

Latissimus Dorsi Flap for Breast Reconstruction: Indications, Technical Variants, Outcomes, And Contemporary Role

Marisela Silva García^{*1}, Regina Gallardo Santiago², Wanda Paola Triana Sanguino³, Sabina Andrea Sánchez Cartela⁴, Edson Misael Ventura Romero⁵

¹Hospital General Dr. Miguel Silva, Morelia, Michoacán, Mexico

²Hospital Ángeles, Morelia, Michoacán, Mexico

³Hospital Regional de Alta Especialidad de Ixtapaluca, Estado de México, Mexico

⁴Hospital General de Zona No. 32, Instituto Mexicano del Seguro Social (IMSS), Coyoacán, Ciudad de México, Mexico

⁵Hospital General de Zona con Medicina Familiar No. 6, San Nicolás de los Garza, Nuevo León, Mexico

ABSTRACT

The latissimus dorsi flap remains one of the most reliable and versatile options in breast reconstruction. Although the increasing use of perforator-based microsurgical flaps and implant-based techniques has changed reconstructive algorithms, the latissimus dorsi flap continues to play an important role in immediate and delayed reconstruction, salvage procedures, partial breast reconstruction, irradiated fields, and patients who are not ideal candidates for abdominal free flaps. The flap may be transferred as a muscle-only, myocutaneous, fat-extended, muscle-sparing, or hybrid flap combined with an implant or tissue expander. Its advantages include consistent vascular anatomy, robust perfusion, predictable transfer, and applicability in complex clinical scenarios. The main limitation is donor-site morbidity, particularly seroma, although modern muscle-sparing, fat-augmented, anterior-approach, and optimized skin-paddle designs aim to reduce complications and improve aesthetic outcomes. Long-term studies generally report high patient satisfaction, acceptable complication rates, low total flap loss, and limited persistent shoulder dysfunction. This review summarizes the indications, operative variants, outcomes, complications, patient-reported satisfaction, and contemporary role of the latissimus dorsi flap in breast reconstruction.

KEYWORDS: latissimus dorsi flap; breast reconstruction; myocutaneous flap; muscle-sparing flap; fat-augmented flap; implant reconstruction; partial breast reconstruction; donor-site morbidity.

ARTICLE DETAILS

Published On:
29 May 2026

Available on:
<https://ijmscrs.com>

INTRODUCTION

Breast reconstruction has evolved substantially with the development of implant-based reconstruction, perforator flaps, microsurgical free tissue transfer, fat grafting, and oncoplastic techniques. Despite these advances, the latissimus dorsi flap remains a dependable reconstructive option because of its reliable thoracodorsal vascular pedicle, broad arc of rotation, and ability to provide vascularized tissue to the anterior chest wall [1].

The latissimus dorsi flap can be used for total or partial breast reconstruction, either immediately after mastectomy or as a delayed procedure. It is particularly valuable in patients with previous radiation therapy, failed implant reconstruction,

insufficient abdominal donor tissue, prior abdominal surgery, obesity, smoking, or limited access to microsurgical reconstruction [1–3]. In these settings, the flap provides well-vascularized tissue that may improve implant coverage, reinforce compromised soft tissue, or reconstruct partial breast defects after breast-conserving surgery.

Historically, the latissimus dorsi flap was often combined with an implant because the flap alone did not always provide sufficient volume for total breast reconstruction. Contemporary modifications, including fat-extended flaps, muscle-sparing approaches, fat grafting, optimized skin paddles, and scar-minimizing anterior approaches, have expanded its indications while reducing donor-site morbidity

[4–6].

METHODS

This narrative review was developed from the provided literature synthesis on the latissimus dorsi flap for breast reconstruction. The review focused on indications, flap configurations, surgical variants, outcomes, complications, functional impact, patient-reported satisfaction, and modern technical refinements. References were organized numerically according to their first appearance in the manuscript.

Anatomical Basis

The latissimus dorsi is a broad, flat muscle of the posterior thorax and lumbar region. It is primarily supplied by the thoracodorsal artery and vein, which arise from the subscapular system. The thoracodorsal nerve provides motor innervation. This consistent neurovascular anatomy explains the flap's reliability and makes it suitable for pedicled transfer to the anterior chest.

The flap can include muscle alone, muscle with overlying skin, subcutaneous fat, or extended fatty tissue. The skin paddle can be designed according to the reconstructive requirement, scar position, and breast shape. Because the pedicled flap can be tunneled to the breast pocket, it avoids microvascular anastomosis and remains useful in centers without microsurgical resources or in patients with limited recipient vessel options.

Indications

The latissimus dorsi flap has several established indications in breast reconstruction. It may be used after mastectomy for total breast reconstruction, after lumpectomy or quadrantectomy for partial breast reconstruction, or as a salvage option after complications of implant-based reconstruction [1,7].

It is especially useful in patients who are poor candidates for abdominal-based reconstruction. This includes patients with prior abdominal surgery, inadequate abdominal tissue, high risk for abdominal wall morbidity, or contraindications to prolonged microsurgical procedures [2,3]. It is also valuable in irradiated fields, where vascularized tissue may improve wound healing and implant coverage.

The flap may be selected when there is a need to cover an implant, protect an expander, replace deficient soft tissue, correct contour deformity, or reconstruct a partial defect after breast-conserving therapy. In partial breast reconstruction, the latissimus dorsi flap can restore volume and shape while preserving the breast envelope [7].

Standard Latissimus Dorsi Flap With or Without Implant

The classic latissimus dorsi myocutaneous flap transfers the muscle with an overlying skin paddle to the anterior chest. Because the volume of the flap alone may be insufficient for total reconstruction in many patients, it is frequently combined with an implant or tissue expander [1,8].

This hybrid approach offers several advantages. The flap

provides vascularized coverage over the implant, improves soft-tissue thickness, and may reduce the risk of implant exposure in compromised tissue. It can be used in immediate or delayed reconstruction and remains particularly useful after radiation or failed implant reconstruction.

Hammond described the latissimus dorsi flap as a reliable method for breast reconstruction, emphasizing its predictable anatomy and applicability in a wide range of clinical scenarios [8]. More recent series continue to support its role as a safe and effective reconstructive option, especially when other autologous donor sites are unavailable or undesirable [2,3].

Muscle-Sparing and Fat-Extended Latissimus Dorsi Flaps

One of the major criticisms of the traditional latissimus dorsi flap is donor-site morbidity, particularly seroma formation and potential shoulder dysfunction. Muscle-sparing and fat-extended techniques were developed to reduce these limitations while maintaining adequate reconstructive volume.

The fat-extended, muscle-sparing latissimus dorsi flap incorporates additional adipose tissue while preserving part of the muscle. This approach aims to increase breast volume, improve contour, reduce functional impairment, and decrease donor-site morbidity [4]. Escandón et al. highlighted the versatility of the latissimus dorsi flap and described modern refinements that improve its role in contemporary breast reconstruction [2].

Muscle-sparing techniques are particularly attractive in patients who require autologous tissue but wish to minimize donor-site functional loss. These approaches may also reduce seroma rates compared with traditional full-muscle harvest [4,5].

Scarless and Anterior-Approach Latissimus Dorsi Flap

Aesthetic concerns related to the posterior donor-site scar have led to the development of scar-minimizing and anterior-approach techniques. The so-called scarless latissimus dorsi approach avoids a visible back scar by harvesting the flap through an anterior incision or through access related to the mastectomy incision.

This technique may be particularly useful when the flap is needed primarily for implant protection, soft-tissue reinforcement, or salvage of threatened reconstruction. Loreti et al. reported favorable aesthetic outcomes using the anterior-approach scarless latissimus dorsi muscular flap for breast reconstruction [6].

The main advantage is improved donor-site aesthetics. However, the approach may be technically more demanding and may not be suitable when a large skin paddle is required. Careful patient selection is therefore essential.

Fleur-de-Lis and Optimized Skin Paddle Designs

Skin paddle design influences breast shape, inset, scar position, and donor-site closure. The fleur-de-lis latissimus dorsi skin paddle has been proposed to improve shaping and volume distribution, particularly in patients requiring more complex breast mound reconstruction.

Javeed et al. reported that fleur-de-lis skin paddle latissimus dorsi myocutaneous flaps achieved favorable aesthetic outcomes in a high proportion of patients [9]. This design may be useful when additional skin is needed or when three-dimensional shaping is a major reconstructive priority.

Other refinements include transverse, oblique, vertical, and customized skin paddle designs. The ideal design should balance breast requirements with donor-site closure, scar concealment, and patient preference.

Latissimus Dorsi Flap for Partial Breast Reconstruction

The latissimus dorsi flap is not limited to total breast reconstruction. It can also be used for partial breast defects after breast-conserving surgery, especially when local glandular rearrangement is insufficient or when the defect is lateral, posterior, or large relative to breast volume.

Merikli et al. reported that the latissimus dorsi myocutaneous flap is a safe and effective method for partial breast reconstruction in the setting of breast-conserving therapy [7]. In these patients, the flap can replace missing volume, reduce deformity, and maintain breast contour.

Partial reconstruction with the latissimus dorsi flap may be especially helpful in patients with small or moderate breast size, unfavorable tumor-to-breast ratio, prior radiation, or defects that would otherwise produce significant distortion.

Immediate Versus Delayed Reconstruction

The latissimus dorsi flap can be used in both immediate and delayed reconstruction. Immediate reconstruction allows restoration of breast shape at the time of mastectomy and may reduce the psychological burden of breast loss. Delayed reconstruction may be preferred when oncologic treatment, radiation planning, infection, wound complications, or patient factors make immediate reconstruction less favorable. Liu et al. described immediate breast reconstruction using a latissimus dorsi muscular flap and supported its utility as a reliable reconstructive method [10]. Delayed reconstruction may be particularly beneficial in patients who have already completed radiation or who present after failed implant reconstruction.

The timing should be individualized according to oncologic treatment plan, mastectomy flap quality, need for radiation, comorbidities, and patient preference.

Hybrid Reconstruction With Implant or Tissue Expander

Hybrid reconstruction combines the latissimus dorsi flap with an implant or tissue expander. This remains one of the most common uses of the flap because the muscle and soft tissue improve implant coverage and reduce contour deficiencies.

The flap may be placed over the implant to reinforce the lower or lateral pole, improve soft-tissue thickness, and protect against implant exposure. In delayed cases, it can replace irradiated or scarred tissue and improve the quality of the implant pocket.

Modern hybrid approaches increasingly incorporate fat grafting to improve contour, reduce implant visibility, and enhance soft-tissue quality. These refinements have made latissimus-based reconstruction more adaptable and

aesthetically competitive.

Complications

The most common complication of latissimus dorsi flap reconstruction is donor-site seroma. Reported rates vary widely, with traditional techniques showing higher rates and muscle-sparing approaches reporting lower rates [2–5]. Seroma is usually manageable with aspiration, drains, compression, quilting sutures, or prolonged drainage, but it remains a relevant source of postoperative morbidity.

Other complications include wound dehiscence, infection, hematoma, partial flap necrosis, mastectomy skin flap necrosis, implant-related complications, and donor-site scar dissatisfaction. Total flap loss is rare because of the robust thoracodorsal pedicle [2,3,10].

Banys-Paluchowski et al. reported outcomes from a large single-institution evaluation and confirmed that latissimus dorsi flap reconstruction is generally safe, although complications remain clinically relevant and should be discussed with patients during preoperative counseling [3].

Functional Impact and Shoulder Morbidity

Because the latissimus dorsi contributes to shoulder extension, adduction, and internal rotation, functional impairment has historically been a concern. However, most studies suggest that shoulder function often recovers over time, especially with rehabilitation, thoracodorsal nerve preservation when appropriate, and muscle-sparing techniques [2,4,11].

Wattoo et al. reported long-term outcomes of latissimus dorsi flap breast reconstruction with follow-up of up to 12 years and found low rates of chronic pain, shoulder stiffness, and unplanned revisions, with high satisfaction [11]. Older long-term data also support the durability and reliability of the flap [12].

Functional preservation is particularly important in active patients, athletes, manual workers, and patients with preexisting shoulder pathology. Preoperative counseling should include a discussion of expected recovery, physiotherapy, and possible donor-site symptoms.

Patient-Reported Outcomes

Patient-reported outcomes are essential in breast reconstruction because technical success does not always correlate with patient satisfaction. Studies using BREAST-Q and other tools have shown high satisfaction after latissimus dorsi flap reconstruction, including satisfaction with breast appearance, psychosocial well-being, and physical well-being [11,13].

Tomita et al. compared muscle and myocutaneous approaches in total breast reconstruction with fat-augmented latissimus dorsi flaps and emphasized the importance of flap design, volume optimization, and donor-site considerations [13].

Donor-site satisfaction may be improved by muscle-only, muscle-sparing, fat-extended, or scar-minimizing techniques [4–6,13].

Ultimately, satisfaction depends on breast shape, symmetry,

Latissimus Dorsi Flap for Breast Reconstruction: Indications, Technical Variants, Outcomes, And Contemporary Role

scar location, shoulder function, number of revision procedures, and whether the reconstruction meets the patient's expectations.

Contemporary Role in the Reconstructive Algorithm

The latissimus dorsi flap occupies a unique position in modern breast reconstruction. It is less technically demanding than free perforator flaps, more durable than implant-only reconstruction in compromised tissue, and more versatile than many local options. It is particularly useful as a "workhorse" flap in complex reconstruction.

Its contemporary roles include:

Salvage after failed implant reconstruction. Reconstruction in

irradiated fields.

Hybrid implant coverage when soft tissue is deficient.

Partial breast reconstruction after breast-conserving therapy.

Reconstruction when abdominal donor tissue is unavailable.

Reconstruction when microsurgery is unavailable or contraindicated. Volume enhancement with fat-extended or fat-augmented techniques. Scar-minimizing reconstruction in selected patients.

Although perforator flaps such as DIEP have become preferred in many centers for fully autologous reconstruction, the latissimus dorsi flap remains highly relevant because of its reliability, accessibility, and adaptability.

Table 1. Contemporary Uses and Technical Variants of the Latissimus Dorsi Flap in Breast Reconstruction

Technique / variant	Main indication	Key advantage	Main limitation	Best clinical scenario
Standard latissimus dorsi flap ± implant	Immediate or delayed total breast reconstruction	Reliable anatomy, robust vascularity, technically reproducible	Often insufficient volume alone; donor-site seroma	Patients needing dependable reconstruction when implant-only or abdominal flaps are not ideal [1–3,8]
Latissimus dorsi flap with tissue expander	Staged reconstruction after mastectomy	Allows gradual pocket creation and volume adjustment	Requires second surgery and implant exchange	Patients with uncertain skin envelope, irradiated tissue, or need for staged reconstruction [1,3,8]
Hybrid latissimus dorsi flap + implant	Total breast reconstruction requiring added volume	Combines vascularized tissue coverage with implant volume	Implant-related complications remain possible	Thin patients, irradiated fields, failed implant reconstruction, or deficient soft-tissue coverage [1,3,10,14]
Muscle-only latissimus dorsi flap	Implant protection or reinforcement without skin paddle	Avoids additional cutaneous paddle and may improve donor-site aesthetics	Limited skin replacement; volume may be insufficient	Salvage of threatened implants or cases requiring vascularized muscular coverage [5,6,10]

Myocutaneous latissimus dorsi flap	Reconstruction requiring both volume and skin replacement	Provides skin, muscle, and vascularized coverage	More visible donor-site scar and possible higher seroma risk	Delayed reconstruction, skin-deficient mastectomy defects, or partial breast defects [3,7,8]
Fat-extended latissimus dorsi flap	Autologous or hybrid reconstruction needing additional volume	Adds volume without relying only on implant size	More technically demanding; donor-site contour must be controlled	Patients needing more autologous bulk while preserving reliable pedicled reconstruction [4,13]
Muscle-sparing latissimus dorsi flap	Reconstruction with emphasis on shoulder function preservation	May reduce functional morbidity and seroma risk	Requires careful dissection and adequate residual flap volume	Active patients, patients concerned about shoulder function, or lower-volume reconstructions [2,4,5]
Anterior-approach /	Reconstruction where back scar	Minimizes or avoids visible	Limited exposure; not	Selected patients needing implant

“scarless” latissimus dorsi flap	avoidance is important	posterior donor-site scar	ideal when large skin paddle is needed	coverage or soft-tissue reinforcement with better donor-site aesthetics [6]
Fleur-de-lis skin paddle LDF	Complex shaping or skin replacement needs	Improves three-dimensional shaping and skin distribution	More complex scar pattern and donor-site planning	Patients needing significant skin replacement or improved breast mound projection [9]
Latissimus dorsi flap for partial breast reconstruction	Defects after lumpectomy, quadrantectomy, or breast-conserving therapy	Restores volume and contour while preserving breast envelope	May be excessive for small defects; donor-site morbidity remains	Large lateral/posterior partial defects or unfavorable tumor-to-breast ratio [7]
Salvage latissimus dorsi flap	Failed implant reconstruction, radiated chest wall, threatened exposure	Brings healthy vascularized tissue into hostile field	May still require implant or staged revision	Irradiated patients, implant exposure, recurrent dehiscence, or poor mastectomy flap quality [1–3,11]

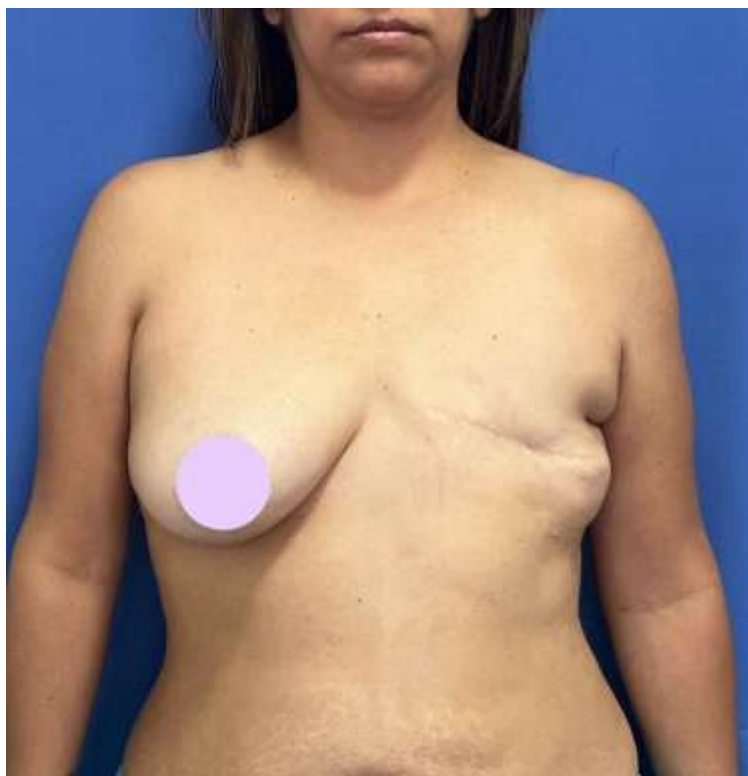


Figure 1. Preoperative image



Figure 2. Bilateral breast reconstruction. With latissimus dorsi ffap, right breast already with two surgical stages: expander and subsequent breast implant, left breast with latissimus dorsi ffap pending second surgical stage.

DISCUSSION

The latissimus dorsi flap has persisted in breast reconstruction because it solves several practical problems. It provides vascularized tissue, does not require microvascular anastomosis, can be combined with implants, and remains useful in hostile surgical fields. These characteristics make it especially valuable in complex or revision reconstruction.

Modern innovations have addressed many historical limitations. Muscle-sparing and fat-extended techniques reduce donor-site morbidity while improving volume. Scarless anterior approaches improve donor-site aesthetics. Optimized skin paddle designs improve breast

shaping. Fat grafting further enhances contour and soft-tissue quality.

The most important limitation remains donor-site morbidity, particularly seroma. However, careful technique, quilting sutures, drain management, compression, and muscle-sparing modifications may reduce this risk. Shoulder dysfunction is generally limited or improves over time, but it remains an important consideration in patient selection.

The latissimus dorsi flap should not be viewed as an outdated option. Rather, it should be considered a flexible reconstructive tool with specific indications. In the correct patient, it can provide stable, aesthetic, and durable

reconstruction with high satisfaction and low risk of catastrophic failure.

CONCLUSION

The latissimus dorsi flap remains a versatile and reliable option for breast reconstruction. Its consistent anatomy, robust vascularity, and ability to provide autologous coverage make it especially useful in complex, irradiated, salvage, and non-microsurgical settings. Traditional latissimus dorsi flap reconstruction is commonly combined with an implant, while modern fat-extended, muscle-sparing, scarless, and customized skin paddle techniques have expanded its applications and improved aesthetic outcomes. Although seroma and donor-site morbidity remain important limitations, long-term functional impairment is generally low, and patient satisfaction is high. The latissimus dorsi flap continues to be an essential component of the breast reconstruction algorithm.

REFERENCES

- I. Sood R, Easow JM, Konopka G, Panthaki ZJ. Latissimus dorsi flap in breast reconstruction. *Cancer Control*. 2018;25. doi:10.1177/1073274817744638
- II. Escandón JM, Manrique OJ, Christiano JG, Mroueh V, Prieto PA, Gooch J, Weiss A, Langstein HN. Breast reconstruction with latissimus dorsi flap: a comprehensive review and case series. *Annals of Translational Medicine*. 2023;11. doi:10.21037/atm-23-469
- III. Banys-Paluchowski M, Brus L, Krawczyk N, Kopperschmidt S, Gasparri M, Bündgen N, Rody A, Hanker L, Hemptenmacher F, Paluchowski P. Latissimus dorsi flap for breast reconstruction: a large single-institution evaluation of surgical outcome and complications. *Archives of Gynecology and Obstetrics*. 2024;309:269-280. doi:10.1007/s00404-023-07186-3
- IV. La Padula S, Esposito G, Ciccarelli A, Errico C, Pensato R, Hersant B, Meningaud JP, Roccaro G, D'Andrea F, Schonauer F. The versatility of the fat-extended, muscle-sparing latissimus dorsi flap in breast reconstruction. *Plastic and Reconstructive Surgery Global Open*. 2025;13. doi:10.1097/GOX.0000000000007073
- V. Cogliandro A, De Bernardis R, Calabrese G, Salzillo R, Petrucci V, Cagli B, Tenna S, Gratterer M, Marangi GF, Persichetti P. Muscular versus myocutaneous latissimus dorsi flap in delayed breast reconstruction: a comparative study of postoperative outcomes. *Aesthetic Plastic Surgery*. 2025;49:6066-6077. doi:10.1007/s00266-025-05042-0
- VI. Loreti A, Bruno E, Abate O, Arelli F, Spallone D, La Pinta M, Matropietro T, Ponti E, Broglia L, Costarelli L, Scavina P, Ribuffo D, Fortunato L. Breast reconstruction using the anterior approach scarless latissimus dorsi muscular flap: a single center retrospective study. *JPRAS Open*. 2024;40:194-205. doi:10.1016/j.jpra.2024.03.004
- VII. Mericli AF, Szpalski C, Schaverien MV, Selber JC, Adelman DM, Garvey PB, Villa MT, Robb GL, Baumann DP. The latissimus dorsi myocutaneous flap is a safe and effective method of partial breast reconstruction in the setting of breast-conserving therapy. *Plastic and Reconstructive Surgery*. 2019;143:927e-935e. doi:10.1097/PRS.0000000000005577
- VIII. Hammond DC. Latissimus dorsi flap breast reconstruction. *Plastic and Reconstructive Surgery*. 2009;124:1055-1063. doi:10.1097/PRS.0b013e3181b6bf05
- IX. Javeed S, Naeem M, Awais M, Farooq A, Zulfiquar M, Khan F. Outcome of fleur-de-lis skin paddle latissimus dorsi myocutaneous flap for breast reconstruction. *Asian Journal of Surgery*. 2024. doi:10.1016/j.asjsur.2024.01.125
- X. Liu Q, Li W, Wu X, Xu L, Hu P, Cao Y. Immediate breast reconstruction using latissimus dorsi muscular flap. *Medicine*. 2021;100. doi:10.1097/MD.00000000000026175
- XI. Wattoo G, Nayak S, Khan S, Morgan J, Hocking H, Macinnes E, Kolar K, Rogers C, Olubowale O, Rigby K, Kazzazi N, Wyld L. Long-term outcomes of latissimus dorsi flap breast reconstructions: a single-centre observational cohort study with up to 12 years of follow up. *Journal of Plastic, Reconstructive C Aesthetic Surgery*. 2021. doi:10.1016/j.bjps.2020.12.058
- XIII. Moore TS, Farrell LD. Latissimus dorsi myocutaneous flap for breast reconstruction: long-term results. *Plastic and Reconstructive Surgery*. 1992;89:666-672. doi:10.1097/00006534-199204000-00011
- XIV. Tomita K, Taminato M, Kubo T. Total breast reconstruction with a fat-augmented latissimus dorsi flap: a comparative study between muscle and myocutaneous flaps. *Journal of Plastic, Reconstructive C Aesthetic Surgery*. 2023;83:250-257. doi:10.1016/j.bjps.2023.04.081
- XV. Wang Q, Chen S, Xie H, Gu J, Xu Y, Wang M, Yuan S. Immediate breast reconstruction with latissimus dorsi flap and implant: the innovation of flap design and transfer. *Aesthetic Plastic Surgery*. 2025;49:3680-3687. doi:10.1007/s00266-025-04740-z