Surgical Technique

Application of pectoralis major fascia in retropectoral breast reconstruction: the five-step method

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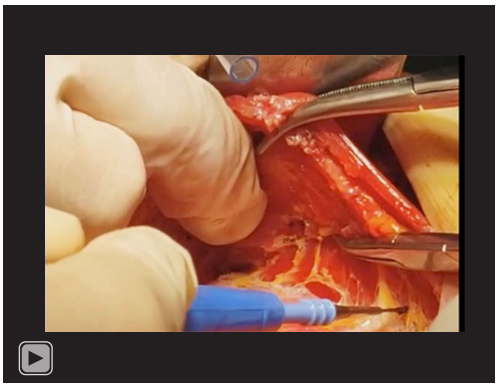
Abstract: The demand for breast reconstruction following early-stage breast cancer diagnosis has been steadily increasing. While prepectoral prosthetic reconstruction offers several advantages, its application is often limited by the necessity of acellular dermal matrix (ADM), which significantly increases costs and restricts widespread adoption. Conversely, traditional retropectoral implant reconstruction presents challenges, particularly in achieving optimal breast softness and mobility. This article aims to provide a comprehensive review of the indications and contraindications for modified retropectoralis major prosthetic breast reconstruction, based on a synthesis of literature and clinical experience. We detail the surgical technique and post-operative care involved in utilizing the pectoralis major fascia as an autologous alternative to ADM. The procedure is summarized into five key steps: (I) surgical positioning and incision design; (II) preservation of the pectoralis major fascia during mastectomy; (III) dissection of the pectoralis major fascia; (IV) creation of the implant pocket; and (V) prosthesis placement and final wound closure. We propose that this five-step approach not only offers a novel and cost-effective solution for prosthetic reconstruction in early-stage breast cancer patients but also demonstrates high feasibility and safety. By eliminating the need for ADM, this technique has the potential to enhance accessibility and promote broader clinical adoption.

Keywords: Pectoralis major fascia; breast reconstruction; subpectoral implant

Submitted Oct 26, 2024. Accepted for publication Feb 17, 2025. Published online Mar 26, 2025.
doi: 10.21037/gs-24-463
View this article at: https://dx.doi.org/10.21037/gs-24-463

Introduction

Over the past few years, there has been a notable rise in the incidence of breast cancer, paralleled by a growing number of early-stage diagnoses (1). Traditional breast cancer surgeries often necessitate the removal of breast tissue, leading to extended recovery times and imposing considerable psychological and physical burdens on patients (2). This predicament adversely influences patients' recovery outcomes and overall quality of life. For those unable to preserve their breasts, prosthetic breast reconstruction has become a leading option, particularly in early-stage breast cancer patients (3). Conventional reconstruction techniques primarily involve placing prostheses in front of the chest muscles. However, these methods are often associated with complications (4), such as prosthesis leakage and insufficient mobility and softness of the reconstructed breast. In response, a surgical technique that integrates prostheses with patches located in front of the pectoral muscles has been introduced, showing promising outcomes (5,6). Nevertheless, its broader implementation is impeded by the high expense of mesh materials.



Video 1 Steps of application of pectoralis major fascia in retropectoral breast reconstruction.

Highlight box

Key findings

- The substantial cost of breast mesh combined with medical insurance coverage discrepancies has hindered access to immediate prosthetic breast reconstruction for some early-stage breast cancer patients, despite this being a clinically validated technique when utilizing pectoralis major fascia replacement mesh.

What is conventional and what is novel/modified?

- While the pectoralis major fascia is routinely excised during mastectomy procedures, its utilization remains uncommon in breast reconstruction. Current surgical approaches primarily involve either: (I) anterior pectoral reconstruction using acellular dermal matrix (ADM)-wrapped implants; or (II) retropectoral reconstruction with submuscular implant placement beneath the pectoralis major muscle.
- In this early breast cancer surgery, the pectoralis major fascia is preserved and utilized as a patch to facilitate retropectoral prosthetic breast reconstruction, with long-term follow-up. Our research findings indicate that this surgical technique is safe, feasible, and effective, and that the reconstructed breast meets the patients' expectations regarding breast appearance.

What is the implication, and what should change now?

- Consistent with the findings of this study, the pectoralis major fascia represents a reliable and biologically integrated patch for retropectoral prosthetic breast reconstruction in patients with early-stage malignant breast tumors. This technique demonstrates not only a high safety profile and clinical efficacy but also achieves superior aesthetic outcomes, including improved breast contour, softness, and natural mobility. Given its cost-effectiveness and reduced reliance on ADM, this approach holds significant promise for broader clinical adoption and warrants further investigation in larger, multicenter studies to validate its long-term benefits.

In order to address these issues, drawing on extensive clinical experience, this study proposed an alternative method that leveraged the pectoralis major fascia in place of traditional mesh patches. This procedure, known as the five-step post-pectoral approach, aims to improve safety and encourage consistent application (also see *Video 1* for details) in clinical environments. This simple and effective five-step technique can be easily implemented across various medical facilities. We present this article in accordance with the SUPER reporting checklist (available at https://gs.amegroups.com/article/view/10.21037/gs-24-463/rc).

Preoperative preparation and requirements

The inclusion criteria were as follows:

(I) Preoperative imaging examinations, including breast ultrasound, mammography and magnetic resonance imaging (MRI), must confirm the diagnosis of breast malignant tumors. Preoperative or intraoperative pathology should confirm the presence of intraductal breast cancer or primary lobular breast cancer, with no indication for breast conservation; (II) the patient must be between 18 and 80 years old and willing to undergo breast reconstruction immediately; (III) the breast volume should not exceed 300 mL and there should be no moderate or severe sagging.

The exclusion criteria were as follows: (I) Individuals aged 18 to 80 years who do not intend to undergo breast reconstruction; (II) individuals exhibiting moderate to severe breast sagging, defined as exceeding 300 mL; (III) individuals who are unable to tolerate surgical procedures; (IV) clinical evaluation showed no evidence of axillary lymph node involvement.

Step-by-step description

This study was approved by the Ethics Committee of the First Affiliated Hospital of Wannan Medical College [approval 2024(204)], and informed consent was obtained from all the patients. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013).

Step 1: body position and incision design

After the administration of general anesthesia and endotracheal intubation, each patient was positioned

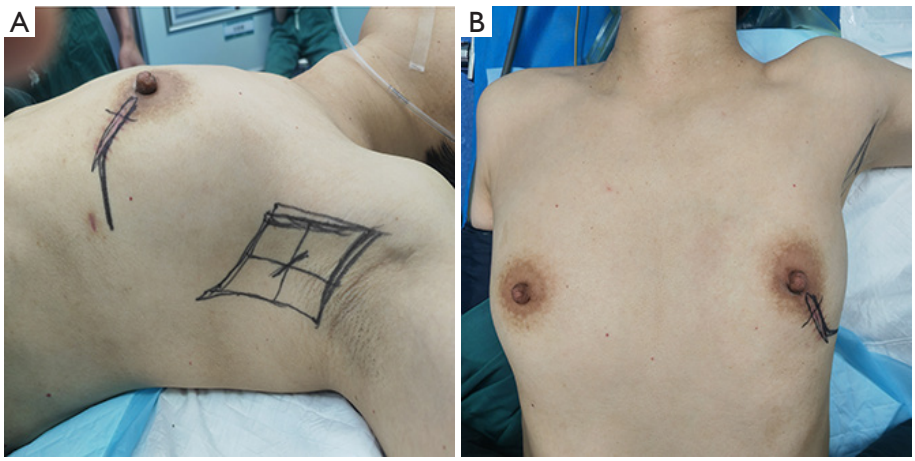


Figure 1 Body position and incision design. (A) Body position. (B) Incision design.

Figure 2 Preserve 1/3 of the pectoralis major fascia.

supine, with a pillow beneath supporting the affected side (*Figure 1A*). The surgical area was disinfected and covered with drapes. A radial incision is made laterally to the nipple and areola. The incision on the breast is about 8–10 cm long, and the inner part cannot be too deep beyond the areola, otherwise it is easy to cause areola necrosis. The outer part cannot exceed the front axillary line, which may affect the appearance. Once the pathology results validated the diagnosis of cancer and the sentinel lymph node biopsy (SLNB) showed no metastasis, the modified subpectoral prosthesis implantation was initiated (*Figure 1B*). Once metastasis occurs in the sentinel lymph nodes, postoperative radiation therapy may be necessary. It is important to consider the potential impact of radiation therapy on appearance, and careful communication with families is recommended whether to delay breast reconstruction.

Step 2: preserve the pectoralis major fascia

A radial incision was made on the surface of the nipple, followed by injecting a solution of epinephrine and normal saline into the superficial layer of fascial tissue beneath the skin. The incision's upper limit was aligned with the edge of the breast, the medial limit was designated as the parasternal region, the lower limit corresponded to the inferior fold, and the lateral limit was defined by the outer breast fold. Then, sharp instruments were utilized to delicately dissect the skin and breast flaps along these boundaries. Afterward, the posterior tissue of the nipple and areola was sent for frozen pathology analysis, which returned negative results, allowing for the preservation of both structures. If the results are positive, the duct beneath the nipple and areola may be excised to preserve the nipple and areola. Alternatively, the nipple can be removed, and the skin of the areola can be utilized to reconstruct the nipple and areola. Next, the breast tissue was detached from the pectoralis major muscle while maintaining the fascia below the nipple level and down to the inferior fold (*Figure 2*). We choose to retain the pectoralis major fascia in the middle and lower one-third or one-half of the breast, while removing the pectoralis major fascia behind the tumor. If the pathology is invasive ductal carcinoma and the lesion is located in the lower quadrant of the breast, this surgery is not recommended. After injecting saline between the pectoralis major fascia and the back of the breast, scissors

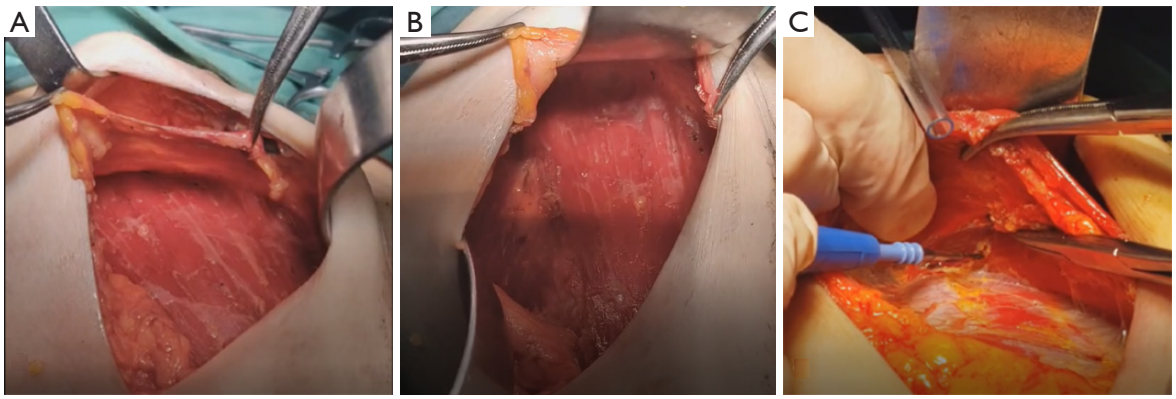


Figure 3 Dissection of the pectoralis major fascia. (A) Separation of pectoral muscles and fascia. (B) Separation to the breast pole. (C) Detach the insertion of the pectoralis major muscle on the sixth rib.

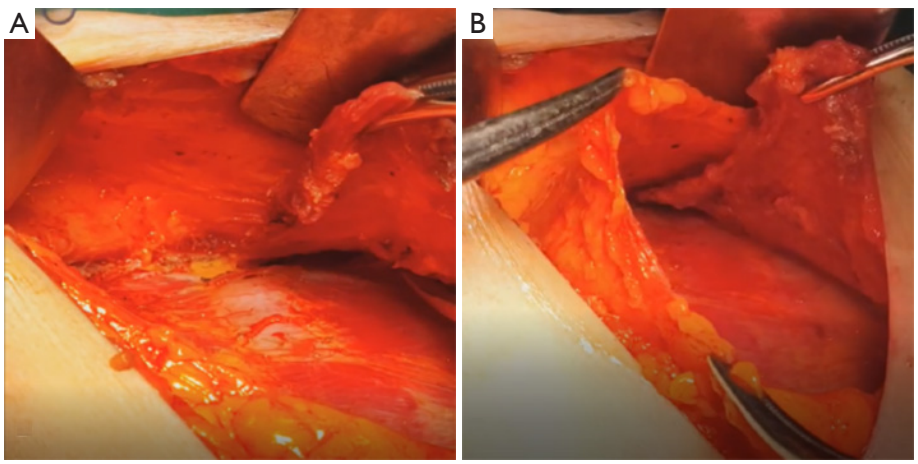


Figure 4 Creation of the implant pocket. (A) Dissect the pectoralis major muscle to the parasternal region. (B) Create a pocket for the prosthesis.

are used to preserve the pectoralis major fascia. The extent of the lower part of the pectoralis fascia is the same as that of the flap.

Step 3: dissection of the pectoralis major fascia

The preserved fascia of the pectoralis major was freed, and the muscle was separated from its surrounding tissue (*Figure 3A*,*3B*). Throughout the procedure, it is crucial to maintain a low level of electrosurgical power to avoid causing irreversible thermal damage to the fascia. The dissection extended medially to the parasternal zone and inferiorly to a point 1 cm below the inferior fold projection on the body surface. Furthermore, the pectoralis major muscle was detached at its insertion point on the sixth rib (*Figure 3C*). During the separation process, small defects in the fascia are discovered and can be sutured. It is important to ensure the continuity of the fascia and its natural fixation to the chest wall, otherwise the operation will fail.

Step 4: creation of the implant pocket

The separation usually starts from the lateral edge of the pectoralis major muscle. Bipolar electrocoagulation can be used to prevent bleeding at the pectoralis major insertion during dissection. Following the release of the pectoralis major muscle at the sixth rib, the area between the pectoralis major and minor muscles was cleared, with the upper boundary aligned with the level of the nipple (*Figure 4A*). Subsequently, the lateral thoracic fusion fascia

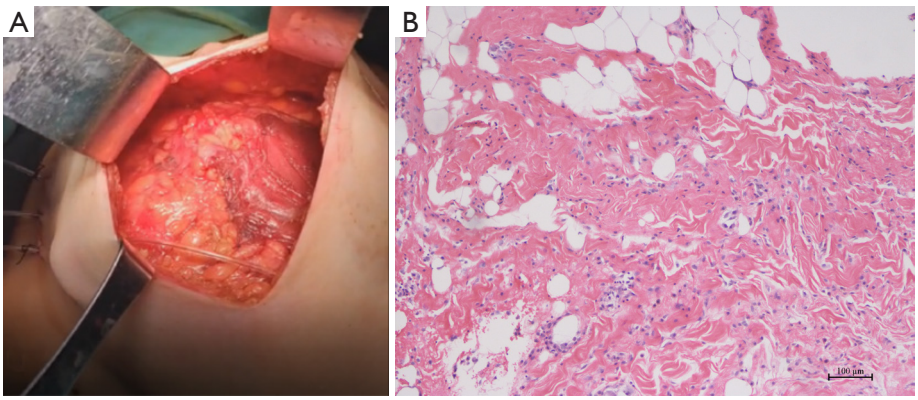


Figure 5 Prosthesis placement and final suturing. (A) Insert the prosthesis and close the pocket. (B) The pathological results of the fascia (immunohistochemistry staining, ×100).

was stretched toward the outer breast contour and inward toward the parasternal region, forming a space for the implant (*Figure 4B*). The optimal range above is within the width of three fingers at the level of the nipple line.

Step 5: prosthesis placement and final suturing

The volume of the prosthetic implant was estimated using the weighing technique. Approximately 80% of the specimen's weight was used to determine the prosthesis size. Based on our surgical experience, we choose a breast implant that is slightly smaller than the theoretical value. Before placing the breast implant, it is necessary to pre-place the intra-bag drainage tube and the extra-capsular bag drainage tube at the lowest point outside the incision. Following this, a 311-type breast prosthesis was positioned in the prepared space. Suture the lower edge of the pectoralis major muscle fracture to its fascia to envelop the prosthesis, thereby preventing sharp damage to the implant. The skin was sutured to complete the procedure (*Figure 5A*). Postoperative pathological analysis showed no cancer cells in the pectoralis major fascia (*Figure 5B*). Finally, the flap is adjusted to maintain the shape of the breast.

Postoperative considerations and tasks

Assess the drainage volume of the postoperative drainage tube. If the postoperative drainage volume is less than 20 mL, the drainage tube should be pulled out. Breast appearance was compared at three time points: preoperatively, on the third postoperative day (*Figure 6A-6C*), and 1-year post-surgery (*Figure 6D*).

Tips and pearls

It is essential to preoperatively evaluate imaging evidence to confirm the absence of axillary lymph node metastasis and ensure that the tumor does not invade the underlying pectoralis major fascia, skin, or nipple. Intraoperative frozen section analysis is indispensable to further confirm the pathological status of the axillary lymph nodes and the tissue behind the nipple. When resecting the nipple-areolar complex, sharp dissection is recommended to avoid thermal injury, and strict hemostasis is necessary to prevent surgical complications such as seroma and infection. Postoperatively, timely adjustment of the breast contour is also crucial.

Discussion

Breast reconstruction has evolved significantly, transitioning from a practice previously regarded as ineffective or even risky to a highly effective method for addressing a variety of breast defects (7). Over the past decade, implant-based breast reconstruction has made substantial advancements, becoming a major focus in the field. Techniques employing acellular dermal matrix (ADM) or mesh in conjunction with prostheses offer distinct benefits but also present specific challenges (8). The success of breast reconstruction using implants relies on the preservation of the nipple-areola complex during subcutaneous gland excision. A retrospective study by Kim *et al.* (9) involved 1,583 breast cancer patients who received conventional nipple-sparing mastectomy or minimally invasive nipple-sparing mastectomy across 21 locations in South Korea between

Figure 6 The appearance of the reconstructed breast and the adjustment of the skin flap. (A) Anterior view on the third postoperative day. (B) Lateral view on the third postoperative day. (C) Oblique view on the third postoperative day. (D) Anterior view 1-year post-surgery.

January 2018 and December 2020. The study demonstrated that nipple-sparing mastectomy (NSM) technology is both safe and doable. Headon *et al.* (10) reviewed NSM research published from January 1970 to January 2015, revealing a local recurrence rate of 2.38%, a total complication rate of 22.3%, and a partial or complete nipple necrosis rate of 2.38%. The overall incidence rate was up to 5.9%. Separate histopathological evaluations of the subareolar area are essential to confirm the absence of malignancy, ensuring the procedure's safety and adhering to oncological standards.

In this research, the pathology results of the subareolar tissue after gland removal were negative, thus ensuring the safety of tumor presence. A systematic review by Ostapenko *et al.* (11) covering studies from 2000 to 2016 found that patients who received radiotherapy post-autologous breast reconstruction reported higher satisfaction with breast aesthetics than those who underwent radiotherapy after prosthetic reconstruction. Criteria for inclusion of participants in this study excluded postoperative breast radiotherapy. Therefore, patients expressed high satisfaction with the appearance of the reconstructed breast throughout the follow-up period (*Figure 6D*).

Prosthetic reconstruction currently follows two primary techniques: the anterior and posterior pectoral approaches. Anterior pectoral implantation is associated with potential complications, such as rippling, implant displacement, inversion, and capsular contracture (12). A meta-analysis suggests that anterior pectoral reconstruction, which avoids dissection of the pectoral muscle, is likely to promote quicker recovery, enhance implant positioning, and lessen pain, thus alleviate the likelihood of capsular contracture, implant failure, and animation deformity (13). By comparison, subpectoral surgery, while involving a longer procedure to create the prosthetic bag, carries similar risks

in terms of surgical complications. However, it is particularly beneficial for patients with multiple comorbid conditions, ongoing smoking habits, a history of preoperative radiation therapy, or poor mastectomy flap perfusion. The additional layer of vascularized tissue provided by the pectoralis major muscle may help reduce the risk of severe complications and unexpected surgical interventions (14). Reconstruction using prepectoral prostheses typically employs a prosthetic device with a support patch, often made from acellular dermis or titanium mesh. This broadens the applicability of anterior pectoral reconstruction and improves aesthetic outcomes (15). The rates of surgical complications for both anterior and posterior pectoral reconstructions are similar. However, the pressure on the pectoralis major muscle in anterior placements can result in both volumetric and visual deformities in the reconstructed breast (16).

Unlike the prepectoral method, the biplane approach incorporates ADM and a prosthetic device beneath the pectoralis major muscle. It can significantly minimize functional limitations, such as restrictions in upper limb flexion, abduction, and both internal and external rotations. Given its minimally invasive nature, this technique reduces patient pain in both preoperative and immediate postoperative phases and accelerates recovery, resulting in increased satisfaction with breast appearance (17). Considering these advantages, this study utilized a portion of the pectoralis major fascia to fix the ADM patch to the pectoralis muscle. This method allows increasing the prosthesis volume to 300 mL. The patients were quite satisfied with their breast appearance after reconstruction. This approach not only substantially enhances breast aesthetics but also promotes mobility. However, it is essential to adhere to stringent surgical criteria when evaluating patient suitability.

Chinta *et al.* (18) conducted a a retrospective study involving 548 patients who underwent breast reconstruction found that the reconstruction technique significantly influenced medical costs. Notably, the prepectoral approach was associated with fewer complications and less discomfort compared to the subpectoral approach. Furthermore, the cost of breast mesh is double that of traditional surgical techniques (19), restricting the widespread adoption of this strategy within the medical insurance reimbursement framework in mainland China. Movassaghi *et al.* (20) used a new material, poly-4-hydroxybutyrate, as a prepectoral breast patch to replace ADM, which greatly reduced the cost, but the incidence of surgical complications did not decrease. Casella *et al.* (21) performed one-stage prosthetic reconstruction on 179 patients with prostheses combined with a titanium-coated polypropylene mesh. The average follow-up was 38.5 months. Prosthetic capsular contracture was the main surgical complication. In this study, the use of pectoralis major fascia as an alternative to breast mesh naturally greatly reduces medical costs. It is suitable for China's medical insurance policy and can be widely implemented. Fascia is a network of collagen fibers. This structure is a hydrated matrix rich in glycosaminoglycans that is interspersed with adipocytes, fibroblasts, and nerve endings and has some absorptive and infection-fighting capabilities (22-24). Therefore, using the pectoralis major fascia as a breast patch can reduce the chance of wound infection and avoid surgical failure due to infection (25). The pectoralis major fascia is particularly thick, primarily composed of elastic fibers and collagen. It contributes to the ligament support of the breast. Chen *et al.* (26) conducted a comparative study and found that after a 5-year follow-up, neither the preservation nor the removal of the pectoralis major fascia had a significant impact on the long-term oncological outcomes for patients with early-stage breast cancer. This study retained the pectoralis major fascia below the nipple line and extracted a sample of tissue for pathological analysis, showing no cancerous cells. Subsequent follow-ups discovered no tumor recurrence (*Figure 5B*). Nonetheless, it must be acknowledged that the indications of this study are strict and the importance of multi-center joint conduct and follow-up is required for further verification.

Conclusions

Based on the available literature and clinical experience, the modified subpectoral prosthesis implantation technique is deemed safe and feasible in early breast cancer cases, provided that both posterior nipple pathology and SLNB results are negative. This enhanced biplane prosthetic reconstruction technology demonstrates significant adaptability across diverse patient profiles. However, the pool of suitable candidates remains relatively small. Consequently, larger sample sizes and extended follow-ups are essential to thoroughly investigate the clinical efficacy of this technique. Continued research could further refine procedural protocols and patient selection criteria.

Acknowledgments

None.

Footnote

Reporting Checklist: The authors have completed the SUPER reporting checklist. Available at https://gs.amegroups.com/article/view/10.21037/gs-24-463/rc

Peer Review File: Available at https://gs.amegroups.com/article/view/10.21037/gs-24-463/prf

Funding: This work was supported by General Surgery National Clinical Key Specialty Construction Funds (Finance KGZ002), Three New Projects of Yijishan Hospital (Y23018), the Major Scientific Research Project of Anhui Provincial Department of Education (grant number 2022AH040176), Horizontal research project of Yijishan Hospital of Wannan Medical College (grant number 662202504001), Anhui Provincial Higher Education Institutions Scientific Research Project (Natural Science) (grant number 2023AH040267), Anhui Provincial Health Research Project Plan Mission Statement (2023) (grant number AHWJ2023A10147), Anhui Provincial Health Commission Hengrui Innovative Drug Research Special Fund (grant number AHWJ2023BAc10053), and the Key Scientific Research Project of Anhui Provincial Department of Education (grant number 2024AH051951).

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://gs.amegroups.com/article/view/10.21037/gs-24-463/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. This study was approved by the Ethics Committee of the First Affiliated Hospital of Wannan Medical College [approval 2024(204)], and informed consent was obtained from all the patients. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013).

References

1. Sha R, Kong XM, Li XY, et al. Global burden of breast cancer and attributable risk factors in 204 countries and territories, from 1990 to 2021: results from the Global Burden of Disease Study 2021. Biomark Res 2024;12:87.
2. Xie X, Li H, Wang C, et al. Effect of modified radical mastectomy combined with neo-adjuvant chemotherapy on postoperative recurrence rate, negative emotion, and life quality of patients with breast cancer. Am J Transl Res 2022;14:460-7.
3. Guo X, Wang Z, Wang Y, et al. Optimal timing of postmastectomy radiotherapy in two-stage prosthetic breast reconstruction: An updated meta-analysis. Int J Surg 2022;105:106814.
4. Mangialardi ML, Salgarello M, Cacciatore P, et al. Complication Rate of Prepectoral Implant-based Breast Reconstruction Using Human Acellular Dermal Matrices. Plast Reconstr Surg Glob Open 2020;8:e3235.
5. Vindigni V, Marena F, Zanettin C, et al. Breast Reconstruction: The Oncoplastic Approach. J Clin Med 2024;13:4718.
6. Nahabedian MY. Commentary on: Comparison of Complication Rates Between Subpectoral vs Prepectoral Techniques in Prosthetic Breast Reconstruction. Aesthet Surg J 2023;43:1293-4.
7. Hanson SE, Lei X, Roubaud MS, et al. Long-term Quality of Life in Patients With Breast Cancer After Breast Conservation vs Mastectomy and Reconstruction. JAMA Surg 2022;157:e220631.
8. Keane AM, Chiang SN, Tao Y, et al. Cortiva versus AlloDerm in Prepectoral and Partial Submuscular Implant-Based Breast Reconstruction: A Randomized Clinical Trial. Plast Reconstr Surg 2024;154:13S-26S.
9. Kim JH, Ryu JM, Bae SJ, et al. Minimal Access vs Conventional Nipple-Sparing Mastectomy. JAMA Surg 2024;159:1177-86.
10. Headon HL, Kasem A, Mokbel K. The Oncological Safety of Nipple-Sparing Mastectomy: A Systematic Review of the Literature with a Pooled Analysis of 12,358 Procedures. Arch Plast Surg 2016;43:328-38.
11. Ostapenko E, Nixdorf L, Devyatko Y, et al. Prepectoral Versus Subpectoral Implant-Based Breast Reconstruction: A Systemic Review and Meta-analysis. Ann Surg Oncol 2023;30:126-36.

12. Safran T, Al-Badarin F, Al-Halabi B, et al. Aesthetic Limitations in Direct-to-Implant Prepectoral Breast Reconstruction. Plast Reconstr Surg 2022;150:22e-31e.
13. Escandón JM, Weiss A, Christiano JG, et al. Prepectoral versus subpectoral two-stage implant-based breast reconstruction: U.S. medical center experience and narrative review. Ann Transl Med 2023;11:411.
14. Weinzierl A, Schmauss D, Harder Y. The Value of Synthetic and Biologic Meshes in Implant-Based Breast Reconstruction. Handchir Mikrochir Plast Chir 2022;54:269-78.
15. Guo L, Lin X, Lin X, et al. Application of TiLOOP bra in implant-based breast reconstruction is associated with decreased complication risk compared with other meshes: A systematic review and meta-analysis. World J Surg 2024;48:631-41.
16. Salgarello M, Fabbri M, Visconti G, et al. Implant-Based Breast Reconstruction After Nipple-Sparing and Skin-Sparing Mastectomy in Breast-Augmented Patients: Prepectoral or Submuscular Direct-to-Implant Reconstruction? Aesthet Surg J 2024;44:503-15.
17. Caputo GG, Zingaretti N, Kiprianidis I, et al. Quality of Life and Early Functional Evaluation in Direct-to-Implant Breast Reconstruction After Mastectomy: A Comparative Study Between Prepectoral Versus Dual-Plane Reconstruction. Clin Breast Cancer 2021;21:344-51.
18. Chinta S, Koh DJ, Sobti N, et al. Cost analysis of pre-pectoral implant-based breast reconstruction. Sci Rep 2022;12:17512.
19. Houvenaeghel G, Cohen M, Sabiani L, et al. Mastectomy and Immediate Breast Reconstruction with Pre-Pectoral or Sub-Pectoral Implant: Assessing Clinical Practice, Post-Surgical Outcomes, Patient's Satisfaction and Cost. J Surg Res (Houst) 2022;5:500-10.
20. Movassaghi K, Gilson A, Stewart CN, et al. Prepectoral Two-Stage Implant-Based Breast Reconstruction with Poly-4-Hydroxybutyrate for Pocket Control without the Use of Acellular Dermal Matrix: A 4-Year Review. Plast Reconstr Surg 2024;154:15-24.
21. Casella D, Di Taranto G, Marcasciano M, et al. Evaluation of Prepectoral Implant Placement and Complete Coverage with TiLoop Bra Mesh for Breast Reconstruction: A Prospective Study on Long-Term and Patient-Reported BREAST-Q Outcomes. Plast Reconstr Surg 2019;143:1e-9e.
22. Kondrup F, Gaudreault N, Venne G. The deep fascia and its role in chronic pain and pathological conditions: A review. Clin Anat 2022;35:649-59.
23. Suarez-Rodriguez V, Fede C, Pirri C, et al. Fascial Innervation: A Systematic Review of the Literature. Int J Mol Sci 2022;23:5674.
24. Pirri C, Fede C, Pirri N, et al. Diabetic Foot: The Role of Fasciae, a Narrative Review. Biology (Basel) 2021;10:759.
25. Fede C, Pirri C, Fan C, et al. A Closer Look at the Cellular and Molecular Components of the Deep/Muscular Fasciae. Int J Mol Sci 2021;22:1411.
26. Chen AX, Li XX, Guo ZY, et al. Preservation of the pectoralis major fascia has no impact on the long-term oncologic outcomes of patients with breast cancer treated with conservative mastectomy and immediate breast reconstruction: A propensity score matching analysis. J Plast Reconstr Aesthet Surg 2023;86:231-8.

Cite this article as: Yu CS, Ma J, Yang LG, Chen B, Fang F, Wang YB, Wang Z. Application of pectoralis major fascia in retropectoral breast reconstruction: the five-step method. Gland Surg 2025;14(3):520-528. doi: 10.21037/gs-24-463