Latissimus Dorsi Thoracolateral Flap: A New Option for Total Autologous Breast Reconstruction

Retalho do músculo latíssimo do dorso toracolateral (LDTL): Uma nova opção para a reconstrução autóloga da mama

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Abstract

Introduction Mastectomy for breast cancer has a significant psychological impact, making breast reconstruction an essential component of comprehensive care. Techniques using tissue expanders and implants have become widely adopted due to their accessibility; however, they may be associated with complications such as capsular contracture, infection, and implant rupture. In contrast, autologous reconstruction provides greater naturalness, consistency, and long-term durability. The latissimus dorsi musculocutaneous flap, first described by Tansini and popularized in the 1970s, has evolved through technical modifications and the incorporation of fat grafting, enabling its use as a standalone method. The thoracolateral latissimus dorsi (TLLD) flap was introduced in 2016. The current study describes its anatomical characteristics, surgical technique, and clinical outcomes.

Methods The present descriptive study was based on a review of medical records and a prospective database of patients who underwent breast reconstruction with the TLLD flap at Instituto do Câncer do Estado de São Paulo (ICESP) between 2017 and 2023.

Results In total, 95 patients underwent surgery, with a mean age of 43.5 years and a mean body mass index (BMI) of 32.8 kg/m^2. Delayed reconstruction was performed in 70% of the cases. The main indications were recurrent capsular contracture, implant infection or rupture, and contraindication to abdominal flaps. Fat grafting was performed in 16% of the patients. Complications, including seroma, wound dehiscence, and epidermolysis, occurred in 11 cases.

Keywords
- breast neoplasms
- surgical flaps
- mammaplasty
- myocutaneous flap
- anatomy

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Conclusion The LDTL flap proved to be an effective and safe alternative for breast reconstruction, particularly in cases of previous reconstructive failure or complications related to alloplastic materials, establishing itself as a versatile salvage technique.

Resumo

Introdução A mastectomia para o tratamento do câncer de mama provoca grande impacto psicológico, e a reconstrução mamária é fundamental. As técnicas com expansores e implantes se popularizaram pelo fácil acesso, mas podem apresentar complicações como contratura capsular, infecção e ruptura. Em contrapartida, as reconstruções autólogas oferecem naturalidade, consistência e durabilidade. O retalho miocutâneo do músculo latíssimo do dorso, descrito por Tansini e difundido na década de 1970, evoluiu com modificações técnicas e o uso de lipoenxertia, o que possibilita o seu emprego isolado. Em 2016, foi proposta uma variação: o retalho do músculo latíssimo do dorso toracolateral (LDTL), que expandiu as indicações para a reconstrução total da mama. Este estudo descreve as suas características, a técnica cirúrgica e os resultados clínicos.

Métodos Trata-se de estudo descritivo, baseado na revisão de prontuários de pacientes submetidas à reconstrução com o retalho LDTL no Instituto do Câncer do Estado de São Paulo (ICESP) entre 2017 e 2023.

Resultados Ao todo, foram operadas 95 pacientes, com idade média de 43,5 anos e índice de massa corporal (IMC) médio de 32,8 kg/m^2. A reconstrução tardia foi realizada em 70% dos casos. As principais indicações foram contratura capsular recidivante, infecção ou ruptura de implantes e impossibilidade de uso de retalhos abdominais. A lipoenxertia foi aplicada em 16% das pacientes. Complicações, incluindo seroma, deiscência e epidermólise, ocorreram em 11 casos.

Conclusão O retalho LDTL demonstrou ser alternativa eficaz e segura para a reconstrução mamária, especialmente em situações de falhas reconstrutivas ou complicações associadas a materiais aloplásticos, de modo que se configura como técnica versátil e de resgate.

Palavras-chave
- neoplasias da mama
- retalho cirúrgicos
- retalho miocutâneo
- mamoplastia
- anatomia

Introduction

The psychological impact of breast loss on the mental health of women undergoing treatment for breast cancer is immeasurable. Breast reconstruction is an integral component of comprehensive breast cancer treatment, providing physical and psychological benefits.

The advent of reconstructive techniques using alloplastic materials has enabled broader access to reconstruction for many women. Despite the technological advances in the development of tissue expanders and implants, reconstruction with these materials may result in complications, including capsular contracture, rupture, infection, and loss of esthetic outcome, which may compromise patients' quality of life.

Autologous reconstruction provides several advantages, including greater naturalness, consistency, and long-term maintenance of results. Multiple studies comparing autologous and alloplastic reconstructions demonstrate the advantages of flap-based techniques with respect to quality of life and durability of outcomes.

The latissimus dorsi musculocutaneous flap was first described by Tansini,[1] and it became widely-adopted in the 1970s in association with implants for volume augmentation. Subsequent modifications in flap design, dissection technique, and incorporation of fat grafting enabled breast-volume reconstruction using the flap in isolation, without the need for implants.

In 2016 at our institution, Arruda proposed a modification to the flap design, incorporating the cutaneous portion located anteriorly to the anterior border of the muscle. This new design expanded the indications for total breast reconstruction. The modified flap was named *TLLD*, reflecting the combination of the thoracolateral flap and the latissimus dorsi flap.

Objective

The current study aims to describe the anatomical characteristics of the TLLD flap, the technical aspects of the surgical dissection, the complications, and the main indications.

Methods

The present descriptive study was based on a review of data obtained from a prospectively-maintained database and the

Fig. 1 Aspect after removal of an infected tissue expander following radiation therapy.

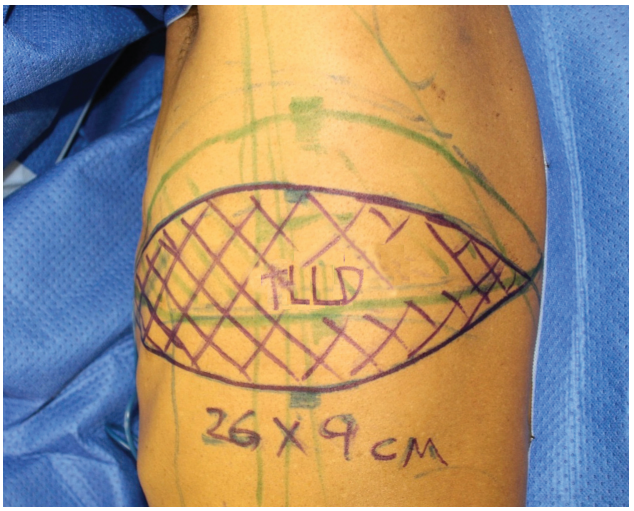

Fig. 2 Preoperative marking. **Abbreviation:** TLLD, thoracolateral latissimus dorsi muscle flap.

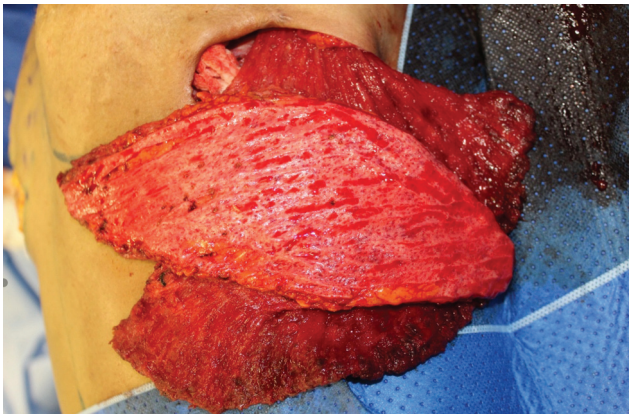

Fig. 3 De-epithelialized flap.

medical records of patients who underwent breast reconstruction using the TLLD flap at Instituto do Câncer do Estado de São Paulo (ICESP) from 2017 to 2023.

Flap design

With the patient in the standing position, anatomical landmarks are delineated, including the inferior border of the scapula, the posterior axillary line, and the posterosuperior iliac spine. The flap axis corresponds to the projection of the inframammary fold. The cutaneous component extends from the dorsal midline to the midmammary line, following the specific indication in each case. A bidigital pinch test determines the appropriate width of the cutaneous portion of the flap (►**Fig. 1**).

Dissection technique

With the patient in lateral decubitus, infiltration is performed using an anesthetic solution containing epinephrine at a concentration of 1:100 thousand throughout the planned incision area. Flap elevation is initiated superiorly in the plane superficial to the muscle, with creation of a subcutaneous tunnel toward the breast when indicated. The segment located anteriorly to the border of the latissimus dorsi muscle is dissected in the subfascial plane. Dissection then proceeds distally until an adequate amount of muscular tissue is obtained, according to the requirements of each case. Following division of the distal portion, dissection continues along the deep surface of the muscle toward the vascular pedicle. After ligation of the branch to the serratus anterior muscle, the main pedicle is isolated, and the thoracodorsal nerve is divided. The humeral insertion is subsequently released, and the flap is rotated into the breast region (►**Figs. 2**–**3**). The inset is performed using absorbable sutures. The donor site is closed with the aid of adhesion sutures using VICRYL 2-0 (Ethicon Inc.). A #15 Blake drain (Ethicon Inc.) is placed in the reconstructed breast and axillary tunnel. The tendinous portion of the muscle is secured to the lateral chest wall to protect the vascular pedicle (►**Fig. 4**).

Fig. 4 Late postoperative status.

Results

Between 2017 and 2023, 95 patients underwent reconstruction using this technique. They had a mean age of 43.5 (range: 34–75) years, and a mean body mass index (BMI) of 32.8 (range: 22.5–34.2) kg/m^2. In total, 12 patients were smokers, and 83 were non-smokers. Overall, 75% of the patients presented with at least 1 comorbidity, including arterial hypertension, diabetes, hypothyroidism, and cardiac conditions.

Most reconstructions were performed in the delayed setting (70%), whereas 30%, at the time of mastectomy. The main indications for the technique were recurrent capsular contracture, expander/implant infection, rupture, desire to change the reconstructive method, failure of another autologous flap, and comorbidities precluding the use of an abdominal flap, such as morbid obesity.

A total of 15 patients (16%) underwent fat grafting of the flap, with injected volumes ranging from 90 to 200 mL. The de-epithelialized area was total in 54 cases (56%) and partial in 41 (44%). Flap dimensions ranged from 22 to 49 cm in length and from 8 to 18 cm in width.

Eleven patients developed complications, including donor-site seroma (2 cases), epidermolysis (3 cases), wound dehiscence (2 cases), wound infection (1 case), and vascular compromise (3 cases), including one case of venous congestion and one case of partial necrosis (4 × 2 cm).

Discussion

Despite its description in the early twentieth century,[1,3] the latissimus dorsi flap was popularized for breast reconstruction by Bostwick et al.[2] in 1978. Numerous modifications have since been described, expanding its indications.

Its consistent anatomy and robust vascularization enable its application in various breast and thoracic reconstructive scenarios. It may be used as a muscular, musculocutaneous, or osteomyocutaneous flap.

Following its initial description in breast reconstruction, several authors introduced modifications aimed at increasing flap dimensions and volume. In 1987, Hokin and Silfverskiold[4] proposed the inclusion of the lumbar fascia. In 1996, Germann and Steinau[5] reported inclusion of the scapular fascia and fat. In 1998, Papp and McCraw[6] described enlargement of the cutaneous component using an anchor-shaped incision. In 1995, Angrigiani et al.[7] presented the extended thoracodorsal artery perforator flap, incorporating the scapular and lumbar fasciae. In 2012, Tame and Ledo[8] described the dorsum-epigastric flap, expanding the limits of the cutaneous portion while reducing the muscular component used. In 2019, Koonce et al.[9] incorporated indocyanine green angiography and defined vascular territories within the cutaneous portion. In 1996, Barnett and Gianoutsos[10] reported the use of fat grafting for volumetric augmentation, thereby eliminating the need for implants.

The design modification described in the present study encompasses the lateral thoracic region, incorporating the cutaneous portion of the lateral thoracic flap (Holmström and Lossin, 1986).[11] The extent of the muscular component is variable and depends on individual patient requirements. The tendinous portion located near the posterosuperior iliac spine should not be included because it has relatively limited vascularization, represents a suboptimal recipient bed for fat grafting, and increases the risk of lumbar hernia.[12] In addition to volumetric enhancement of the flap, mobilization of tissue from the lateral region may improve regional body contour in obese patients or those with excess lateral skin and adiposity.

The dimensions of the cutaneous portion, the volume of the adipose pad, and the possibility of fat grafting enabled fully-autologous reconstruction, achieving natural results with breast symmetry. The indications for the flap include immediate and delayed reconstructions requiring volume and/or cutaneous coverage. Among the procedures performed, 36 patients underwent removal of an expander or implant with replacement by the flap due to infection, rupture, exposure, or capsular contracture. The contraindications are consistent with those of the traditional latissimus dorsi flap, and they include prior thoracic surgeries with incisions within the flap territory and previous ligation of the vascular pedicle.

The advantages of the TLLD flap include rapid dissection, technical simplicity, avoidance of a microsurgical procedure, adequate flap volume, and reduced donor-site morbidity compared with pedicled abdominal flaps. The main disadvantage is the presence of a dorsal scar; however, this scar is linear and positioned at bra level, according to the flap design. Other disadvantages, such as decreased shoulder strength and flap atrophy, are well established in the literature.

A subgroup warranting particular attention consists of patients with morbid obesity, who, due to specific characteristics such as increased breast volume, ptosis, and elevated intra-abdominal pressure, are poor candidates for reconstruction using either alloplastic materials or abdominal flaps. Flap use enables total reconstruction of large and ptotic breasts without the risks of abdominal hernia or complications associated with alloplastic materials.

In the present study, the overall complication rate was of 32%. The complications were either minor, including epidermolysis, wound dehiscence (a single case required resuturing under local anesthesia), wound infection, and donor-site seroma (8%), or major, such as vascular compromise (5%). No flap loss occurred. These findings are consistent with those of previously-published studies that report complication rates of up to 34.9%.

According to Pirro et al. (2017),[13] patients undergoing breast reconstruction with autologous tissue report greater satisfaction with the breast outcomes compared with alloplastic reconstruction after the application of the BREAST-Q. This satisfaction is attributed to more durable and predictable results, improved outcomes in patients with complex cases and/or undergoing radiation therapy, and absence of anaplastic large cell lymphoma risk.

Conclusion

The TLLD flap is an option for immediate or delayed autologous breast reconstruction. It represents an additional salvage alternative in patients with prior reconstructive failure, infection related to alloplastic materials, or recurrent capsular contracture.

Data Availability

Data will be available upon request to the corresponding author.

Authors' Contributions

EM: data analysis and/or interpretation, final manuscript approval, conceptualization, study conception and design, project management, investigation, writing – original draft; and writing – review & editing; EGPA: conceptualization and investigation; LMD: data collection and writing – original draft; EMC: methodology and writing – review & editing; TU: final manuscript approval and performance of surgeries and/or experiments; AMM e FFB: statistical analysis; and RG: data analysis and/or interpretation.

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Clinical Trials

None.

Conflict of Interests

The authors have no conflict of interests to declare.

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