



THE USE OF THE *LATISSIMUS DORSI* MUSCLE FLAP IN BREAST RECONSTRUCTION AFTER MASTECTOMY COMPLICATED BY IMPLANT SITE INFECTION

Zastosowanie płata z mięśnia najszerzego grzbietu w rekonstrukcji piersi po mastektomii powikłanej zakażeniem łoży implantu



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Abstract

The *latissimus dorsi* musculocutaneous flap has recently been increasingly used in breast reconstruction after mastectomy. The technique utilises the *latissimus dorsi* muscle with an island skin flap and adipose tissue to create full-thickness tissue coverage and achieve increased volume for the reconstructed breast. By combining this method with prosthetic devices, such as implants or tissue expanders, satisfactory outcomes can be achieved. This paper presents a literature review on the transplantation of the *latissimus dorsi* musculocutaneous flap and describes a case of a 43-year-old patient who underwent reconstruction using a *latissimus dorsi* muscle flap after previous cancer treatment. The patient had previously undergone mastectomy with simultaneous breast reconstruction using implants. The procedure was complicated by implant site infection, necessitating implant removal. Breast reconstruction using the *latissimus dorsi* flap was combined with a tissue expander for subsequent replacement with an implant. The presented case suggests that the *latissimus dorsi* flap can be an effective and safe method of breast reconstruction after mastectomy in situations where less advanced reconstruction techniques fail.

Streszczenie

W ostatnich czasach płat mięśniowo-skórny mięśnia najszerzego grzbietu jest coraz częściej stosowany w rekonstrukcji piersi po mastektomii. Technika ma na celu wykorzystanie uszypułowanego mięśnia *latissimus dorsi* z wyspą skórną i tkanką tłuszczową w celu wytworzenia pełnowartościowego pokrycia tkankowego oraz uzyskania zwiększonej objętości rekonstruowanej piersi. Łącząc tę metodę z zastosowaniem urządzeń protetycznych, takich jak implanty lub ekspander tkankowy, można osiągnąć zadowalający efekt. W pracy przedstawiono przegląd literatury dotyczący przeszczepu płata mięśniowo-skórnego mięśnia najszerzego grzbietu oraz opis przypadku 43-letniej pacjentki, która została poddana rekonstrukcji z wykorzystaniem płata z mięśnia *latissimus dorsi* po przebytej chorobie nowotworowej. Pacjentka w przeszłości przeszła mastektomię z jednoczasową rekonstrukcją piersi z użyciem implantów. Zabieg został powikłany zakażeniem łoży implantu, w efekcie czego konieczne było jego usunięcie. Rekonstrukcję piersi z użyciem płata *latissimus dorsi* zastosowano w połączeniu z ekspanderem tkankowym w celu późniejszej zamiany na implant. Prezentowany przypadek wskazuje, że płat *latissimus dorsi* może być skutecznym i bezpiecznym sposobem rekonstrukcji piersi po mastektomii, kiedy mniej zaawansowane techniki rekonstrukcyjne zawodzą.

Keywords: infection; breast reconstruction; flap plasty; *latissimus dorsi* muscle

Słowa kluczowe: zakażenie; rekonstrukcja piersi; plastyka płatowa; mięsień najszerzy grzbietu

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Introduction

Implant site infection following breast reconstruction after mastectomy is a common complication. Breast reconstruction after mastectomy is currently the gold standard and an integral part of the treatment process. There are many reconstruction approaches, including prosthetic reconstruction (implant), a tissue expander combined with a prosthesis, or the use of patient's own tissue (microcutaneous/adipose tissue flaps) [1].

Haematoma, infection, skin necrosis and implant loss are the most common complications encountered in medical practice following radiotherapy in patients after breast reconstruction. According to the available data, the reconstruction failure rate after radiotherapy is 6–62.6% [2]. Radiotherapy increases the risk of complications to 55% [3] and the risk of implant loss to 4.8–33% [4].

The use of muscle flaps allows for covering deep and extensive tissue defects (post-resection or post-traumatic). Muscle is an optimally vascularised tissue material, which is used for defects after infection or irradiation, where the quality of tissue blood supply is questionable. It is commonly employed in reconstructive surgery also due to its structure. It is large, flat, and has a large flap pedicle with vessels.

Case report

A 43-year-old woman was electively admitted to the Department of Plastic and Reconstructive Surgery and Burn Treatment due to loss of tissue in the right breast as a result of postoperative wound dehiscence following the removal of a tissue expander due to infection. She had a history of right mastectomy with simultaneous breast reconstruction using an implant, with adjuvant radiotherapy. The patient was qualified for right breast reconstruction with a latissimus dorsi flap (LD flap), with simultaneous placement of a temporary tissue expander and elective breast augmentation. The procedure began with a skin incision in the shape of the future LD island flap, and a simultaneous resection of a fragment of skin with the tissue defect. While dissecting the tissues, the capsule surrounding the old implant was accessed. The implant site was rinsed with an antiseptic. The capsule was incised longitudinally from the inside at the greatest adhesions and tensions in order to create space for the expander. Then a tunnel was made in the subcutaneous tissue towards the axilla, through which the prepared LD flap was to pass. Using a separate access on the back, an incision was made in the skin and the subcutaneous tissue, reaching the latissimus dorsi muscle. A flap of the appropriate size was raised to cover the tissue defect. The released island myocutaneous flap was transferred through the previously created subcutaneous tunnel to its target site on the right breast to maintain proper blood supply of the island. The patient was positioned on her left side during this part of intervention. Using subcutaneous and cutaneous sutures, the LD flap was attached to the right breast acceptor site. The patient was then placed on her back to proceed to the next stage of the procedure.

The tissue elasticity of the site was adjusted to the expander. Under sterile conditions, a Mentor 400cc expander was introduced under the created flap. Drains were placed and a port for fluid administration was introduced in order to gradually fill the expander, which was filled with 20 cm³ and then checked for potential leaks and the correct level of filling. Non-absorbable sutures were placed to recreate the inframammary fold and provide tissue support for the lower pole of the expander.

In the days following the procedure, the wound healed normally, without any inflammatory reaction around the sutures. The blood supply to the island was satisfactory. Follow-up visits were planned according to the schedule. The patient was discharged home in a good general and local condition. The peri- and intraoperative course was uneventful. There was no increase in body temperature or wound healing disorders. There was no visible inflammatory reaction around the sutures. The blood supply to the skin island remained normal during follow-up visits. On postoperative day 4 of hospital stay, follow-up laboratory tests were performed, which did not deviate from the norm. A slight increase in CRP to 2.3 mg/dL (norm up to 0.5 mg/dL) and a decrease in RBC to $3.60 \times 10^{12}/L$ (norm: $3.81\text{--}5.13$) were observed. Electrolyte levels were as follows: Na⁺: 135 mmol/L (norm: 136–145), K⁺: 5.1 mmol/L (norm: 3.5–5.1). Renal parameters were normal.

Amoxicillin was used for 7 postoperative days as perioperative prophylaxis.

Follow-up visits were held on day 1 after the procedure, and then every other day until discharge. Redon drains were removed 6 days post surgery due to the lack of abnormalities in their contents. It was decided to discharge the patient home on postoperative day 6.

The patient was instructed to maintain a resting lifestyle for the first 14–21 days after surgery. Then, gradual physical rehabilitation was prescribed (return to full life activity after 6–8 weeks). A high-protein diet was recommended to ensure optimal conditions for postoperative wound healing. Outpatient follow-up visits were arranged to assess flap healing and to gradually fill the expander with physiological saline solution.

Subsequent follow-up visits found no flap healing disorders. Blood supply remained satisfactory, with no postoperative wound dehiscence, pathological discharge, or signs of inflammation.

Three months after the surgery, full integration of the flap with the surrounding tissues was confirmed (fig. 1, fig. 2).

During a follow-up visit, a minor skin inflammation was observed in the form of redness and pain, located at the level of the second intercostal gap, parasternally on the right side, superiorly and medially in relation to the myocutaneous island (fig. 3). Therapy with non-steroidal anti-inflammatory drugs at standard doses was recommended, with improvement in the following days. A procedure to replace the expander with an implant was planned. Due to the visible asymmetry of



Figure 1. Full integration of the myocutaneous flap with the surrounding tissues three months postoperatively



Figure 2. Healed scar three months postoperatively



Figure 3. Three months postoperatively, a slight skin inflammation in the form of redness and pain, located in the area at the level of the second intercostal gap, parasternally on the right side, superiorly and medially in relation to the musculoskeletal island

the breasts, another procedure was planned to restore breast symmetry.

Discussion

In the case described above, an LD myocutaneous flap was used due to the failure of standard breast reconstruction after anticancer treatment. This method was chosen as it was considered an appropriate solution for a patient with questionable quality of breast soft tissues, as well as healing disorders after radiation therapy and a previous infection of the implant site.

In 2022, Słowacki et al. published a paper on the efficacy of the LD flap in patients who underwent a second-attempt implant-based reconstruction (IBR) with or without an LD flap between 2006 and 2019 [5]. The paper has shown that the combination of an LD flap with IBR may offer benefits compared to IBR alone in patients who have undergone radiotherapy in the past, and that the use of an LD flap may reduce the incidence of complications and increase the chance of reconstructive success.

Bacterial infection is a well-known complication with an incidence of 1–43%. *Staphylococcus aureus*, *Staphylococcus epidermidis*, and coagulase-negative staphylococci are the most common pathogens in breast implant infections [6].

In 2022, a study was published that demonstrated the benefits of an LD flap. The paper described a retrospective evaluation of patients who underwent a second attempt at IBR or free flap reconstruction after explantation due to infection between 2006 and 2019 [7]. The authors concluded that given the high failure rate of implant-based breast reconstruction in patients with prior radiotherapy and failure due to infection, autologous reconstruction should be strongly considered in this population.

An LD flap not only ensures a satisfactory aesthetic outcome, but also carries a low risk of complications and offers good healing outcomes. Such conclusions were reached in a publication describing cases of patients who presented for delayed breast reconstruction and underwent LD myocutaneous flap transplantation. The 1999–2007 patient medical records were reviewed for age, type of mastectomy, history of chest wall radiation therapy, reconstruction of the nipple-areola complex, and complications at both the donor and acceptor sites. The researchers concluded that an LD flap provides adequate soft tissue and reliable blood supply to reinforce the missing tissues after mastectomy. It is a safe method of breast reconstruction and an excellent alternative for patients at high risk of complications [8].

This approach is often used for salvage purposes when other breast reconstruction techniques have failed. For example, Chiasson et al. (2020) reviewed the use of an LD flap in combination with prosthetic devices, regardless of the need for adjuvant radiotherapy, and assessed the safety and efficacy of this approach as a primary method of reconstruction. Their conclusions were as follows: autologous tissue alleviates many of the sequelae of radiotherapy. Reconstruction with LD myocutaneous flap

combined with prosthetic devices is a safe option, even in the setting of adjuvant radiotherapy. It has high success rates [9].

Petrescu et al. presented evidence for the efficacy of the LD flap technique. Based on this work, the following conclusions were drawn: careful planning of breast reconstruction using an LD flap in combination with implant reconstruction provides stable outcomes and excellent cosmetic appearance of reconstructed breasts, while minimising the risk of complications. As a result, the quality of life of patients is significantly improved, with relatively rapid social and occupational reintegration [10].

An LD flap is very commonly used for breast reconstruction. This method involves using muscle to vascularize the skin and/or increase the volume of the reconstructed breast [11]. The morbidity associated with the procedure is low, and the surgery is well tolerated even in the presence of risk factors. This is a good option for mastectomy patients seeking breast reconstruction.

Considering factors such as the number of applications and the potential for excellent aesthetic outcomes, the use of LD flaps may be considered as a first-line option in selected patients [12]. An LD flap offers many benefits, including trophicity and very low complication rates [13]. It can be used successfully in women with skin damaged by radiation therapy. In contrast to implant-only reconstruction, this approach provides well-supplied graft, which results in a better aesthetic outcome. The recovery period after implant placement is 6–8 weeks [14]. However, this method may also have adverse effects. Physicians performing breast reconstruction procedures should use knowledge about the complications that occur and clearly inform patients about the benefits and disadvantages of LD muscle transposition [15]. Breast reconstruction using an LD muscle flap offers very good outcomes with a low rate of complications [16].

Conclusions

Postoperative wound healing disorders after mastectomy with breast reconstruction and radiotherapy pose a serious clinical challenge. The presented method is an appropriate solution for patients with wound healing disorders after radiotherapy and a history of implant site infection, as confirmed in the presented case. The LD flap provides well-supplied tissue of adequate quality to cover the soft tissue defect. In the case of failure of less complex reconstructive approaches, such as free skin grafts or local flap plasty, an LD flap may be an appropriate method for covering tissue defects. The presented breast reconstruction approach not only seems to be a safe and appropriate alternative for patients at high risk of complications, but it also offers satisfactory aesthetic and healing outcomes.

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