation needs to be found to diagnose familial forms of the diseases [23]. Table 1 presents diseases to be considered in differential diagnosis of HUS/TTP [23].

Treatment

Similarly to the diagnostics of TMA, treatment of those syndromes is very difficult, expensive, and thus limited. Possibly early implementation of treatment, both symptomatic and causal, is recommended in order to prevent severe complications of microangiopathies: significant renal function impairment, severe arterial hypertension and death [3]. Therapy may be started before the final diagnosis is made. The following

parameters should be monitored during the treatment: platelet count, hemolytic indexes, i.e. concentrations of LDH, bilirubin and haptoglobin, and parameters of nitrogen retention, i.e. concentration of creatinine and urea [49].

Treatment of HUS

So far no therapy (transfusion of fresh frozen plasma - FFP [50], plasmapheresis [5], eculizumab [51]) demonstrated better effects than symptomatic and maintenance treatment in typical HUS [52]. Analysis of the epidemic of 2011 confirms that the best treatment methods in HUS include fluid therapy with isotonic fluids [53], using analgesics (acetaminophen and morphine), avoiding medications reducing intestinal motility [54], cautious antibiotic therapy [51, 55] and renal replacement therapy. Antibiotic therapy in HUS and *Escherichia coli* infections is disputable. Administration of cephalosporins, macrolides and penicillin increases release of the Shiga toxin [56]. P-lactam antibiotics used in the therapy of *Escherichia coli* 0157 infections were associated with the development of HUS [57]. Presently, it is believed that antibiotics damaging bacterial DNA (fluoroquinolones, beta-lactams, mitomycin C) increase the release of the toxin, and may contribute to disease exacerbation. However, meropenem, azithromycin [51] and tigecycline [55] are considered to be safe. During the epidemics in Germany, treatment with eculizumab was implemented, but its effectiveness in the treatment of typical HUS was not confirmed [51, 58, 59].

Table 1. Differential diagnosis of HUS/TTP
Tabela 1. Różnicowanie HUS/TTP

systemic lupus erythematosus
antiphospholipid syndrome
DIC
HELLP syndrome
cobalamin metabolism disorders
virus infections, especially HIV, but also cytomegalovirus, adenovirus, herpex simplex virus
meningococcal and streptococcal bacterial infections
medications (quinine, simvastatin, interferon, inhibitors)

The results of a phase III study on eculizumab effectiveness in HUS have not been published yet (Clinical trials.gov NCT01 410916 and EudraCT: 2011-002691 -17. Eculizumab, a monoclonal antibody, inhibits the production of complement compound C5a, and by binding with C5 it blocks the complex attacking the C5b-9 membrane. Eculizumab is registered by FDA (Food and Drug Administration) for treatment of paroxysmal nocturnal hemoglobinuria and atypical hemolytic-uremic syndrome. The medication has been registered in Poland, but its use is limited due to the high price. Phase III studies did not reveal any benefits of Stx deactivation by an antibody imitating a receptor *(Shiga toxin binding agent, Stx receptor mimic)* [60]. Presently, a phase II study on the effectiveness of chimeric monoclonal antibodies to Shiga toxin is being conducted. The immunoadsorption of IgG antibodies and recombined thrombomodulin, despite reports of their effectiveness [58, 61-63], remain experimental therapies.

Treatment of aHUS

In case of suspected aHUS, therapy should be started within 24 hours from the onset of symptoms [64]. Primary treatment involves plasmapheresis and, if it is unavailable, transfusion of FFP [64]. It is recommended to exchange 1-2 volumes of plasma in adult patients, and 50-100 ml/kg bw in children during each plasmapheresis [65]. The purpose of plasmapheresis and FFP transfusion is to supply complement compounds or their regulators. In 2009, EMA approved eculizumab in aHUS therapy. It is a monoclonal antibody to complement compound C5, approved also in the treatment of paroxysmal nocturnal hemoglobinuria. Eculizumab is a first-line medication in Great Britain [66], and plasmaphereses are conducted until the antibody is administered. Recent studies demonstrated that 80% of patients treated with eculizumab obtain long-term remission (observation time of 62-64 weeks) [67]. In comparison, long-term remission is obtained in only 5% of patients treated with plasmapheresis.

Table 2. Types of mutations in aHUS and prognosis after renal transplantation
Tabela 2. Rodzaje mutacji w aHUS i rokowanie po przeszczepie nerki

mutation	frequency	recurrence after KTx
CFH	15-30%	~80%
MCP	10-15%	~20%
CFI	5-14%	~90%
C3	5-10%	~50%
CFB	0-3%	~100%
THBD	0-5%	100%
autoantibodies to factor H	4-14%	

The effectiveness of single remission due to plasmapheresis depends on the mutation type; 55-80% of remission in the case of CFH *(complement factor H),* mutation, C3, THBD (gene for thrombomodulin) or antibodies to factor H, and only 25% with the CFI mutation [7]. According to individual reports, eculizumab is safe for pregnant women [68]. Due to increased susceptibility to meningococcal infections, a 4-valent vaccination is required before implementation of a therapy with eculizumab [18]. Moreover, due to the lack of vaccination for group B meningococci, each patients should receive long-term prophylactic penicillin or erythromycin [69]. Hepatitis B should also be excluded

before starting the treatment. Adverse reactions to eculizumab, affecting approximately 5% of patients, include arterial hypertension, upper respiratory tract infections, diarrhea, headache, anaemia, vomiting, urinary tract infections and leukopenia. Anticoagulation therapy should be continued during the treatment [49]. In case of deterioration of the renal function, dialysis should be introduced. Possible renal transplantation may be considered after genetic testing. Atypical HUS may recur after the transplantation. Frequency of disease recurrence is presented in Table 2. In case of CFH and CFI mutations, kidney transplantation should be performed simultaneously with liver transplantation, as complement compounds CFH and CFI are produced by the liver [7, 70, 71]. There are reports of eculizumab's effectiveness in the treatment and prevention of the post-translational recurrence of aHUS [67, 72], as well as after a liver and kidney transplantation [73]. Transplant from a family member is contraindicated as family members are often carriers of complement compound mutations. Increased filtration in one kidney may be a trigger for the occurrence of atypical hemolytic syndrome in the kidney donor [66].

Presently, studies are being conducted on the safety and effectiveness of new monoclonal antibodies. One of them is a monoclonal antibody in the IgG - OMS721 class, directed against the MASP-2 molecule (NCT02222545, ClinicalTrials.gov.) MASP-2 is a lectin-associated serine protease found in the lectin pathway activating the complement system. Blocking of the lectin pathway results in reduced amounts of active C4, which is affected by factor H.

Another potential medication in a clinical study phase is CCX168 - a low molecular weight inhibitor of C5a receptor (NCT02464891, ClinicalTrials.gov), whose effectiveness is studied also in IgA nephropathy (NCT02384317, ClinicalTrials.gov) or in anti-neutrophil cytoplasmic antibody-associated vasculitis (NCT02222155, Clinical Trials. gov). The results of the clinical studies are yet to be published.

Treatment of TTP

What distinguishes TTP from other TMA is the effectiveness of plasmapheresis, resulting from the removal of large vWF multimers and autoantibodies to ADAMTS13 during the procedure [3]. Until 2009, plasmapheresis was considered the most effective method of TTP treatment, more effective than FFP transfusion [52, 74]. According to literature data, 80% of patients with TTP respond to plasmapheresis [74]. Plasmapheresis treatment should be introduced preferably within 4-8 hours from suspected TTP due to thrombocytopenia and thrombotic microangiopathy. Daily plasmapheresis should be performed until a platelet count of >150 thousand/mm^3 is obtained, and for the next 2 days [23]. If no improvement is observed, the treatment is intensified by intravenous administration of methylprednisolone (1g/day) for 3 consecutive days or 1 mg/kg bw/day of oral prednisolone. In case of resistant or recurrent TTP, and patients in serious condition (increased cardiac and neurological symptoms), administration of rituximab (with a 4-hour interval after a plasmapheresis) should be considered, as well as increasing the frequency of plasmaphereses [75]. Rituximab is a monoclonal antibody directed against the CD-20 antigen on lymphocytes B, approved for FDA and EMA for the treatment of non-Hodgkin lymphoma, chronic lymphocytic leukemia, severe rheumatoid arthritis and granulomatosis with vasculitis; there are no recommendations for the treatment of TTP. However, only 10% of patients treated with rituximab experienced recurrence, in comparison with 57% of patients treated with plasmapheresis [76]. Rituximab is well-tolerated. The first infusion may be associated with fever, shivers, skin rash, pruritus, tachycardia and hypotension [77]. Repeated rituximab infusions may result in hypogammaglobulinemia [78], which does not have to be associated with an increased risk of infection [79]. However, there are individual reports of reactivation of CMV *(Cytomegalovirus)* infection [80], CSN infections, VZV *(Varicella zoster virus)* reactivation [81] and pneumonia [82].

There are different approaches to the treatment of TTP if rituximab appears ineffective; splenectomy and immunosuppression are considered (cyclophosphamide, vincristine, cyclosporine). Administration of romiplostim, a thrombopoietin mimetic, was associated with the improvement of the clinical condition of patients [83]. Presently, the effectiveness of romiplostim is under further study (NCT02338414ClinicalTrials.gov). Also, the effectiveness of n-acetylcysteine (nac) in the therapy of TTP is being studied (NCT01 808521 clinicaltrials.gov). Chen et al. suggested that NAC could replace ADAMTS13 and reduce the activity of large molecular weight vWF multimers. A phase I study on the effectiveness of therapy with a recombined ADAMTS13 factor has also been started [84] (NCT02216084 ClinicalTrials.gov). There are reports of the effectiveness of bortezomib in TTP [85]; however, no randomized studies are available. Tersteeg et al. suggest that plasminogen activation may become a substitute mechanism deactivating large vWF multimers [86], but no randomized studies have been performed yet. However, there are reports of thrombolysis effectiveness in pulmonary embolism in the course of TTP [87, 88]. Transfusions of fresh frozen plasma are effective in the treatment of inherited TTP [89].

Prognosis

Thrombotic microangiopathies are life-threatening conditions. According to Gami, in approximately 10% of patients acute cardiac failure in the course of thrombotic microangiopathies is observed, which doubles the risk of death during a severe episode [90]. An age of >40 years old, severe anaemia and fever of >39℃ [3] are also predictors of poor prognosis. The best prognosis in the course of thrombotic microangiopathies is observed in HUS. Approximately 70% of patients obtain remission [50], while in the remaining 30% complications of HUS may include: chronic proteinuria (18%) [3], arterial hypertension (9%), reduced GFR (7%) [3] and

neurological symptoms (4%) [50]. Rare complications include: insulin dependent diabetes mellitus, pancreatitis, and cardiomyopathy [54]. Before eculizumab, a relapse of aHUS resulted in the death in 25% of patients. Within 5 years from the diagnosis, 48% of children and 67% of adults died or required renal replacement therapy due to end-stage renal failure [18]. Presently, 80% of patients treated with eculizumab achieve remission and increased GFR [67]. The best prognosis is observed in patients with the *MCP* mutation: 92% of remissions *vs* 12-50% in the case of other mutations [9]. Untreated TTP is associated with a 90% mortality rate [91, 92]. Presently, the level of mortality in TTP is 10% [69]. Increased concentration of troponin at admission is an independent factor increasing the mortality rates three-fold [93]. Also the level of IgG antibodies to ADAMTS13 is correlated with increased mortality [94]. Characteristic for TTP is that remission is possible despite an ADAMTS13 level of <5%. Such patients are at a risk of disease recurrence, but the ADAMTS13 level is not fully correlated with recurrence [95].

Prevention

HUS is the only thrombotic microangiopathy directly associated with infection. In 2009, the first vaccination against *Escherichia coli* strain O157, intended for cattle, appeared on the market. According to Matthews, wide-scale vaccinations would reduce the frequency of *E. coli* 0157 infections by 80% [96]. There is also ongoing work on a vaccine for humans [97]. Due to a lack of wide-scale availability of the vaccine, the only method of HUS prevention is avoidance of infectious factors. These include the consumption of raw meat, unpasteurized milk products and contact with an infected person [3].

Conclusion

Thrombotic microangiopathies are rare disease syndromes characterized by poor prognosis. Diagnosis is problematic, requiring exclusion of any secondary causes (neoplasms, systemic diseases, infections, adverse reactions to medications used) responsible for the occurrence of TMA. Due to the high costs of therapy, diagnosis must be confirmed. In Poland, therapeutic options in the presented group of patients is limited due to the non-availability of eculizumab. Early implementation of treatment improves the prognosis.

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Heart rate variability and exercise training - a review

Wpływ wysiłku fizycznego na zmienność rytmu serca -przegląd aktualnego stanu wiedzy

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Abstract. Heart rate variability (HRV) is a noninvasive indicator of the activity of the autonomic nervous system (ANS) showing the cardiovascular function controlled by the nervous system. Decreased HRV is an independent negative risk factor in patients after myocardial infarction, with congestive heart failure, unstable angina, hypertension and diabetes. The disruption of autonomic balance related to the increased sympathetic activity and the decreased parasympathetic function is also one of the pathophysiological mechanisms responsible for arrhythmias and sudden cardiac death. Regular exercise training (ET), especially endurance exercise, increases the activity of the parasympathetic ANS changing the sympathetic-parasympathetic balance in favor of the latter. It is observed at rest and during ET and improves the prognosis. New fields of research on HRV focus on applying this parameter as a prognostic marker in patients with a history of cardiovascular diseases but also as a marker of physical fitness and the improvement of autonomic balance in response to motor rehabilitation.
Key words: cardiovascular system, exercise training, heart rate variability, physiology

Streszczenie. Zmienność rytmu serca [heart rate variability-HRV) jest nieinwazyjnym wskaźnikiem czynności autonomicznego układu nerwowego (AUN), obrazującym kontrolę układu nerwowego nad układem krążenia. Zmniejszona HRV jest niezależnym negatywnym czynnikiem prognostycznym u chorych po zawale serca, z przewlekłą niewydolnością serca, niestabilną chorobą wieńcową, nadciśnieniem tętniczym czy też cukrzycą. Zaburzenie równowagi autonomicznej związane ze zwiększoną aktywnością współczulną i zmniejszonym napięciem przywspółczulnym jest również jednym ze zjawisk opisywanych w patofizjologii zaburzeń rytmu serca i nagłego zgonu sercowego. Regularny wysiłek fizyczny [exercise training - ET), zwłaszcza ćwiczenia wytrzymałościowe, zwiększają aktywność części przywspółczulnej AUN, zmieniając równowagę współczulno-przywspółczulną na korzyść tej drugiej. Dotyczy to zarówno aktywności AUN w spoczynku, jak i w trakcie obciążenia ET, co poprawia rokowanie chorych. Nowe kierunki badań HRV mają na celu wykorzystanie tego parametru nie tylko jako czynnika prognostycznego u osób z wywiadem chorób układu sercowo-naczyniowego, ale również jako markera wydolności fizycznej oraz poprawy równowagi autonomicznej w odpowiedzi na rehabilitację ruchową.
Słowa kluczowe: układ sercowo-naczyniowy, wysiłek fizyczny, zmienność rytmu serca, fizjologia

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Introduction

Heart rate variability (HRV) is a non-invasive indicator of the activity of the autonomic nervous system (ANS), showing one of the mechanisms of body adaptation to changing internal and external conditions. Decreased HRV is an independent negative prognostic factor in patients with cardiovascular diseases and a marker of life-threatening arrhythmias. ANS is modulated by various factors and the balance between sympathetic and parasympathetic systems changes dynamically over time. It gives the opportunity to influence its function in a controlled way, by pharmacotherapy but also by means of applying non-pharmacological methods [1-3]. This paper presents clinically important aspects of influencing ANS through exercise training (ET), especially its positive influence on HRV.

Autonomic nervous system

The autonomic nervous system (ANS) plays a major role in maintaining the homeostasis of the body through regulation of the cardiovascular and

respiratory systems in order to adjust their functions to suit the changing conditions. This is achieved through reflex arches, which include: mechanical receptors (sensitive to contraction), metaboreceptors (sensitive to change in substance concentration) and nocireceptors (sensitive to stimuli damaging the tissues) [1-3]. ANS consists of sympathetic and parasy-mathetic systems which are coupled and act in opposing ways. The anterior area of ventrolateral medulla oblongata is the starting point for all reflex pathways connected to the sympathetic part of the ANS and the posterior area of the ventrolateral medulla oblongata for the parasympathetic part. These constitute the "main base" for the analysis of stimuli recorded by the baroreceptors located in the wall of carotid arteries and the aorta, chemo-receptors located in the low resistance pulmonary arteries, metaboreceptors and nocireceptors. Sympathetic fibers innervate the whole myocardium, the parasympathetic fibers running mainly in the vagus nerves primarily innervate the sinoatrial node, the muscles of the atria and the atrio-ventricular node. An increase in the activity of the sympathetic nervous system causes an increase in heart rate (HR), a rise of systemic vascular resistance (SVR) and blood pressure (BP). The increase in activity of the parasympathetic nervous system through the activation of baroreflex and decrease of the sympathetic ANS causes the opposite results. The structures controlling the function of the autonomic nervous system are also located in the medulla oblongata, pons, limbic system and especially in the hypothalamus, in which they are divided into two opposite systems: ergotropic - activated during stress and emotions, and trophotropic - activated mainly during basic functions, such as food intake [1, 2].

AIMS research methods

The ANS function can be evaluated by direct and indirect methods. Some of them are performed at rest, others are based on the reaction of the ANS to a controlled stimulus. In most cases these methods require particular methodological carefulness, an adequate location and suitable research equipment. The reliability of the results depends on many factors connected with the patient's clinical condition and environment, which are presented in detail in table 1.

HRV - heart rate variability and its analysis

Heart rate and blood pressure oscillate as a result of breathing and in response to environmental factors, both mental and physical. Research into the spontaneous oscillation of the intervals between successive RRs in ECG *[heart rate variability* -HRV) and blood pressure change *(blood pressure variability* - BPV) enable the analysis of ANS under different physiological and pathological states. The analysis of HRV reflects indirectly the relationship of the influence of the sympathetic and parasympathetic parts on the automatism of the sinoatrial node [4, 5]. It is feasible by means of a 24-hour (holter monitoring) but also short ECG records (5 minute sequences are usually analyzed within the time and/or frequency domains). The most popular parameters of HRV time variability are:

- **SDNN** *(standard deviation of the average of NN intervals)* - standard deviation of all R-R intervals (ms); this reflects long-term heart rate variability and especially the functioning of the parasympathetic nervous system,
- **SDANN** *(standard deviation of the averages of NN intervals)* - standard deviation of the average R-R in successive 5 minute intervals (ms); shows short-term heart rate variability,
- **rMSSD** *(square root of the mean of the sum of the squares of differences between adjacent NN intervals)* - square root of the mean of the sum of the squares of the differences between adjacent R-R intervals (ms); this reflects the activity of the parasympathetic part,
- **pNN50** *(percentage of NN50)* - percentage of the differences between R-R intervals over 50 ms (%); this reflects the activity of the parasympathetic part [5].

Frequency (spectral) analysis is carried out by means of analyzing the elements of the HRV wave and is based on the assessment of the function of the changes in the R-R intervals as a complex wave that is divided into simpler waves of particular frequencies [1]. Spectral analysis enables the cyclic changes to be shown that take place in the cardiovascular system due to peripheral and central stimuli, the most popular parameters of frequency being:

- **HF** *(high frequency)* - frequency band 0.15-0.4 Hz (ms^2); this shows the activity of both the parasympathetic and sympathetic nervous systems,
- **LF** *(low frequency)* - frequency band 0.04-0.15 Hz (ms^2); this shows the activity of the parasympathetic nervous system,
- **VLF** *(very low frequency)* - frequency band 0.0033-0.04 Hz (ms^2),
- **ULF** *(ultra-low frequency)* - frequency band <0.0033 Hz (ms^2).

Table. Summary of methods used to evaluate the autonomic nervous system [28]
Tabela. Podsumowanie metod wykorzystywanych do oceny autonomicznego układu nerwowego

Direct methods of assessment of the autonomic nervous system activity	
measurement of catecholamine concentration	autonomic nervous system function assessment by measuring the concentration of adrenaline, noradrenaline and their metabolites in daily urine collection
isotope methods	sympathetic nervous system function assessment in particular organs based on the measurement of regional concentrations of radiolabeled catecholamines in PET *{positron emission tomography)* or SPECT *(single-photon emission computed tomography)*
microneurography	invasive examination allowing direct assessment of the electrical activity of the postganglionic sympathetic nerve endings in the skeletal muscles *{muscle sympathetic nerve activity* - MSNA)
Indirect methods of assessment of the autonomic nervous system at rest	
measurement of heart rate variability (HRV)	assessment of spontaneous oscillations of RR intervals in electrocardiograms: time-domain and spectral (frequency) analysis
measurement of blood pressure variability (BPV)	assessment of cyclical changes of systolic blood pressure in the frequency-domain
Methods of indirect activity of the autonomic nervous system when exposed to stimulus	
ewing test battery	I. **controlled breathing test** *{controlled breathing test*- **CBT) / deep breathing test** *{deep breathing test*- DBT) -assessment of the influence of an imposed breathing rate (usually 6 breaths per minute) on the oscillation of the R-R intervals and BP II. **handgrip test** *{handgrip test* - HGT) - assessment of the influence of the isometric test (constant pressure on the hand-held dynamometer for approximately 5 min) on the oscillation of the intervals R-R and BP, including the assessment of the difference between maximum DBP and mean DBP during ET III. **heart rate response to standing** - rapid assumption of an upstanding position in order to produce a rapid change in SBP IV. **Valsalva maneuver** - controlled intense steady pressure breathing of 40 mm Hg lasting approximately 15 sec during which the Valsalva coefficient is determined
assessment of chemoreceptors	determining the relationship between hypoxia (influence on the activity of peripheral chemoreceptors located in the carotid and aortic bodies and other bodies from the arterial vessels of the thorax and abdominal cavity) and hypercapnia (influence of central receptors located on the ventral side of the medulla oblongata in the vicinity of the respiratory center) and increase of ventilation per minute
assessment of baroreceptor response (BRS)	assessment of sensitivity of baroreceptors to standard determined stimuli: 1. invasive methods: **phenylephrine treatment** - the sensitivity of baroreceptors is the relationship between the increase in BP and the corresponding lengthening of R-R intervals **vasodilator treatment** - the sensitivity of baroreceptors is the relationship between the decrease in BP (30- 50 mm Hg) and the corresponding shortening of R-R intervals **pressure neck chambers** - stimulation of the carotid bodies independently of any general changes in BP. **Microneurography** - analysis of the relationship of changes in SBP and MSNA reaction 2. **Non-invasive methods** (at rest, after excitation, e.g. CBT, HGT): **sequential method** - from constant numerical records of ECG and SBP a minimum of 3 sequences of heart cycles during which there is an increase or a decrease of SPB of 1 mm Hg and a corresponding lengthening or shortening of R-R intervals by a minimum of 4 ms **spectral analysis method** - relationship between the values of spectral power within particular frequencies obtained from a spectral analysis of HRV and BPV

BPV - blood pressure variability, CBT - controlled breathing test, DBP - diastolic blood pressure, DBT - deep breathing test, HGT - handgrip test, SBP - systolic blood pressure, HRV - heart rate variability, MSNA - muscle sympathetic nerve activity, PET - positron emission tomography, SPECT - single-photon emission computed tomography

- **LF:HF** *([low frequency]:[high frequency ratio])* - treated as a coefficient of balance of the autonomic system,
- **TP** *(total power)* - variability of all R-R intervals based on 24 hour or longer monitoring.

It should be noted, however, that there exist a number of doubts as to the direct relationship between the above-mentioned parameters and the sympathetic and parasympathetic balance. Thus, any interpretation of spectral results must be supplied with a greater clinical context.

Influence of exercise training on the circulatory system and AUIM

Regular ET provokes an adaptive response from the circulatory system from heart muscle but also from the blood vessels. The changes are strictly connected with its type, and this phenomenon has been known for many years. An athlete's heart is a synonym of the physiological reconstruction of the heart, as a result of which surpassing population norms is not pathological. As a consequence of endurance training there is a volume-overload of the left ventricle muscle which in the long-term results in an increase in LVEDD *(left ventricle end diastolic volume)* and a proportional thickening of its walls. This type of adaptation is referred to as eccentric hypertrophy. Similar changes are brought about in pathological conditions as a result of mitral or aortic insufficiency [8]. During regular strength exercise the increase in pressure load brings about the thickening of the left ventricle muscle, though its LVEDD does not change. This type of adaptation is referred to as concentric hypertrophy. Similar changes may take place in pathological conditions such as aortic stenosis or hypertension [6]. The difference between the influence of ET on the heart muscle and pathological conditions is also connected with the fact that exercise is usually carried out cyclically (e.g. during a particular period in life), whereas valve conditions or blood pressure have a constant influence on the heart.

Although ET brings about adaptive changes, it usually has a beneficial influence on the circulatory system. Regular endurance exercise reduce metabolic overload in steady-state and submaximal exercise by means of increasing the stroke volume and decreasing HR. Moreover, there is a decrease in both systolic and diastolic BP at rest and during submaximal exercise [9], and a reduction in the reaction of catecholamines during sub-maximal exercise [10]. During maximal exercise no beneficial tendency to modulate ANS has been observed.

ET significantly modulates the functioning of ANS, whereas the main index of the phenomenon is the behavior of HR [11]. An increase in HR can be produced by decreasing the activity of the parasympathetic part or an increase in the activity of the sympathetic part [12]. Although HR gradually rises during ET through the increasing sympathetic activity [13], in the long run, ET reduces HR in steady-state and during submaximal exercise by means of shifting the long-term autonomic balance towards greater parasympathetic activity [14, 15]. The intensity of the phenomenon depends on many internal factors (e.g. general fitness condition, genetic predisposition) and external factors (e.g. type of exercise).

Furthermore, moderate long-term ET changes the composition of flowing blood expanding the blood plasma, which improves the return of blood and reduces the risk of left ventricle mechanoreceptor activity. In spite of the increase in blood plasma in athletes, it seems that they have a less precise system of BP control during orthostatic stress which can result from excessive excitation of the heart and lung receptors due to volume overload of the left ventricle after ET. It can be observed clinically as BP drops in the upright positions and there is a tendency to faint [16].

Bradycardia among athletes is a known phenomenon resulting from long-term ET and ensuing changes in the neural transmitters in the cardiovascular system [17]. Regular ET, especially endurance exercise, increases the activity of the parasympathetic ANS, changing the sympathetic-parasympathetic balance for the benefit of the latter at rest and during submaximal exercise.

HRV modulation by means of exercise training

HRV is a non-invasive indirect indicator of AUN activity at rest which depicts the body's adaptive abilities to the changing conditions, including exposure to ET. A number of studies point to the connection between endurance ET, physical endurance and HRV, both in the healthy and in the sick [18, 19, 20, 21]. Shin et al. [17] compared HRV among athletes and people who do not practice sport regularly. HR measurements at rest and post-exercise were significantly lower and HF significantly higher in the former group.

Lower HRV is an independent negative prognostic indicator in myocardial infarction, chronic heart failure, unstable angina, arterial hypertension and diabetes, whereas autonomic imbalance connected with the increase in sympathetic activity is one of the phenomena-modulating factors - described in the pathophysiology of sudden cardiac death (SCD) [21]. Therefore, it seems that the interventions, whose aim is to bring back ANS balance by means of increasing parasympathetic activity, will have a beneficial influence on the prognosis for patients with a heart dysfunction.

It seems that ET brings positive effects as it increases HRV both in young and older patients and is related to an increase in parasympathetic activity. The studies carried out on patients with heart conditions mostly show the positive influence of endurance ET. Sztazjel et al. [22] observed that endurance ET (running, cycling) is beneficial for the patient's autonomic profile increasing parameters of short-term HRV, such as pNN50, rMSSD and HF, but also decreasing the LF:HF coefficient. Malfatto et al. [23] showed that an 8-week motor rehabilitation in patients with myocardial infarction resulted in an increase of all HRV parameters (SDNN, SDANNi, rMSSD, pNN50 and HF) when compared to a control group (who did not carry out regular ET), whereas the effect lasted a year after the supervised ET. Cooke et al. [24] obtained similar results in people subjected to 4-week endurance training. Also, Selig et al. [25] demonstrated that a 3-month training in patients with chronic heart failure produced statistically significant changes in the autonomic balance. These were shown on

the basis of an increased HF, a decreased LF and LF:HF coefficient. According to Raczak et al. [26, 27] it seems that even a single endurance training of low intensity improves the sensitivity of the baroreceptors and influences the parameters responsible for short-term HRV in people who do not practice sports.

It has also been shown that ET reduces the decrease in autonomic regulation connected with ageing [28, 29]. Galetta et al. [30] demonstrated that regular ET has a positive influence on the worsening in autonomic activity due to ageing by means of increasing the parasympathetic activity. Similar results were presented by Albinet et al. [31] who studied a group of elderly people subjected to a 12-week training program. Likewise, Ernest et al. [32] observed an improvement in HRV in females over 60 years subjected to controlled endurance ET.

However, not all studies' results confirm this relationship. Manzi et al. [33] showed that an increase of the intensity of individual training among athletes can be linked to a decrease in the parasympathetic and increase in the sympathetic modulation of the cardiovascular system. Moreover, Lee and Mendoza [18] in their study on well-trained runners show that the autonomic modulation of the cardiovascular system by means of HRV correlates weakly with ET and the intensity of trainings.

This is why other indicators of HR variability due to ET are proposed. One of them is HRR *(heart rate recovery),* which shows the level of HR reduction after ET. It is claimed to reflect the reactivation of the parasympathetic nervous system which could show the post-training response from ANS [18, 19, 24]. Sugawara et al. [34] showed an increased HRR in response to 8-week aerobic training and suggested that a sudden increase in the parasympathetic activity after training in well-trained people can be an important mechanism that reduces the load of the cardiovascular system connected with ET. Hence, it seems that the assessment of HRR is useful in monitoring the changes in ANS connected with physical exertion, at least in well-trained athletes [18].

The search for prognostic factors of SCD is a separate problem. It is the most serious complication of cardiovascular conditions, usually occurring in ischemic heart disease, heart failure and badly-monitored hypertension. Unfortunately, SCD is also one of the major reasons for sudden death among athletes. Recently, attempts have been made to use HRV analysis in the prediction of SCD. It has been shown that SCD occurred when HRV was lower in comparison to healthy people [35]. Attempts at multivariate HRV analysis within the domains of time and frequency and non-linear methods have been undertaken in order to prepare algorithms for the identification of patients at SCD risk during hospitalization [36].

Conclusions

The analysis of heart rate variability can be a useful, easily accessible, non-invasive and direct tool for assessing the functioning of ANS. The studies hitherto carried out show that the imbalance between the sympathetic and the parasympathetic systems has significant clinical implications. The search for new and the standardization of assessment of existing indicators of ANS, should constitute the central aim of further studies. They should focus particularly on the risk factors of unfavorable heart and blood vessel events. The possibility of positive HRV modulation could become a clinical aim whereas regular exercise training, pre-programmed for type and intensity, seems to be an effective therapeutic method in this area.

Study Basis

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60th anniversary of the death of Maj. Lesław Ignacy Węgrzynowski PhD (1885-1956) - head of the medical services for the Lviv Defense Headquarters

60. rocznica śmierci mjr. dr. Lesława Ignacego Węgrzynowskiego (1885-1956) – Szefa Sanitarnego Naczelnej Komendy Obrony Lwowa

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Abstract. This presents a profile of the Polish military physician who was the head of medical services for the Lviv Defense Headquarters. Lesław Ignacy Węgrzynowski was born in Rohatyn on 15 September 1885. In 1910, he graduated from the University in Lviv. The defense of Lviv is one of the most important episodes in Polish history. The civilian population of the city (mostly higher school and university students) fought against the Ukrainian soldiers of Dmytro Wytowsky, who achieved a coup d'état. On 1 November 1918, the Lviv Defense Headquarters (LDH) was organized. Lieutenant Lesław Węgrzynowski became the LDH Head of Medical Services. During the defense of Lviv his cousin, 2nd lieutenant Lech Gluziński, was killed by the Ukrainian soldiers while a POW. In the interwar period, Doctor L. Węgrzynowski was employed as the hospital director in Hołosko Wielkie. During World War II, as a soldier of the Home Army, he took part in the Warsaw Uprising in 1944. Maj Lesław Węgrzynowski "Bartosz" was the head of medical services for Śródmieście District. Unfortunately, after World War II he was unable to return to Lviv. In Zakopane, Bukowiec and Oborniki Śląskie he worked as a director of tuberculosis sanatoriums. He was appointed the deputy of the Medical Department professor at the University in Wrocław on 9 August 1949. Dismissed for political reasons in 1951, he worked as a physician until the end of his life. He died in Wrocław, on 10 June1956.
Keywords: Węgrzynowski, defense of Lviv, Lviv, Warsaw Uprising, military medical services

Streszczenie. Artykuł przedstawia sylwetkę polskiego lekarza wojskowego, który był Szefem Sanitarnym Naczelnej Komendy Obrony Lwowa. Lesław Ignacy Węgrzynowski urodził się 15 września 1885 r. w Rohatynie. W 1910 r. ukończył Uniwersytet we Lwowie. Obrona Lwowa to jeden z najważniejszych epizodów w historii Polski. Mieszkańcy miasta (głównie gimnazjaliści i studenci) walczyli z ukraińskimi żołnierzami Dmytra Wytowskiego, który przeprowadził zamach stanu. 1 listopada 1918 r. zorganizowano Naczelną Komendę Obrony Lwowa (NKOL). Porucznik Lesław Węgrzynowski został Szefem Sanitarnym NKOL. Podczas obrony Lwowa ukraińscy żołnierze zamordowali jego kuzyna, podporucznika Lecha Gluzińskiego, będącego ich jeńcem wojennym. W okresie międzywojennym doktor L. Węgrzynowski pracował jako dyrektor szpitala w Hołosku Wielkim. W okresie II wojny światowej jako żołnierz Armii Krajowej wziął udział w Powstaniu Warszawskim w 1944 r. Mjr Lesław Węgrzynowski „Bartosz" był szefem sanitariatu Obwodu Śródmieście. Po zakończeniu II wojny światowej nie mógł niestety powrócić do Lwowa. Pracował jako dyrektor sanatoriów gruźliczych w Zakopanem, Bukowcu, Obornikach Śląskich. 9 sierpnia 1949 r. został mianowany zastępcą profesora Wydziału Lekarskiego w Uniwersytecie we Wrocławiu. Zwolniony z przyczyn politycznych w 1951 r., do końca życia pracował jako lekarz. Zmarł we Wrocławiu 10 czerwca 1956 r.
Słowa kluczowe: Węgrzynowski, Obrona Lwowa, Lwów, Powstanie Warszawskie, wojskowa służba zdrowia

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Introduction

It is impossible to provide an honest picture of Poland's history without mentioning Lviv (Leopolis, Lemberg, Lwów, Львов, Львів) – a city of great beauty with a centuries-long history as a major center of science, culture and broadly defined Polishness. A number of world-famous scholars worked there, including Hugo Steinhaus, Stefan Banach, Stanisław Ulam, Ludwik Rydygier and Kazimierz Bartel. It is worth mentioning that the first three founded the famous Lviv School of Mathematics, whose achievements continue to inspire admiration and respect among mathematicians all over the world, with Stefan Banach's work being compared to Copernicus's discoveries in terms of how it influenced scientific progress. Lviv is also associated with many great artists of various disciplines, who were certainly inspired by the beauty and atmosphere of the "Semper Fidelis" city. Maria Konopnicka, Gabriela Zapolska, Tadeusz Boy-Żeleński, Artur Grottger, Kornel Makuszyński, Stanisław Lem and Wojciech Kilar are household names in Poland, although after many years of erasing the Eastern Borderlands from Polish history, few Poles associate these names with Lviv – the city where King John II Casimir made the Lviv Oath in 1656. Kornel Makuszyński once wrote about his city: "...It is one formidable city, the ever faithful and vigilant watchdog of the Polish Republic..." These words refer to the courageous attitude of Lviv's residents, who had stood up for their homeland for hundreds of years, forming a real mainstay and redoubt for the Eastern Borderlands. They are attributed with one of the most remarkable chapters in Polish history, involving an armed protest by the youngest Lviv residents against the Ukrainian coup d'état of Ataman Dmytro Vitovski in November 1918. These young people became legendary, known as the Lviv Eaglets. Major Lesław Ignacy Węgrzynowski PhD, whose 60th death anniversary occurs in June 2016, played an important role in these extraordinary and bloody, and yet admirable and momentous events [1].

Adolescent years and World War I

Lesław Ignacy Węgrzynowski was born on 15 September 1885 in the Eastern-Borderland town of Rohatyn to Władysław (a physician) and Zofia born Gluzińska. He started his education at the reputable K.U.K. Francis Joseph Gymnasium in Lviv, from which he graduated in 1903. It was his humanistic interests that set his future path, as well as, to some extent, his "genetic predisposition". Indeed, his father was one of a number of physicians in the family, with Lesław's uncle, Professor Antoni Władysław Gluziński (1856-1935), the then Head of the Pathology and Specific Therapy Department and Clinic of the Lviv University, being most prominent of them. Lesław Węgrzynowski studied medicine at the Faculty of Medicine of this highly reputable institution, graduating on 15 June 1910 with the degree of doctor medicinae universae (MD). Afterwards he worked as an assistant at Prof. Antoni Gluziński's clinic, where he acquired experience in diagnosing and treating pulmonary diseases (including in particular tuberculosis), which were the focus of his interests and genuine professional passion. In the meantime, he completed a research traineeship program at the Robert Koch Institute in Berlin and also clinical training courses in Hamburg and Davos [2-4]. The outbreak of World War I disrupted his flourishing scientific career. Paradoxically, however, it also provided a great opportunity for Poland to regain its independence, something that Węgrzynowski very much longed for, what with his patriotic upbringing. In August 1914 he enlisted in the Eastern Legion (Legion Wschodni), where he was committed to setting up a healthcare system. Together with Prof. Antoni Cieszyński and Assistant Professor Edward Loth, he established the Polish Sanitary Service, which provided dental treatment to all legionaries. He also headed the Health Committee for Counteracting Infectious Diseases. It is important to remember that dangerous infectious diseases (typhus, smallpox, dysentery, cholera, etc.) during the war took a deadly toll on soldiers and, above all, civilians. After the Eastern Legion was dissolved, Węgrzynowski was enlisted in the Austrian army. The year 1918 proved to be crucial for the regaining of independence by Poland. Perhaps for the first time in Poland's difficult and bloody history, the political situation was very favorable. The three states that partitioned the First Polish Republic)Russia, Prussia and Austria-Hungary) lost the global conflict. The Bolshevik Revolution swept through the Russian Empire, the Austro-Hungarian Empire ceased to exist, and Prussian armies suffered defeat on all fronts, with a revolutionary wave sweeping through most German cities [5, 6].

The Lviv defense

This was the political background against which the then Lt. Lesław Węgrzynowski PhD returned to Lviv. The city at the time was mostly inhabited by Poles, with a fairly large Jewish community and a much smaller presence of other nations, including Ukrainians, Armenians, Germans and Russians. In this melting pot of nations, the Ukrainians were the only nation to have usurped the right to establish their own state on the territory that had legally belonged to Poland before it was partitioned. On 1 November 1918, at 03:30, Ataman Dmytro Vitovski's units launched a coup d'état in Lviv. It is important to remember that the authorities of Austria-Hungary were apprehensive of the independence tendencies in Polish society, so they sent k.u.k. units made up of Poles to remote sections of the front (such as to Italy).

Figure 1. Members of the Lviv Defense Headquarters, 3rd on the right Lt. Lesław Węgrzynowski, 1st on the left 2nd Lt Lech Gluziński, Lviv, November 22, 1918 (E, "Klink J. Obrona Lwowa 1-22 listopada 1918". Vol. II. Lviv 1935: 31).

Rycina 1. Członkowie Naczelnej Komendy Obrony Lwowa, trzeci z prawej por. Lesław Węgrzynowski, pierwszy z lewej ppor. Lech Gluziński, Lwów, 22 listopad 1918 r. (źródło: Wawrzkowicz E, Klink J. Obrona Lwowa 1-22 listopada 1918. Tom II. Lwów 1935: 31)

As a result, Lviv at the time had no regular Polish units; however, Ukrainian units were in place, so the imbalance of power was tremendous. The whole community stood up for its city, including in particular young people from high schools and universities – going down in history as the legendary Lviv Eaglets. It is worth recalling that the youngest defender of Lviv, Jaś Kukawski, who fell during the battle, was only 9 years old, and that 13-year-old Antoś Petrykiewicz was the youngest person to become a Knight of the Virtuti Military.

Probably as early as in the evening hours of 1 November 1918, the Defense of Lviv Headquarters were established, headed by Capt. Czesław Mączyński, with the then Lt. Lesław Węgrzynowski PhD acting as the Sanitary Chief. The fighting grew stronger and more violent, although most of the defenders were not regular soldiers. However, their extraordinary determination and commitment helped them to gradually drive the Ukrainian units out of the city. The battle took a heavy human toll on both sides. Of particular note is that Maj. Lesław Węgrzynowski PhD was committed to ensuring that sanitary aid was provided to the injured of both sides: Poles and Ukrainians. His aide-de-camp, and cousin (Prof. Antoni Gluziński's son), 2nd Lt. Lech Gluziński PhD, who attended to the wounded in the frontline battle of Persenkówka despite the retreat of his army, was taken captive and murdered on 29 December 1918 in Dawidów. This was one of the first hideous war crimes of which any decent Ukrainian should be ashamed. His death dealt a devastating blow to the entire family, including Prof. A. Gluziński and Lesław Węgrzynowski.

Węgrzynowski's involvement in the Lviv Defense is the most remarkable chapter in his life, although his later life was full of other commendable deeds. In recognition of his contribution to Poland's independence, he was promoted to the rank of Major with seniority from 1 June 1919 [7, 8].

The interwar period

After the War was over, he was demobilized and was able to resume his work as a civilian physician. He was appointed the director of the Anti-Tuberculosis Society Clinic in Hołosko Wielkie, where together with Maria Krasowska PhD and Ludwik Ptaszek PhD, he was committed to counteracting the effects of this extremely dangerous pulmonary disease. At the same time, he was a member of the board of two well-known organizations – the Polish Anti-Tuberculosis Association and the Polish-State Physicians Association. He never forgot his brothers in arms from the time of the Lviv Defense, and remained committed to maintaining a friendly relationship with them and was always willing to help. For many years he headed the Lviv Defense Cross Jury and the Małopolska Volunteer Army Cross Jury. It was he who tried to save the life of his former commander, Czesław Mączyński, till the very end. In the interwar period, Czesław Mączyński, the legendary commanding officer of the Lviv Defense, had a farm in Wierzbowo. Almost every year Ukrainian nationalists, their hatred still fervent, set light to buildings and haystacks on his farm. This hatred escalated in the following decade into bloodshed, when the Ukrainian Insurgent Army caused the genocide of tens of thousands of Poles in Wołyń and across the Małopolska region. The permanent stress and traumatic experiences of the war took their toll on Mączyński's health (circulatory collapse and stomach cancer). On 9 July 1935, he was personally taken by his friend Lesław Węgrzynowski to the 6th Regional Military Hospital at 26 Łyczakowska Street in Lviv. Despite being attended to by excellent medics, he died there six days later. His funeral became a patriotic manifestation of proportions rarely seen in Lviv, with a crowd of over thirty thousand people, including Lviv residents, Province Governor Władysław Belina-Prażmowski, Polish Army generals and officers and the President of the Lviv Defense Cross Jury – Lesław Węgrzynowski. Węgrzynowski delivered a wonderful eulogy at the Lviv Defenders Cemetery, saying that: "...The Lviv Defense, of which you were the soul and brain, puts you alongside the heroic leaders of Częstochowa and Zbaraż..." For many years Węgrzynowski also supported the Polish Lviv Heroes' Grave Guard, an association dedicated to taking care of the necropolis where his fellow Lviv defenders, including his cousin Lech Gluziński, were laid to rest [2, 7, 9, 10].

World War II, occupation and the Warsaw Uprising

After nearly 20 years of peace, in 1939 both Germany and the USSR (aided by Slovakia) invaded Poland to start World War II.

Maj. Res. Lesław Węgrzynowski PhD was mobilized and assigned to the Reserve Staff at the branch of the 2nd Regional Hospital in Lublin. He did not leave his city, once again standing up for it, this time against the Germans. Under the Ribbentrop-Molotov Pact, the Soviets took over Lviv and immediately went about bringing their new order to the city. What followed were massive arrests of Polish Army officers by the NKVD, including Węgrzynowski. He managed to have himself released, as the investigating officers discovered that during World War I Węgrzynowski, as a military physician, provided medical aid to Vladimir Ilich Lenin, who was arrested by the Austrians and kept in the Nowy Targ jail.

During the Soviet occupation Węgrzynowski managed the Pulmonology Clinic in Lviv (which was then a branch of the Kiev Tuberculosis Institute). After the Germans took over the city, he moved to Warsaw to work at the famous Ujazdowski Hospital. There, he also joined the underground resistance movement as a member of the Home Army under the pseudonym of "Bartosz", and actively participated in the "Żegota" campaign, whose aim was to help the persecuted Jewish community. After the Warsaw Uprising broke out on 3 August 1944, the Sanitary Chief of the Warsaw District of the Home Army – 2nd Lt. Henryk "Bakcyl" Lenk PhD (1894-1969) designated Maj. Lesław "Bartosz" Węgrzynowski PhD to replace the fallen Capt. Leon "Korwin" Kuliszewski" MD (1906-1944) as the Chief Physician for the 1st Śródmieście District. Węgrzynowski was supported by the chief physicians of sub-districts: Jerzy "Pigoń" Teter (1912-1993, Śródmieście Północ District) and Capt. Wacław "Jur" Kafliński MD (1904-1985, Śródmieście Północ District). Struggling with the permanent shortage of medicines, dressings, water and food, and being under constant fire, the entire sanitary service had to face a huge challenge. It would not have been possible to set up a medical-aid system for the injured and ill but for the stout hearts of hard-bitten physicians like Węgrzynowski. With his attitude he set an excellent example for younger apprentices in the art of medicine and for other members of the staff, who showed exceptional dedication and heroism during those trying days. Maj. "Bartosz" played a particularly important role in ensuring that all the injured transported via sewers from Stare Miasto to Śródmieście on 1-2 September 1944 were properly attended to (anti-tetanus serum was obtained and beds in hospitals and dressing stations were arranged). In those trying days, he found support in his daughter – Krystyna Dobrochna Węgrzynowska, who was also a physician and Home Army soldier. They both survived the hecatomb of Warsaw [11-15].

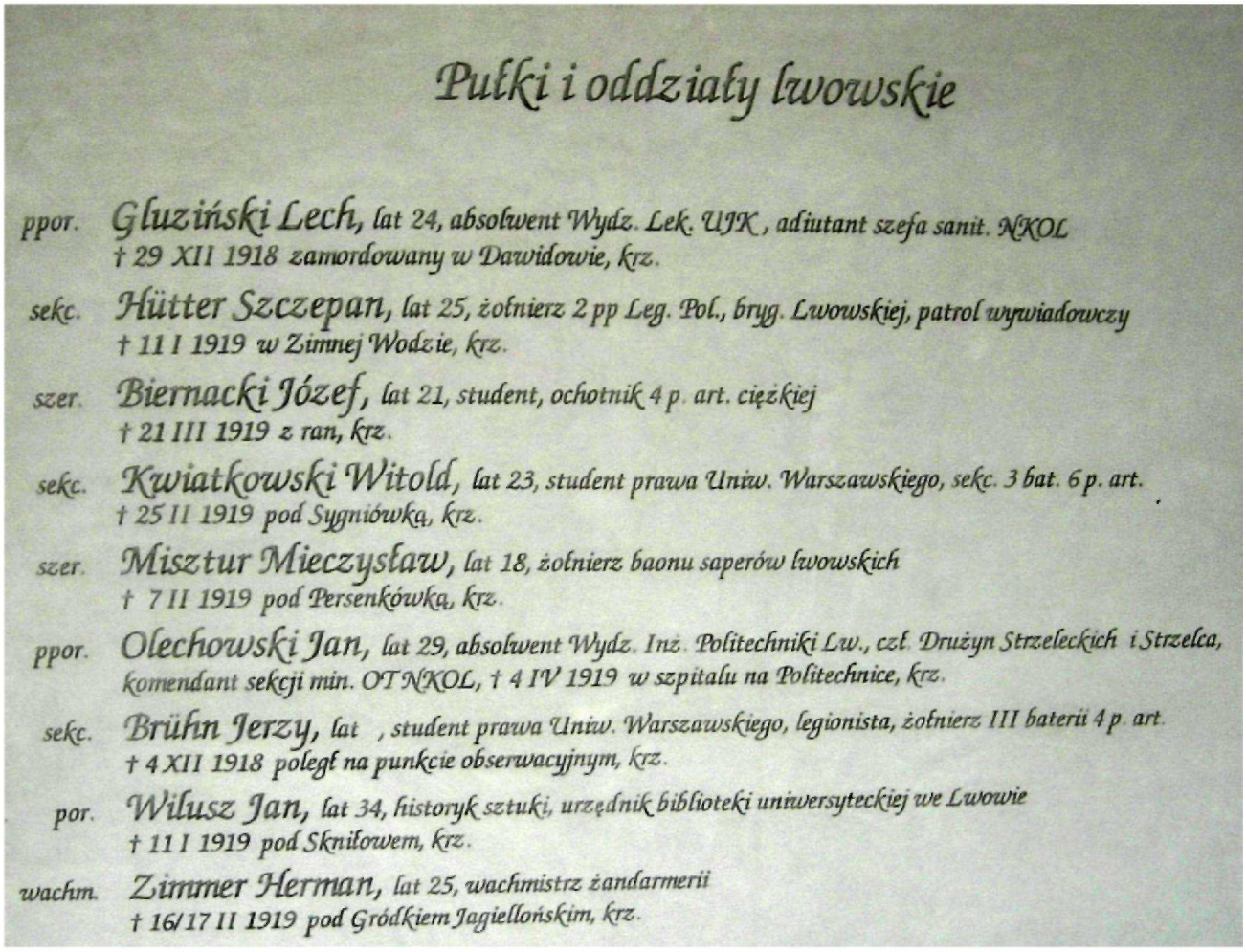

Figure 2. Commemoration plaque with an inscription in honor of 2nd lieutenant Lech Gluziński at the Cemetery of Lviv's Defenders, Lviv, 2005

Rycina 2. Tablica pamiątkowa z inskrypcją ku czci podporucznika Lecha Gluzińskiego na Cmentarzu Obrońców Lwowa, Lwów, 2005 r. (fot. Z. Kopociński)

Post war and the loss of Lviv to Ukraine

Once the War was over, Węgrzynowski's home city of Lviv was no longer within the borders of Poland, which forced him to wander from one place to another for a number of years. Initially, he headed to Zakopane, where he opened a Polish Red Cross Sanatorium, and then later he became the director of the Anti-Tuberculosis Sanatoriums in Bukowiec near Kowary. In 1947 Węgrzynowski was entrusted with the management of the Anti-Tuberculosis Sanatorium Complex in Oborniki Śląskie. It is important to remember that tuberculosis represented a major public concern after World War II, with emaciation, stress and hunger contributing to the rapid spread of this disease, resulting in thousands of deaths. Modern, effective tuberculosis medicines (Streptomycin and PAS) were in short supply at the time, although Węgrzynowski's extensive efforts in this field contributed to improving this situation. While in Oborniki Śląskie, he was committed to providing the best-possible conditions for the patients there, while also focusing on identifying new cases as quickly as possible and isolating patients that were sputum-positive.

On 9 August 1949, he was appointed Deputy Professor at the Department of Pulmonology of the Faculty of Medicine of the Wrocław University. It is important to remember that this was when the Stalinist terror in Poland was at its most rampant and vicious, with Secret Police prisons and places of torture being full not only of Home Army soldiers, but also of common folk who were not enthusiastic about the new Communist authorities. The Secret Police (*Urząd Bezpieczeństwa)* worked the "Medycyna" (Medicine) case to expose the "reactionary" past of the medical community in Wrocław, including those physicians from the former Eastern Borderlands and Lviv. A total of 23 physicians, including Lesław Węgrzynowski, were placed under surveillance. An away session of the Health Committee of the Wrocław Provincial National Council was held in Oborniki Sląskie on 15

July 1951. While discussing the issues related to fighting tuberculosis, Węgrzynowski took the liberty of expressing mild criticism of the authorities, which was reflected in the session conclusions: "The gravity of the issue of fighting tuberculosis in the province is under-appreciated and underestimated by the local authorities, the administrative and social factor (...) The provincial sanitary service has no statistical data on tuberculosis mortality and morbidity while the number of tuberculosis cases that pose a public hazard...". At a time when the Stalinist terror was at its most vicious (this is when Gen. Emil "Nil" Fieldorf, Maj. Zygmunt "Łupaszka" Szendzielarz, Maj. Bolesław "Żmudzin" Kontrym and many other eminent figures were kept in prison and murdered), even the slightest criticism of the authorities, such as exposing the ineptitude of the party apparatchiks, inevitably elicited a vindictive response. Indeed, on 1 October 1951, Lesław Węgrzynowski was dismissed from the University of Wrocław, with his dismissal notice containing the remark that he was "politically hostile, scientifically worthless, rather backward-minded, and should no longer remain at the department". Despite such a treatment, being a seasoned physician and veteran of two World Wars, Węgrzynowski maintained his spirits and continued extending aid to patients as the manager of the Municipal Tuberculosis Outpatient Clinic in Wrocław.

Privately, he was married to Stella Maria Węgrzynowska-Starkel, a dentist who graduated from the Lviv University in 1911. Their daughter, Krystyna Dobrochna Węgrzynowska MD PhD, followed in the footsteps of her parents to become a specialist in pulmonary diseases.

Maj. Lesław Ignacy Węgrzynowski PhD died on 10 June 1956 in Wrocław, at the age of 71.

Because of the disgraceful Yalta and Potsdam Agreements, under which the U.S. and the UK left Poland at the hands of the Stalinist regime, the Sanitary Chief of the Lviv Defense Headquarters sadly could not be laid to rest alongside his former fellows at the Lviv Defenders Cemetery. In his last days, in facing the inevitable end of his earthly life, he must have dreamt of being buried next to his cousin, 2nd Lt. Lech Gluziński, his grand master, Prof. Ludwik Rydgier or his former commander Col. Czesław Mączyński. In 1956, this was impossible, so he was buried at the Saint Lawrence Cemetery on Bujwida Street in Wrocław, with the memorial service being attended only by his closest friends and family [2, 16, 17]. The gravestone had a short inscription stating only his name, professional title and dates of birth and death. When passing the grave of Węgrzynowski, the average resident of Lower Silesia has no idea that it is the grave of a legend of the 1918 Lviv Defense and a heroic physician that took part in the Warsaw Uprising.

Luckily enough, he did not live to see the devastation of the Lviv Defenders Cemetery, which the Polish Lviv Heroes' Grave Guard he supported had taken care of for many years. In 2014, physicians of the 105th Eastern Borderlands Military Hospital in Żary, together with the Eastern Borderlands Lviv Eaglets Tourist and Travel Society, launched the now-famous campaign called "Oddajcie Orlętom lwy" ("Give the Lions Back to the Eaglets" – a wordplay, "Lviv" meaning "the city of the lion"), whose aim has been the complete and historically accurate restoration of the Lviv Defenders Cemetery, with the figures of the lions being put back in front of the Glory Monument, the colonnades of this monument being reconstructed and each gravestone once again receiving the "Lviv Defender" inscription). The originators of this campaign are deeply hopeful that Maj. Lesław Węgrzynowski PhD is looking down from Lviv heaven, keeping his fingers crossed for the success of their effort. Kornel Makuszyński wrote: "...For they never know no limits in this damned Lviv. May it finally go to hell, this ravenous vulture of a city that is eating the hearts out of everybody, like it has eaten mine...". Lesław Ignacy Węgrzynowski was undoubtedly one of those who lost their heart to the city that was the "Polish Republic's Most Faithful". New generations of Polish medics are aspiring to join this prominent company, including the physicians of the 105th Eastern Borderlands Military Hospital in Żary.

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Four cases of stress disorders among Polish soldiers of the 1st Independent Parachute Brigade participating in Operation Market Garden

Cztery przypadki zaburzeń stresowych wśród żołnierzy 1. Samodzielnej Brygady Spadochronowej uczestniczących w operacji „Market Garden"

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Abstract. The 1st Polish Independent Parachute Brigade fought its only battle near Arnhem in Holland in September 1944, as part of Operation Market Garden. At least four Polish paratroopers showed signs of stress disorder, and two of them committed suicide. In the article, the author attempts to present the circumstances that led to the development of the disorders in those soldiers, briefly discussing the attitude of the medical service and the HQ of the Polish Brigade towards the problem, and presenting an outline of the history of this issue. The study was mostly based on documents from the Polish Institute and Sikorski Museum in London.
Key words: combat stress, battle exhaustion, acute stress reaction, history of medicine, 1st Independent Parachute Brigade

Streszczenie. Polska 1. Samodzielna Brygada Spadochronowa swój jedyny bój stoczyła we wrześniu 1944 r. pod Arnhem. W trakcie operacji „Market Garden" u co najmniej czterech polskich spadochroniarzy wystąpiły objawy zaburzeń stresowych. Dwóch z nich popełniło samobójstwo. W artykule autor podjął próbę przedstawienia okoliczności, które doprowadziły do rozwoju tego typu zaburzeń u tych żołnierzy, pokrótce omówił stosunek służby zdrowia brygady oraz dowództwa do tego problemu, a także zaprezentował krótki rys historyczny tej problematyki. Swoje badania oparł przede wszystkim na analizie dokumentów pochodzących z Instytutu Polskiego i Muzeum im. gen. Sikorskiego w Londynie.
Słowa kluczowe: stres bojowy, wyczerpanie bojowe, ostra reakcje stresowa, historia medycyny, 1. Samodzielna Brygada Spadochronowa

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Introduction

There are four known cases of stress disorders among Polish soldiers of the 1st Independent Parachute Brigade participating in *Operation Market Garden*. They were disclosed in the documents created following the completion of this large-scale operation that ended in failure. However, this hardly means that the problem in question concerned only four Polish paratroopers, as the lists of battle casualties as well as medical reports only made reference to the gravest cases; hence this number.

The problem of stress disorders, both acute and chronic, occurring in soldiers participating in combat operations remained unknown to the Polish public until the Iraqi and Afghani war veterans began returning to Poland. The military health service also seemed to take no account of this problem for many years. After World War II, only a small group of physicians paid attention to this issue [1]. In an interview given for one of the weekly magazines, Prof. Stanisław Unicki said: "*Until the mid-1960s, Poles believed that there were no cases of mental disorder among soldiers, because that could not happen in the army. Soldiers were said to be strong, resistant and tough*" [2].

In reality, stress disorders concerned soldiers belonging to all armies that have existed throughout the centuries [1]. Soldiers of the Polish Parachute Brigade (1942-1947), treated as the elite of the Polish Armed Forces in the West, were no exception. The brigade commanded by Gen. Stanisław Sosabowski fought their only battle near Arnhem in September 1944; however the problem of combat stress among Polish soldiers, with minor exceptions, is not to be found in the Polish historiography.

The purpose of this study was to present stress reaction cases among Polish soldiers participating in *Operation Market Garden*. It needs to be underlined that the author only dealt with acute disorders, not taking into consideration any chronic forms that might have developed in Arnhem veterans.

This issue is worth analyzing for a number of reasons, and any one of these alone constitute a sufficient premise for the investigations in this matter. The analysis of battle casualties not suffering from physical injuries will surely shed some light on the history of the 1st Independent Parachute Brigade. It should be remembered that airborne operations bear exceptional features. Firstly, they begin with the landing of the soldiers by parachute or troop-carrying glider. Secondly, the combat specificity entails fighting for some time while being encircled and cut off from supplies by land and the possibility of evacuating the injured. The cases of stress reactions that occurred under such circumstances may prove interesting for researchers dealing with the issues of combat stress. A description of the soldiers' reactions arising from stress disorders can also be of use to historians investigating the history of the Polish army and cast light on events that took place more than 70 years ago.

The study is, to a large extent, based on documents stored in the Archives of the Polish Institute and Sikorski Museum (PISM) in London.

Case 1. Suicide at the airfield

The plan for *Operation Market Garden*, the largest airborne operation of World War II, assumed that the 1st Independent Parachute Brigade would act jointly with the British 1st Airborne Division. The objective was to capture and secure bridges on the River Rhine in Arnhem. The main forces of the Polish military unit were to be dropped on the third day of the operation (the third air-drop), i.e. on 19 September. On the first two days only the British division was planned to land, partly due to the insufficient number of military transport aircraft that could drop the Polish and British soldiers. This meant that the forces had to be dropped in stages, which later was considered to be one of the reasons that the operation failed.

The weather was terrible on the day of the planned take-off, the sky hidden by thick fog. In the morning, trucks arrived at the Spanhoe and Saltby airfields carrying the Polish paratroopers, who then began to jump out. Grouped in sticks, they hurried towards the sequentially-numbered aircraft. Next they waited for the signal to put on their equipment and parachutes, and then to board the aircraft. However, no such command was given, and the flight time was delayed several times. Finally, in the afternoon, a decision was made to cancel the take-off due to the severe weather conditions. After several hours of expectant waiting, the soldiers returned to the garrison in a very bad mood, to spend the night there.

Although the weather was still bad on 20 September (Wednesday), the Polish troops once again arrived at the airfields, hoping to take off. In the morning, the British high command changed their order for the Polish brigade and set a different landing zone. The plan that had been meticulously created over many days was being turned upside down, causing confusion among both the Polish command and soldiers. Finally, around 13:00 hours, a decision was made to take off. The paratroopers, each carrying dozen kilograms or so of equipment, began to clamber into the aircraft. The engines were started and the American Dakota aircraft moved toward the take-off line [3, 4]. Like any other take-off, the atmosphere could not be tenser. Suddenly, the aircraft began to return to the start line as the American crews were ordered to discontinue the take-off. The weather was still bad and the flight was put off for another 24 hours. The paratroopers had to leave the aircraft, cursing. Some of them had tears in their eyes. They probably realized that on the following day they would have to go through the same procedure once again, while they had hoped to "get it over" as soon as possible. It was reported that the Polish soldiers were so emotional that some of the American aircrew tried to avoid them as much as possible [4].

Eventually, one of the Poles could no longer bear the tension. He took out his gun, pointed it at his own head and fired. He died instantly. This was Spr. Tadeusz Mikiciuk from the parachute sapper company [5, 6]. The statistical and descriptive report regarding the brigade's health service activities included the laconic remark: "Spr MikiciukTadeusz - on 29.09.44. shot himself at the airfield" [6]. Spr Mikiciuk was buried at the Polish War Graves Cemetery in Newark-on-Trent, England [7].

Case 2. Suicide under fire

The majority of the brigade eventually landed near the village of Driel on 21 September 1944. Once it was revealed that the ferry which the Polish soldiers were supposed to use to travel to the north bank of the River Rhine, to support the British, had been sunk, Gen. Sosabowski decided that the soldiers should take up positions in the village and proceed with its defense, while at the same time seeking a way to cross the river. On 22 September, German troops with the support of armored vehicles attacked Driel, but they were repelled by the paratroopers. There were no more attacks as vicious as that on the following days; however, Driel suffered severe shelling [3], with the most savage targeting the Polish positions on 23 and 25 September, where sharp force injuries accounted for nearly 80% of all combat injuries. A safe shelter was nowhere to be found, even the school housing the brigade's main dressing station was under fire as it lacked even the protection of flags or large sheets with Red Cross markings. Between 22 and 25 September Driel was virtually cut off from any supplies, and casualties could not be evacuated. The soldiers began to run out of supplies, including dressings, drugs and plasma [3, 8].

This was when the second suicide occurred. A 30-year-old soldier from the 3rd parachute battalion, Cpl. Tomasz Barkiet, took his own life. This tragedy took place on 24 September[1] [9].

Cases 3 and 4. "Psychoneurotic breakdown"

Two of the soldiers from among the Polish paratroopers evacuated to British hospitals manifested symptoms which Lt Col Jan Golba, PhD, Head of the Brigade Health Service, described in his report as "*psychoneurotic breakdown.*" One of these, following a week's stay at hospital, returned to his unit while they were still in the Netherlands. The other soldier spent more time at hospital, following which he returned to the brigade [7]. The list of the brigade's casualties also reports that the SSgt. Cad. Franciszek Olekson from the Chief Headquarters suffered from "*nervous shock*" [9].

[1] The list of Polish soldiers who died during *Operation Market Garden*, drawn up on 4/10/1944, referred to 25/09/1944 as the date of death, whereas the date on the Cpl. Barkiet's grave reads 24.09.1044.

Acute stress reaction, battle exhaustion, and combat and operation stress

Code F43.0 of the International Classification of Diseases ICD-10 refers to acute stress reaction. It is defined as "*A transient disorder that develops in an individual without any other apparent mental disorder in response to exceptional physical and mental stress, which usually subsides within hours or days*" [10]. Such severe stress can be generated by a situation posing physical danger to a given person or his/her beloved (including accident, rape, battery or being a witness of tragic death), or causing a sudden loss of the social status or exerting a very negative impact on the person's life situation (including the loss of an entire property or a house fire). The spectrum of symptoms is very wide and may cover disorientation with limited awareness and the inability to distinguish between various stimuli, as well as depersonalization and/or derealization. There is also limited contact with the person suffering from acute stress, which the people nearby interpret as "daze" or "mental shock." The symptoms may progress, eventually leading to complete stupor. The disorder can also take other forms, including psycho-motor activation, strange behavior and aggression. Vegetative symptoms of panic fear may also co-occur, including tachycardia, *tachypnea* and excessive sweating [10].

As regards soldiers participating in combat operations, who experience acute stress reaction symptoms, we can speak of combat fatigue symptoms. The risk factors are said to include participating in battles and witnessing the death of one's brothers in arms, being responsible for civilian deaths, and participating in an event that leads to the death of many soldiers [1]. The brutality of battles leaves its impact on the soldiers' mental condition.

Similar symptoms were extensively described in medical literature dating back to World War I [1, 11, 12]. In an article dated 1915, published in *British Medical Journal,* Lt. Col. William A. Turner of the Royal Army Medical Corps presented his experiences in dealing with soldiers suffering from "*nervous and mental shock.*" He mentioned the following symptoms: mutism, stupor, loss of memory, deafness and visual impairment, including blindness. Patients whom he treated at military hospitals also displayed more spectacular symptoms, such as paraplegia. In the article's summary, Dr. Turner characterized the symptoms as neurasthenia [11]. In the Great War period, a new term *shell shock* was coined, covering both acute symptoms and the distant consequences of being exposed to combat stress. Based on some estimates, shell shock concerned as many as 10% of officers and 4% of other soldiers of the British Expeditionary Force fighting on the Continent in 1914. Most of those cases, i.e. 60-80%, probably entailed acute forms of various disorders [12].

After the dreadful trench experience, the western communities thought that nothing worse could happen. The war that followed was to make those illusory hopes vanish. During World War II, the concept of shell shock was replaced with the notions of battle exhaustion, battle fatigue and combat exhaustion [1, 13, 14]. Among all the mental disorders and illnesses, these diagnoses prevailed in the American army, and the soldiers of airborne units were no exception. According to the chief surgeon of the 82nd American Airborne Division, Lt. Col. William C. Lindtrom, those cases were relatively less frequent among paratroopers than among land force troops [15]. Nonetheless, the number of casualties qualified as neuropsychiatric cases in the American airborne units appeared rather high, with *Operation*

Market Garden being an accurate example of that. During this operation, in the 82nd Airborne Division alone, 261 such cases were reported, with 161 soldiers having been evacuated to field hospitals [15].

One might consider whether the four soldiers of the 1st Independent Parachute Brigade suffered from acute stress disorders. As regards Cpl. Barkiet, Sgt. Olekson and another paratrooper not known by name, the answer seems to be *yes*. Although there is no description of the symptoms observed in these three soldiers, or of the circumstances preceding the suicidal death of the Corporal, Dr. Golba had no doubts as to the causes of their health problems, straightforwardly calling them "*nervous breakdown.*" Referring to the above-mentioned contemporary definition, this diagnosis seems to find support in the short hospitalization time of the two soldiers and their prompt return to military service. At this point, it is worth noting that the author, having gone through the modern databases, did not find any articles dealing with the problem of suicides committed by soldiers suffering from acute stress disorders on a battlefield.

More questions arise in the case of Tadeusz Mikiciuk. Can one say that he suffered from combat stress considering that he did not participate in fighting? Can one speak of acute stress reaction in this case? Finally, can yet another take-off postponement be considered "exceptional stress", sufficient to cause such disorders? At present, it is common knowledge that physical exhaustion can contribute to the development of acute stress disorders [10]. The Polish paratroopers were exposed to considerable stress for many days. It increased gradually, in line with the approaching date of the operation commencement, causing sleeping problems in some soldiers. The paratroopers were also mindful of several other airborne operations that had been cancelled almost at the last moment. They were surely asking themselves the question as to whether the operation was about to begin. Such stress appears natural and these doubts were resolved on 17 September when *Operation Market Garden* eventually began. Nonetheless, the fact that on 19 September the take-off was delayed several times, and finally put off until the following day, created a considerable mental burden on the Polish soldiers. The night was hard and sleepless, and the soldiers felt extremely tired. The same course of events repeated on 20 September, and at the same time the paratroopers received the news of severe fighting in Arnhem, and of the dramatic situation of their British colleagues and the Polish soldiers who had landed with them on the north bank of the River Rhine by glider. This must have been physically and mentally exhausting. It appears significant to refer to the statement made by Lt. Col. Jan Golba: "While some of the soldiers wanted to take off as quickly as possible despite their fear, others having weaker nerves and less mental strength felt extremely nervous, and some of them even broke down to the point of committing suicide. Not to mention such nervous disorders as nervous shock, hysteria, etc. There were relatively few such cases in our Brigade, but they did happen. I mention them to stress that a paratrooper begins to experience a combat operation well before his feet touch the ground and when he is expected to fight his enemy.

There are numerous causes of stress, including in particular:

a) flying above the enemy's territory and being doubtful of reaching the destination;
b) fear of being injured while landing, and thus being incapable of fighting in the most significant operation period;
c) fear that the parachute will not open;
d) facing the likelihood of being forced to land in enemy territory;
e) curiosity about the welcome accorded by the enemy once landed;
f) fear of being left alone, and being uncertain about the seclusion duration and the possibility of surviving.

Contrary to what the paratrooper's imagination makes him experience while preparing for the operation, a land force soldier gradually approaches the battlefield, with the opportunity to become accustomed to being under fire while approaching the battle zone and become convinced that not every bullet reaches its target. These circumstances give a land force soldier the sense of considerable mass safety and the opportunity to get used to the harsh battlefield conditions. A paratrooper, in contrast, passes through that period very rapidly. Within a few hours he goes from a relatively peaceful garrison life to the middle of the fierce and violent fighting that is taking place behind the enemy's lines, far from his base and surrounded on all sides by an active enemy" [8].

Figure. Polish paratroopers expectantly wait for a take-off. RAF Saltby or RAF Spanhoe airfield, September 1944 (Polish Institute and Sikorski Museum)

Rycina. Polscy żołnierze w napięciu oczekują na start. Lotnisko Saltby lub Spanhoe, wrzesień 1944 (Instytut Polski i Muzeum im. gen. Sikorskiego))

Interestingly, similar observations were made by Dr. Lindtrom of the 82nd Division, who wrote that the mental trauma related to an airborne operation exceeded the stress experienced by paratroopers preparing for fighting during the German offensive in the Ardennes, where an airborne landing was not used. He also maintained that the jump itself was so mentally exhausting that soldiers who participated in several drops needed to take a leave or even undergo rehabilitation. He referred to air force flight crew on airborne combat operations taking a long leave once they had completed a 'tour' made up of a certain number of missions (e.g. 30 flights). Moreover, some modern specialists advocate that the notion of combat stress should be replaced with a wider notion of combat and operation stress. This results from the observation that stress reactions may develop quickly, not only in the soldiers directly participating in the fighting but also in those participating in peace-keeping missions or humanitarian actions, or even serving in garrisons [1]. The arguments provided seem to give credit to the thesis that Spr. Mikiciuk's suicidal death was connected with severe and unbearable stress, this reaction being triggered by another cancellation of the flight. It can therefore be stated that he fell victim to combat and operation stress.

Battle exhaustion in the eyes of the health service

The extensive excerpt quoted above comes from a lecture given by the head of the health service of the 1st Independent Parachute Brigade at the Scientific Meeting of the Polish Armed Forces Physicians, which took place in London on 11-12 December 1944. In giving an account of the military health service actions in Arnhem and Driel, Dr. Golba referred not only to the suicide of Spr. Mikiciuk at the airfield, but also listed three other casualties suffering from combat exhaustion. It appears obvious that the issue of operation and combat stress was known to the sanitary head of the brigade. In London he paid much attention to this problem, though he did not conduct any in-depth analysis. The open and emphatic attitude of Dr. Golba (which would nowadays be called professional) made this specific problem known to a wider group of military physicians.

Medical workers serving in the Polish military units and hospitals could also familiarize themselves with the widely-understood psychiatric and mental hygiene-related issues in the army through the publications and lectures given by military psychiatrists, including Dr. Wiktor Szyryński and Dr. Konstanty Świder. Dr. Szyryński, in his study "W laboratorium radości życia. Zarys higieny psychicznej ze szczególnym uwzględnieniem życia wojskowego" [In the laboratory of the joy of life. An outline of mental hygiene with specific consideration of military life], issued in the Middle East in 1944, referred to the problem of "psychoneuroses and war neuroses." In his opinion, this group of psychiatric disorders included acute hysteria, which manifested, inter alia, by temporary blindness, and constitutional hysteria, characterized by "a diversity and changeability of symptoms [and] a richness of forms that could co-occur in different patterns" [16]. The chief psychiatrist of the 2nd Polish Corps, Dr. Konstanty Świder, touched upon this topic at the Meeting of Polish Military Physicians that took place in 1946 in Bologna [1]. Unfortunately, it is nowadays hard to determine the reach of the studies and publications developed by each of the above-mentioned physicians.

The issue of mental disorders occurring among soldiers was also analyzed by the Health Service Board, a proof of which can be found in the Archives of the Polish Institute and Sikorski Museum in London. The files of the Health Service Board of the Ministry of National

Defense contain a thick file that includes documents devoted to the mental health of soldiers [17]. Unfortunately, the author failed to identify any materials directly concerning the problem of acute stress disorders.

Let us return to the soldiers from the 1st Independent Parachute Brigade. The list of casualties drawn up soon after operation completion included those soldiers who died or were missing, as well as those who were wounded or injured in combat operations [9]. The case of SSgt. Olekson was included in the category of those injured. Next to his name, a note was made, stating that he fell victim to "*nervous shock*." The same document also clearly stated that Cpl. Barkiet died by suicide [9]. The causes of Spr. Mikiciuk's death were reported in "*The statistical and descriptive report of the health service of the 1st Independent Parachute Brigade for September 1944"* [6]. However, there is no information regarding the sub-unit of the fourth soldier.

The analysis of the above-mentioned documents leads to the conclusion that the brigade command was informed on, and must have been aware of, the suicidal deaths and combat stress among soldiers. Unfortunately, it cannot be said whether the brigade headquarters conducted any analyses of this problem. Most likely it was left to the physicians.

The forgotten victim

While writing this article, the author pondered on whether the identity of the paratroopers who committed suicide should be revealed. Then, he realized that they were war victims just like those killed by bullets or shrapnel. Given the numerous occasions when he wrote about soldiers killed or wounded while fighting and also included their full names, why should it be otherwise this time? This is especially important in the case of Spr. Mikiciuk, who cannot be found in any lists of casualties of the 1st Independent Parachute Brigade, sustained in the Netherlands, and neither in those kept in the archives created 70 years ago or in the contemporary ones drawn up by historians. Tadeusz Mikiciuk died of the injuries he had inflicted himself, most likely as a result of experiencing the enormous stress connected with the multiple postponements of operation commencement. This happened on 20 September 1944 during *Operation Market Garden*. Although he was not buried together with other Polish paratroopers in the Allies' cemetery in Oosterbeek near Arnhem, but in England, the author advocates that he should be included among the combat casualties of the brigade.

Summary and conclusion

It proved challenging to gather the scattered archival materials in order to present in detail the problem of stress disorders occurring among Polish paratroopers participating in *Operation Market Garden,* as the documents available contain few details. Nonetheless, based on the available sources, two major conclusions can be drawn. Firstly, stress disorders, including those related to combat stress, occurred in the Polish Parachute Brigade, just like in other allied airborne units. Secondly, the health service seemed to take account of the problem, and some physicians attempted to fathom its causes. However, the physicians' awareness appears to have been rather limited. Drawing any conclusions on the scale of this problem in the 1st Independent Parachute Brigade therefore appears groundless and is subject to significant bias. Back in those times, there were no diagnostic criteria. This is reflected in the large number of medical terms referring to stress disorders. It is very likely that temporary stress disorders could have concerned a larger number of soldiers, although they were not reported, with the symptoms not being identified or continuing for a very short period.

On no account should the article be viewed as being exhaustive of the topic. It is limited to acute disorders and should serve as the starting point for further studies on operation and combat stress in the Polish Armed Forces in the West. Materials regarding other military units, such as those forming part of the 2nd Polish Corps, may prove more detailed, although this would require conducting a more in-depth investigation. The archive search query conducted by the author in respect of the health service of the 1st Armoured Division was futile.

Studies devoted to chronic stress disorders would be extremely interesting and would enrich the knowledge on the history of Polish military units fighting side by side with their western allies. However, these should not be limited to analyzing archival sources developed by military units but should also, if not in particular, include investigating the post-war history of veterans and the activities of veteran organizations, or possibly reaching out to the soldiers' families.

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They were the authors of the “Lekarz Wojskowy” journal in the interwar period. Polish professors publishing in the journal's first decade. Part IV

Oni tworzyli „Lekarza Wojskowego” w okresie dwudziestolecia międzywojennego. Wykładowcy polskich uniwersytetów w pierwszym dziesięcioleciu działalności czasopisma. Część IV

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Abstract. "Lekarz Wojskowy" (Medical Physician) was first issued in an independent Poland, where medical departments at five universities in Krakow, Lviv, Warsaw, Vilnius and Poznań were already active. The editorial team, especially in the first years of the journal's existence, and due to the lack of access to the current achievements in the field, looked for authors working in recognized medical centers, who had contacts with foreign hospitals, and who expanded their skills by working with famous specialists. The natural environment was the university - the breeding ground for new personnel. The article attempts to introduce the lecturers at the Faculties of Medicine of the Jagiellonian University in Krakow and the Jan Kazimierz University in Lviv who published in Medical Physician, in the context of their scientific interests. The authors publishing in the journal include both theorists and clinicians.
Key words: history of 20th century medicine, universities-history, medical journals, physicians

Streszczenie. „Lekarz Wojskowy" rozpoczął działalność w Polsce niepodległej, w której funkcjonowały już wydziały lekarskie na pięciu uniwersytetach: w Krakowie, Lwowie, Warszawie, Wilnie i Poznaniu. Redakcja, zwłaszcza w pierwszych latach działalności czasopisma, ze względu na ograniczony dostęp Czytelnika do najnowszych osiągnięć medycyny zabiegała o autorów, którzy pracowali w liczących się ośrodkach naukowych, wyjeżdżali do znaczących klinik zagranicznych, poszerzali umiejętności, praktykując u wybitnych lekarzy. Naturalnym środowiskiem były uniwersytety stanowiące kuźnie nowych kadr. Celem niniejszego artykułu jest przedstawienie sylwetek wykładowców wydziałów lekarskich Uniwersytetu Jagiellońskiego i Uniwersytetu Jana Kazimierza we Lwowie, publikujących w „Lekarzu Wojskowym", w kontekście ich zainteresowań naukowych. Wśród autorów znaleźli się zarówno pracownicy zakładów zajmujących się naukami teoretycznymi, jak i klinicznymi.
Słowa kluczowe: historia medycyny XX w., uniwersytety-historia, czasopisma medyczne, lekarze

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Only a life lived for others is a life worth living
Albert Einstein

Not only natural scientists on a path reviewing knowledge should seek solutions to troubling issues, but appropriate efforts should also occupy a physician to the same extent
Henryk Hoyer

In 1920 there were already faculties of medicine at five universities by the time the independence of Poland was regained, the organization of higher education in Poland being initiated almost immediately. Medicine was taught continuously at the Jagiellonian University and in Lviv, while the University of Warsaw had been reactivated in August 1915 with the foundation of the next two faculties being initiated in 1918.

Aiming for diligence in regard to providing its readers with knowledge on the most recent achievements in medicine, Military Physician cooperated with a large circle of outstanding representatives of the national scientific community, with the first issue of the journal presenting five articles authored by lecturers of the universities in Kraków and Lviv. The journal, apart from publishing articles, informed the readers on a current basis about many facts from the academic life of Polish universities, including announcements in regard to vacancies for academic positions and the lectures of famous professors, as well as reports from meetings of scientific associations and conventions. In the years 1920-1924, the members of Senates and names of academic staff of medical faculties of particular universities were published. In 1920, in the "Official Section" of the journal, there appeared a note on the jubilee of the Faculty of Medicine of the Lviv University, celebrating the 25th anniversary of its existence in that year. One of the participants on behalf of the Sanitary Department of the Polish Army was Lt. Col. Prof. Edward Żebrowski, who uttered the following words: "When dark shadows covered the entire Polish land and cruel[2] oppressors wished to nip in the bud every thought, every word, almost every sound related to Polish speech, two flames gave light in the thick darkness: Kraków and Lviv! It has only been 25 years since the hearth of Polish medical knowledge was lit in Lviv, and look how many great names it has given to the world" [1].

Jagiellonian University

For a long period the incubators of personnel for other Polish universities included the Jagiellonian University (Fig. 1) and the Jan Kazimierz University in Lviv. A number of outstanding Polish scientists worked there, including Józef Dietl (1844-1905), Edward Korczyński (1844-1905), Walery Jaworski (1849-1924), Jan Mikulicz Radecki (1850-1905), Ludwik Rydygier (1850-1920) and Odo Bujwid (1857-1942) [2].

[1] Henryk Hoyer (1834-1907), Polish physician, histologist, embryologist
[2] Original spelling

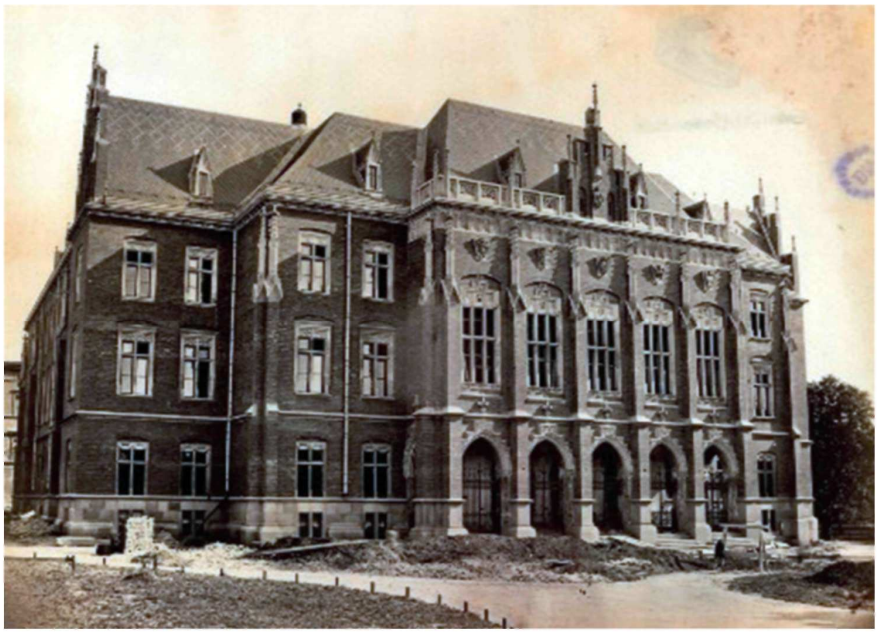

Figure 1. Jagiellonian University in Kraków http://www.uj.edu.pl/wiadomosci/-/journal content/56 INSTANCE d82IK-Zvhit4m/10172/102053941

Rycina 1. Uniwersytet Jagielloński w Krakowie

Among the listed professors, cooperation with Military Physician was initiated by Prof. Odo Bujwid,[3] who became the Head of the Department of Hygiene and Bacteriology in 1893. Throughout those years, a circle of students gathered around the professor who also reinforced the faculty of lecturers of the Polish universities. After Bujwid left the JU, the department was replaced with two new departments, i.e. the Department of Bacteriology and the **Department of Hygiene,** this happening in 1919. Articles that originated from this department were published in Military Physician and their authors included: **Kazimierz Karaffa-Korbutt, Witold Gądzikiewicz and Emil Paluch** [3].

The first professor in the department, **Kazimierz Karaffa-Korbutt** (1878-1935 [Fig. 2]), received the degree of associate professor, and was one of the most outstanding hygienist physicians of that time. His publications concerned, among other things, the methods of disinfecting drinking water, in particular the unassisted disinfecting of water by soldiers on the battlefield, fighting typhus and typhoid vaccinations. The most numerous works authored by the professor concerned industrial and occupational hygiene [4-8], two of which he published in Military Physician. In the article "*Przyczynek do metodyki badania tkanin odzienia wojskowego*" ["A contribution to methods of research on the fabrics used for military clothing"], he described the previous procedures used in research on clothing, indicated some of the lacks in the methods, and stated that: "(...) in order to standardize the methods and facilitate work it would be useful to develop an Instruction for research on the fabrics used for military clothing (...)" [9]. In the introduction to the second work on industrial hygiene "*O chorobach zawodowych robotników, zajętych w fabrykach mater-jałów wybuchowych*" ["On occupational diseases of workers employed in explosives factories"], he announced that the inspiration for its creation was his participation in the military committee for research into the conditions of work in explosives factories created in 1914 in Saint Petersburg. The results of the research presented in the conclusions indicated univocally that the production of explosives is one of the most dangerous occupations, both due to the chance of explosions or fires occurring, as well as occupational diseases, especially those related to poisoning [10].

In 1923, the position of head of the Department was taken by **Witold Gądzikiewicz** (1879-1962 [Fig. 3]), a student and friend of professor Karaffa-Korbutt. He conducted research related to nutritional hygiene, particularly the conditions for the baking and storage of bread, which was very important in the post-war years. He claimed that the improvement of the sanitary condition of the country depends to a large extent on making society aware of the role of hygiene. He published two works in Military Physician, thematically matched to the two main directions of his research, i.e. nutritional hygiene and statistics [3, 8-12].

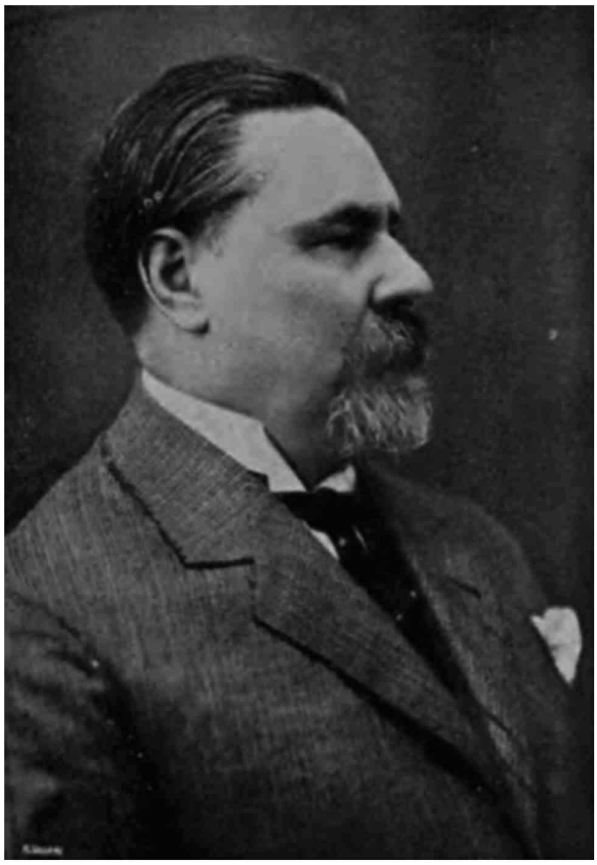

Figure 2. Kazimierz Karaffa-Korbut (Braczkowska B. Kazimierz Karaffa-Korbutt... Med. Pr. 1994; 45 (5): 461)

Rycina 2. Kazimierz Karaffa-Korbut

The Institute was also the place of origin of a work published in issue 7 in 1929 concerning the lead poisoning of potters working at home, authored by **Emil Aleksander Paluch** (1904-1954), a student of the Faculty of Medicine at the JU in the 1920s, the future founder and head of the Institute of Occupational Medicine in Łódź [13].

The Department and Institute of Pathological Anatomy at the JU was represented in Military Physician by an outstanding scholar, **Stanisław Witalis Ciechanowski** (1869-1945 [Fig. 4.]), who became its head in 1919. Stanisław Ciechanowski emphasized the high position of physical education, which according to him not only contributed to preventive healthcare in the youth, but should also be a part of pedagogy in the future to help educate and train boys for military service. These were the issues to which he devoted the article "*Powszechne wychowanie fizyczne, jako podstawa przygotowania ludności do wojny*" ["General physical education as a basis for preparation of the population for war"], printed in Military Physician [14-16].

[3] The profile of Odo Bujwid was presented in Military Physician in 2015; 93 (4): 348-349, 357

They were the authors of "Lekarz Wojskowy", a medical journal from the interwar period.

Figure 3. Witold Gądzikiewicz
http://www.wl.uj.edu.pl/wydzial/historia-higiena/-/journal_content/56_INSTANCE_KVhJyt3cd06w/41663/44473529

Rycina 3. Witold Gądzikiewicz

In issue 23 of the first volume of Military Physician, an article by **Józef Szymanowicz** (1886-1946) was published: "*Przyczynek do wczesnej operacji postrzałów przewodu pokarmowego*" ["A contribution to early operations for gunshot wounds in the gastrointestinal system"]. The work was written by a future gynecologist-obstetrician, who during World War I was a military physician [17, 18]. He included his own experiences in the article: "[I was] in the fortunate position that by examining the fate of abdominal gunshot wounds subjected to conservative treatment on the front I could recognize the futility of such a procedure (...). I was not able to achieve this with the regiment, but once I was transferred to a sanitary unit, I most of all aimed to ease the plight of these ill-fated injured patients (...)" [19].

Jan Kazimierz University in Lviv

The University of Lviv (Fig. 5) at the end of the 19th century was already a university that was not inferior, in terms of the level of science and education, to that of European universities, and in the Polish lands of all three partitions it was the second most important center of Polish science, next to the Jagiellonian University. The high position of the university was most of all determined by its faculty of professors. The

Figure 4. Stanisław Ciechanowski
http://www.col.uj.edu.pl/image/image_gallery?uuid=ad2f46d-458a-4cb-3-adfa-fbfa9ee7fb6c&grupld=166381=1347900061426

Rycina 4. Stanisław Ciechanowski

Department of Medicine was where world-famous scholars delivered lectures, including Antoni Noga-Mars (1819-1905), Ludwik Rydygier (1850-1920), Roman Rencki (1867-1941), Jakub Parnas (1884-1949), Rudolf Weigl (1883-1957), Antoni Gluziński (1856-1935), Edmund Biernacki (1866-1911), Włodzimierz Sieradzki (1870-1941), Hilary Schramm (1857-1940), Antoni Jurasz (1847-1923), Adam Gruca (1893-1983) and Jan Lenartowicz (1877-1959) [20].

In the 1920s the editorial team of Military Physician recruited ten scientist from the Lviv circle to publish works in the journal. These authors included: **Rudolf Weigl,**[4] a world-famous biologist, inventor of the first effective typhus vaccine, as well as Witold Nowicki, Helena Schuster, Władysław Dybowski, Wiktor Janusz, Włodzimierz Mozołowski, Adam Gruca, Stanisław Laskownicki, Wiktor Feliks Reis and Jakób Rothfeld.

[4] The profile of Rudolf Weigl was presented in part I of "Pioneers of Polish medicine" in Military Physician, 2015; 93 (4): 349, 355.

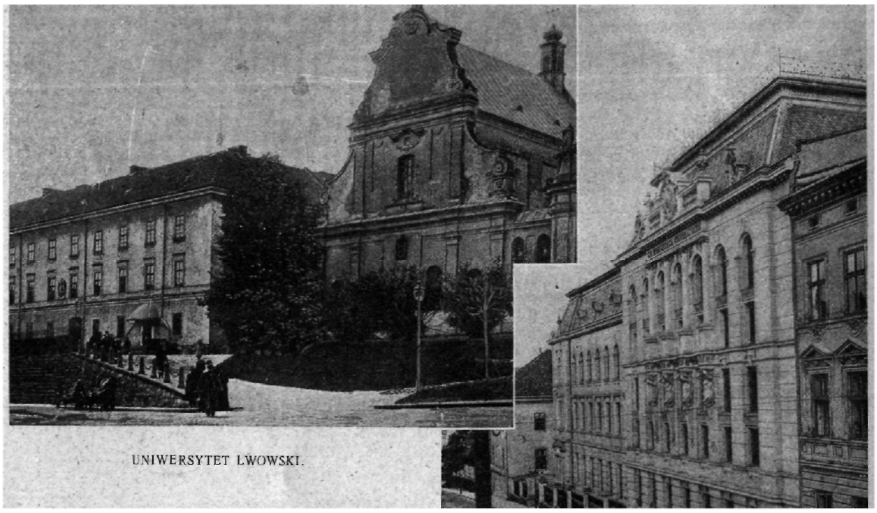

Figure 5. Jan Kazimierz University in Lviv Tygodnik Ilustrowany, 1911 (11)48:958

Rycina 5. Uniwersytet Jana Kazimierza we Lwowie

The Institute of General and Experimental Pathology and the **Institute of Pathological Anatomy** of the University were linked by the name of **Witold Nowicki** (1878-1941 [Fig. 6.]), who according to "*Skład Uniwersytetu w roku szkolnym 1920/1921*" ["Faculty of the University in the school year of 1920/1921"] [19] was simultaneously a deputy head of the Institute of General and Experimental Pathology and head of the Department of Pathological Anatomy. Witold Nowicki associated himself with the University of Lviv from the beginning of his professional career [21-23]. In 1920 Military Physician published an extensive work titled: "*Zmiany anatomiczne u zmarłych w krótki czas po zatruciu gazami z pocisków*" ["Anatomical changes in the deceased in a short time after poisoning with gases from shells"], based on research with the use of dissected material, which "(...) consists of people deceased a very short time after poisoning (...). These date from the time when Lviv was bombed by the Ukrainians, which also involved the use of gas shells" [24]. The scientific interests of Nowicki were mainly the pathology of tumors and progressive and regressive changes, experimental oncology, as well as the pathophysiology of neurohormonal regulation.

Helena Schuster (1884-1949) received her education in the circle of students under the care of professor Nowicki, and in 1913 she obtained the position of assistant at the Institute of Pathological Anatomy. Her circle of scientific interests included skin cysts, histopathological bleeding of ulcers and experimental oncology, and she was primarily interested in rare cases, including neurofibromatosis type 1, which she described in an article sent to Military Physician: *"Przyczynek do anatomji patologicznej t.zw. choroby Recklinghausena*" ["A contribution to the pathological anatomy of 'Recklinghausen disease'"] [25].

Figure 6. Witold Nowicki https://pl.wikipedia.org/wiki/Witold_Nowicki_(lekarz)

Rycina 6. Witold Nowicki

Figure 7. Włodzimierz Mozołowski
https://pl.wikipedia.org/wiki/W%C5%82odzimierz_Mozo%C5%82owski

Rycina 7. Włodzimierz Mozołowski

Also related to the Institute of Pathology was Władysław Dybowski (1892-1969), a bacteriology and infectious disease specialist, and at the same time one of the three scientists who conducted pioneering scientific research in the field of sports medicine. In 1924 he founded the first Sports Medicine Laboratory in Poland at the Institute of Pathology [26]. As far as Military Physician is concerned, he published the work: "*Doświadczenia oddechowe w narciarstwie*" ["Respiratory tests in skiing"], referring to the issue of increasing the efficiency of human functioning. "(...) For socio-economic reasons, it is currently coming to the forefront as one of the most urgent issues. The current works highlight certain aspects of this issue, bringing to light even more of the vastly complicated mechanism of the human machine (...). As far as the analysis of phenomena occurring during work and fatigue is concerned, skiing is a very satisfying material." [27]

Figure 8. Stanisław Laskownicki
http://www.wple.net/plek/numery_2014/numer-10-2014/563-565.pdf

Rycina 8. Stanisław Laskownicki

The Institute of Pathological Anatomy was also represented by Wiktor Janusz, a Russian physician, and the author of three works published in the years 1920-1924. One of the works was on the health of the exiles from the Kingdom of Poland to Moscow in the period from August 1915 to September 1916. Janusz worked at that time in the organization of an all-Russian union of Zemstvos[5] [28].

[5] A national association of elected local government units in the Russian Empire)zemstvos and municipal dumas) appointed in July 1915 as a joint committee of the 1914 All-Russian Union of Zemstvos and All-Russian Union of Towns, for the purpose of aiding the disabled and the exiles of World War I, as well as the purpose of aiding state authorities in directing the war effort by means of organizing deliveries of weapons, gear and military equipment intended for the Russian army.

Table 1. Publications in the Medical Physicians journal
Tabela 1. Publikacje w „Lekarzu Wojskowym"

1. Kazimierz Karaffa-Korbutt
- *Przyczynek do metodyki badania tkanin odzienia wojskowego* ["A contribution to the methods of research into the fabrics used for military clothing"]. 1924; 5 (10): 894-898
- *W sprawie ustalenia i ujednostajnienia polskiego mianownictwa higienicznego* [On the matter of determining and standardizing Polish nomenclature in hygiene]. 1926; 7 (5): 512-513
- *Eugenika, służba wojskowa a wojna* [Eugenics, military service and war]. 1926; 7 (2): 105-121
- *0 chorobach zawodowych robotników, zajętych w fabrykach materjatów wybuchowych* [On occupational diseases of workers employed in explosives factories]. 1928; 11 (3-4): 236-244
- Jan-Antoni Rapczewski. 1928; 11 (3-4): 193-201
- *Statystyka sanitarna jako podstawa nauczania higjeny społecznej* [Sanitary statistics as a foundation in teaching social hygiene]. 1930; 16 (1): 1-15

2. Witold Gądzikiewicz
- *Nadpiek chleba i jego hygieniczne znaczenie* [Surplus weight of bread in relation to the amount of flour and its significance to hygiene]. 1923; 4 (6): 498-523
- *Najprostsze sposoby zastosowania rachunku prawdopodobieństwa w pracach lekarskich* [The simplest methods of applying probability theory in medical works]. 1928; 11 (3–4): 205-222

3. Emil Paluch
- *Polewy garnków glinianych pod względem higienicznym* [Earthenware glazes in terms of hygiene]. 1929; 14 (7): 323-333

4. Stanisław Witalis Ciechanowski
- *Powszechne wychowanie fizyczne, jako podstawa przygotowania ludności do wojny* [General physical education as a basis for the preparation of the population for war]. 1925; 6 (8): 674-684

5. Józef Szymanowicz
- *Przyczynek do wczesnej operacji postrzałów przewodu pokarmowego* [A contribution to early operations on gunshot wounds of the gastrointestinal system]. 1920; 1 (23): 1-7

6. Witold Nowicki
- *Zmiany anatomiczne u zmarłych w krótki czas po zatruciu gazami z pocisków* [Anatomical changes in the deceased a short time after poisoning with gases from shells]. 1920; 1 (8): 3-16

7. Helena Schuster
- *Przyczynek do anatomji patologicznej t.zw. choroby Recklinghausena* [A contribution to the pathological anatomy of 'Recklinghausen disease']. 1921; 2 (10): 289-303

8. Władysław Dybowski
- *Doświadczenia oddechowe w narciarstwie* [Respiratory tests in skiing]. 1927; 10 (5-6): 512-515
- *Pierwsze wyniki badań lotników w komorze niskich ciśnień* [Initial results of hypobaric chamber tests for aviators]. 1933; 21 (1): 25-29
- *Pierwsze wyniki badań lotników w komorze niskich ciśnień*: *(ciąg dalszy)* [Initial results of hypobaric chamber tests for aviators: (continued)]. 1933; 21 (2): 119-126 (To be concluded)
- *Pierwsze wyniki badań lotników w komorze niskich ciśnień*: (*dokończenie*) [Initial results of hypobaric chamber tests for aviators: (conclusion)]. 1933; 21 (3): 219-230
- *Wyniki doświadczalnego wysokogórskiego kursu narciarskiego dla lotników w Dolinie Pięciu Stawów polskich* [Results of experimental mountain ski course for aviators in the Valley of Five Polish Ponds]. 1934; 24 (8): 379-396 *Aktualne problemy fizjologii lotnictwa* [Current issues in aerospace physiology]. 1934; 24 (1): 13-35
- *Cel i wyniki doświadczeń w zdejmowaniu maski tlenowej na znacznych wysokościach* [Purpose and results of experiments on the removal of an oxygen mask at considerable heights]. 1935; 25 (11): 617-622
- *Wpływ szybkości i jej zmian na organizm lotnika* [The influence of speed and its changes on the organism of an aviator]. 1936; 27 (6): 335-342
- *Ciśnienie krwi jako wskaźnik zmęczenia i wypoczynku po większych wysiłkach* [Blood pressure as an indicator of fatigue and rest after significant efforts]. 1937; 29 (6): 347-355
- (*Referat wygłoszony podczas IV Zjazdu Naukowego Oficerów Służby Zdrowia) Międzynarodowy Zjazd Lekarski medycyny sportowej* [(Paper presented during the 4th Scientific Convention of Health Care Officers) International Sports Medicine Convention].11-18.VIII.1937, Paris. 1937; 30 (4): 253-254
- *Hodowla narządów* [Culturing organs]. 1939; 33 (6): 760-764
- *Sprawność narządów krążenia wybitnych polskich zawodników lekarskich* [Efficiency of circulatory organs in outstanding Polish competitors-physicians]. 1939; 34 (1): 45-51

9. Wiktor Janusz
- *W sprawie uszkodzeń urazowych wątroby w związku z niezwykłym przypadkiem własnym* [On the matter of traumatic liver injuries in relation to an unusual individual case]. 1924; 5 (9): 786-795
- *Choroby nagminne wśród wygnańców z Królestwa Polskiego w Moskwie w świetle statystyki moskiewskiego magistratu* [Epidemic diseases in the exiles from the Polish Kingdom in Moscow in the light of statistics of the city hall in Moscow]. 1920; 1 (33): 14-24
- *Przyczynek do leczenia na wojnie kończyn odmrożonych* [A contribution to the treatment of limbs frostbitten during war]. 1920; 1 (51/52): 6-9

10. Włodzimierz Mozołowski
- *O źródle amonjaku krwi* [On the source of ammonia in the blood]. 1928; 12 (1): 41-57
- *O zaczynach profilatycznego ustroju zwierzęcego*. (*Obecny stan zagadnienia*). [On the origins of prophylactic of animal organisms. (Current state of the issue)]. 1929; 13 (1): 573-580
- *Anatomja i fizjologja w nauczaniu przedklinicznym* [Anatomy and physiology in preclinical teaching]. 1929; 13 (5): 246-249
- *Przemiany chemiczne w mięśniu pracującym* [Chemical changes in a working muscle]. 1933; 21 (3): 193-204; 1933; 21(4): 297-302. *Wykład wygłoszony dnia 21 listopada 1932 r. w Towarzystwie Chemicznym we Lwowie* [Lecture delivered on 21 November 1932 at the Chemical Society in Lviv]

11. Stanisław Laskownicki
- *Przyczynek do rozpoznawania i leczenia przepuklin pachwinowych sztucznie wywołanych* [A contribution to diagnosis and treatment of artificially induced ingunal hernias]. 1923; 4 (4): 281-286

12. Feliks Reis
- *O wymiarach rogówek zwierzęcych i ich znaczeniu dla patogenezy rogówki olbrzymiej u człowieka* [On the dimensions of cornea in animals and their significance for pathogenesis of megalocornea in humans]. 1921; 2 (1): 6-12

13. Jakób Rothfeld
- *O nagminnem zapaleniu mózgu*. (*Encephalitis epidemica, lethargica, choreiformis, myoclonica*) [On epidemic encephalitis. (Encephalitis epidemica, lethargica, choreiformis, myoclonica)]. 1920; 1 (18/19): 34-40

They were the authors of "Lekarz Wojskowy", a medical journal from the interwar period.

At the end of the 1920s there were three works published in Military Physician that originated from the **Institute of Medicinal Chemistry**, authored by **Włodzimierz Mozołowski** (1895-1975 [Fig. 7]). He conducted scientific research into the metabolism of the phosphorous compounds of the muscles, the mechanism of systemic detoxification, proteins and nitrogenous compounds of blood serum [29-32]. W.S. Ostrowski writes in his work titled "*Jakub Karol Parnas. Życie i twórczość*" ["Jakub Karol Parnas. The life and works"]: "One of the themes developed at the Institute of professor Parnas in Lviv (this refers to the Institute of Medicinal Chemistry - annotation of the authors) was ammoniagenesis in the blood and muscles. In 1927, Gustaw Embden and Margarete Zimmermann found AMP in the muscles, sometime earlier identified in yeast cells. In the same year professor Parnas and Włodzimierz Mozołowski, while seeking the source of ammonia in the muscles, noticed that a damaged muscle produces much more ammonia than a correct muscle and that ammonia in a working muscle disappears when it is resting (...)" [29], This subject area was the focus of one of three articles published in the journal in the years 1928-1929 "*O źródle amonjaku krwi*" ["On the source of ammonia in the blood"] [33].

Lviv's school of surgery, created by Ludwik Rydygier, head of the Department and Clinic of Surgery, enjoyed a great reputation in the medical world. His successors: Hilary Schramm and then Tadeusz Ostrowski, retained its high position. The alumni of the Department included Adam Gruca[6] and **Stanisław Laskownicki** (1892-1978 [Fig. 8]), the first Polish urologist, who consecutively received all the academic degrees [34, 35]. He published one of his works on surgical treatment in Military Physician, titled: "*Przyczynek do rozpoznawania i leczenia przepuklin pachwinowych sztucznie wywołanych*" ["A contribution to the diagnosis and treatment of artificially induced ingunal hernias"], which discussed hernias induced for the purpose of release from military service: "Although a hernia does not release anyone from serving in the army on a general basis, in some cases it releases those serving in the ranks and is designated category C_1 or C_2 (...). It should also be taken into account that we currently have a number of people in Poland, especially in the Eastern Borderlands, who used to induce hernias in Russia and may wish to continue to do so." [36]

Readers of the journal also had the opportunity to become familiar with the works of the specialists: **Wiktor Feliks Reis** (1875-1943) from the **Clinic of Ophthalmology** and **Jakób Rothfeld** (1884-1971) from the **Clinic of Neurological Diseases.** Wiktor Reis worked at the Eye Clinic of the University from 1911. The work "*O wymiarach rogówek zwierzęcych i ich znaczeniu dla patogenezy rogówki olbrzymiej u człowieka*" ["On the dimensions of cornea in animals and their significance for pathogenesis of megalocornea in humans"], published in Military Physician, was presented at the meeting of the Military and Medical Association in Przemyśl in 1920 while the author served in the Polish Army [37,38].

Jakub Rothfeld (later Rostowski) started his academic career in 1910 in the position of assistant at the Outpatient Neurological Clinic, headed by Henryk Halban. His scientific achievements include over 70 publications, among which the particularly recognized ones were the works on the labyrinth, as well as on epidemic lethargic encephalitis and brain tumors. In 1920 he published a work based on the description of cases from his own medical practice in Military Physician, titled: "*O nagminnem zapaleniu mózgu. (Encephalitis epidemica, lethargica, choreifor-mis, myoclonica*)" ["On epidemic encephalitis. (Encephalitis epidemica, lethargica, choreifor-mis, myoclonica)"](Tab. 1) [34].

[6] Ibid.: 346, 354

Summary

It is impossible to overrate the role of both of the presented medical faculties of the universities. They became inscribed in the history of Poland and the history of the development of medicine, and they educated many outstanding scientists who also had their share in the development of Military Physician. It is noteworthy to emphasize the development of Polish statehood that is significant for the described period. It was a time when new structures were created, not only in regard to the development of science, but most of all putting in order the organization of many areas of the economy and social life on lands which had remained under rule of three partitioners for 123 years. The country needed educated personnel, aware of the challenges to be faced by the new generation. These tasks have been undertaken by the universities and journals that were created or resumed their activities in this period, which primarily based their work on cooperation between national scientific centers and international contacts.

The authors of the cycle have so far presented three out of the five universities, the academic staff of which also popularized their scientific achievements in Military Physician.

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Family Medicine
News and practice 2016

4-5 November

ICE Kraków Congress Centre, 17 Maria Konopnicka St.

Patronage

Program

Friday

10:00 Opening of the Conference

10:10-10:30 Introductory lecture

Session I

10:30-11:00 Assessment of cardiovascular risk in 2016 - in the eyes of a practitioner *Prof. Andrzej Januszewicz (Warsaw)*

11:00-11:30 Antithrombotic prophylaxis in special situations *Prof. Anetta Undas (Kraków)*

11:30-12:00 Ischemic heart disease - from a diagnosis to a... cardiologist *Prof. Waldemar Banasiak (Wrocław)*

12:00-12:30 What am I breathing in? - on air pollution *Ewa Konduracka MD, PhD with habilitation (Kraków)*

12:30-12:35 Quiz for General Practitioners, pt. I *Ernest Kuchar MD, PhD [doktor habilitowany] (Warsaw)*

12:35-12:50 Discussion

12:50-13:50 Satellite session

13:50-14:30 Lunch

Session II

14:30-15:00 Sitting hurts - proctological problems in Primary Health Care practice *Małgorzata Kołodziejczak MD, PhD [doktor habilitowany] (Warsaw)*

15:00-15:30 Restless legs syndrome - it is still not a diagnosis *Adam Wichniak MD, PhD [doktor habilitowany] (Warsaw)*

15:30-16:00 Practical approach to opioids in the treatment of chronic nonmalignant pain *Magdalena Kocot-Kępska MD, PhD (Kraków)*

16:00-16:30 On the other side of the preventive vaccination plan - vaccinations in adults *Prof. Jacek Wysocki (Poznań)*

16:30-16:35 Quiz for General Practitioners, pt. II *Ernest Kuchar MD, PhD [doktor habilitowany] (Warsaw)*

16:35-17:00 Discussion

17:00-17:15 Coffee break

Session III

17:15-17:45 On qualifying children for PE classes *Ernest Kuchar MD, PhD [doktor habilitowany] (Warsaw)*

17:45-18:15 To see the pain in an X-ray image, or on spine imaging diagnostics *Agnieszka Marcinowska-Kaliszczak MD, PhD (Kraków)*

18:15-18:45 Parasitic skin diseases *Anita Hryncewicz-Gwóźdź MD, PhD [doktor habilitowany] (Wrocław)*

18:45-18:50 Quiz for General Practitioners, pt. I - answers and commentary *Ernest Kuchar MD, PhD [doktor habilitowany] (Warsaw)*

18:50-19:05 Discussion

Saturday

Breakfast session. Current recommendations with regard to nutrition and physical activity

8:15-8:20 Introduction

8:20-8:30 Does new mean better? *Jakub Sobiecki MSc, nutritional epidemiologist (Warszawa)*

8:30-8:40 10 minutes for change - is it possible? *Małgorzata Majewska PhD (Kraków)*

8:40-8:50 How to get traction? *Mikołaj Wiśniewski MD (Bydgoszcz)*

8:50-9:00 Break

Session IV

9:00-9:30 Neuropathy, ischemia, and diabetic foot - procedures in a general practice *Ireneusz Szymczyk MD, PhD (Zabrze)*

9:30-10:00 Haloperidol with tea, or on behavioral disorders in the elderly *Małgorzata Fedyk-Łukasik MD, PhD (Kraków)*

10:00-10:30 When can a patient sue a general practitioner? *Radosław Tymiński PhD in law, legal counsel (Warsaw)*

10:30-11:00 Stop smoking, start running - how to talk about a healthy change *Małgorzata Majewska PhD (Kraków) Mikołaj Wiśniewski MD (Bydgoszcz)*

11:00-11:30 Evidence of hepatic steatosis in an ultrasound image *Prof. Andrzej Habior (Warsaw)*

11:30-11:35 Quiz for General Practitioners, pt. II - answers and commentary *Ernest Kuchar MD, PhD [doktor habilitowany] (Warsaw)*

11:35-12:00 Discussion

12:00-13:00 Satellite session

13:00-13:40 Lunch

Session V

13:40-14:10 Primary immunodeficiencies in children *Prof. Maciej Siedlar (Kraków)*

14:10-14:40 Parathyroid glands, calcium and vitamin D_3 *Prof. Tomasz Bednarczuk (Warsaw)*

14:40-15:10 Veganism, vegetarianism and other diets *Jakub Sobiecki MSc, nutritional epidemiologist (Warsaw)*

15:10-15:40 Acute urological conditions in children *Prof. Maciej Bagłaj (Wrocław)*

15:40-16:10 Laryngological problems in a general practice *Danuta Raj-Koziak MD, PhD (Kajetany)*

16:10-16:40 Discussion

16:40 Closing of the Conference

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internal medicine 2017

XVI National Training Conference of the Polish Society of Internal Medicine
Progress in internal diseases

Warsaw, Gromada Conference Centre, 31 March - 1 April 2017
Kraków, ICE Kraków Congress Centre, 26-27 May 2017

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