Devisetti *et al. Plast Aesthet Res* 2024;11:21
DOI: 10.20517/2347-9264.2024.48

Plastic and Aesthetic Research

Review

Open Access

Fat-augmented omentum-based construct for breast reconstruction

Nitya Devisetti, Claudy Sarpong, Allison C. Hu, Pooja S. Yesantharao, Farrah C. Liu, Kassandra Carrion, Dung H. Nguyen

[1]Division of Plastic and Reconstructive Surgery, Department of Surgery, Stanford University, Palo Alto, CA 94304, USA.

Correspondence to: Dung Nguyen, MD, PharmD, Stanford University Medical Center, Division of Plastic and Reconstructive Surgery, Department of Surgery, Stanford University, 770 Welch Road, Suite 400, Palo Alto, CA 94304, USA. E-mail: nguyendh@stanford.edu

How to cite this article: Devisetti N, Sarpong C, Hu AC, Yesantharao PS, Liu FC, Carrion K, Nguyen DH. Fat-augmented omentum-based construct for breast reconstruction. *Plast Aesthet Res* 2024;11:21. https://dx.doi.org/10.20517/2347-9264.2024.48

Received: 25 Mar 2024 **First Decision:** 18 Apr 2024 **Revised:** 14 May 2024 **Accepted:** 13 Jun 2024 **Published:** 24 Jun 2024

Academic Editors: Pietro Gentile, Christodoulos Kaoutzanis **Copy Editor:** Yanbing Bai **Production Editor:** Yanbing Bai

Abstract

In the landscape of breast reconstruction, autologous tissue procedures have provided viable alternatives, albeit restricted by donor site morbidity and patient-specific anatomical considerations, including donor tissue availability and surgical history. Amidst these challenges, a novel approach has emerged - the fat-augmented omentum-based construct for breast reconstruction. This comprehensive review endeavors to explore the historical evolution, anatomical considerations, surgical techniques, clinical outcomes, and future directions of the fat-augmented omentum-based approach in breast reconstruction. The omental fat-augmented free flap (O-FAFF) offers a promising choice for patients who might not be appropriate candidates for conventional autologous reconstruction methods due to low BMI, previous surgeries compromising traditional donor sites, or insufficient adipose tissue volume. Operative techniques for O-FAFF involve a coordinated team approach, with simultaneous mastectomy and laparoscopic omentectomy. The omentum is shaped within an acellular dermal matrix casing, allowing for precise control of reconstruction dimensions. In addition, utilizing the omentum with fat grafting effectively restores the natural breast volume. Clinical outcomes of O-FAFF reconstruction have shown promise, with patients reporting natural-looking and soft-feeling reconstructed breasts. However, challenges such as accurate tissue volume estimation and potential complications remain, highlighting the need for further research and refinement of the technique. Overall, O-FAFF represents a significant advancement in breast reconstruction, offering a promising alternative to traditional methods. Continued investigation and clinical experience will be instrumental in establishing O-FAFF as a standard of care, ultimately improving outcomes for a wide range of patients undergoing

breast reconstruction.

Keywords: Omentum, flap, autologous reconstruction, breast reconstruction

INTRODUCTION

Autologous breast reconstruction stands as a cornerstone in the continuum of post-mastectomy care, representing a pivotal aspect of breast cancer treatment. This approach offers natural-looking outcomes while mitigating the risks associated with foreign material implants[1]. Over the years, various techniques for breast reconstruction have evolved in pursuit of achieving aesthetically pleasing outcomes while minimizing associated donor site morbidities. Some of these long-established methods include utilizing tissue from various sites: abdomen, thigh, back, or gluteal region. Pedicled flaps (e.g., TRAM) and free transfer flaps (e.g., DIEP) have sufficient tissue to restore an anatomically natural breast mound with aesthetic integrity, often necessitated in cases of locally advanced breast cancer[1-4].

However, the viability of employing autologous reconstruction hinges upon several patient-specific factors. Successful implementation of this approach requires the presence of ample donor tissue at the selected site, a criterion that may pose challenges for individuals with a smaller BMI (body mass index). Moreover, individuals with a surgical history encompassing procedures such as abdominoplasty or thighplasty may exhibit apprehension regarding the potential adverse outcomes linked to noticeable scarring at donor sites[5]. As a result, they may perceive certain autologous reconstruction procedures as an unsuitable option for their breast cancer treatment, leading individuals to opt for implant-based breast augmentation or to forgo reconstruction altogether[6]. Though reconstruction via implants remains the most well-known breast reconstruction option in the United States, it is reported to produce diminished long-term patient-reported satisfaction relative to flap surgeries. Issues such as unnatural appearance, aesthetic deformities resulting from capsular contracture, and the risk of infectious complications are often deemed unacceptable by patients[7,8].

Among these challenges, the utilization of the omental tissue has garnered attention for its intrinsic regenerative properties and vascularity, presenting a promising avenue for reconstructive endeavors. Historically, omental flap surgery has served as a reliable approach for addressing complex wounds and cavities, demonstrating its efficacy across multiple surgical specialties[9-11]. However, its application in breast augmentation has been restrained by its uncontoured appearance, limiting its ability to restore breast shape and symmetry following lumpectomy surgery[12-20]. Because limited options remain for unsuitable individuals for autologous reconstruction, this constraint has prompted a quest for innovative approaches to harness the regenerative potential of the omentum. Initially proposed in place of traditional flap-based reconstruction techniques by Kirikuta in 1963, omentum flap breast reconstruction has since evolved markedly[18,19,21].

Nguyen *et al.* introduced an innovative autologous tissue approach aimed at providing women with an augmented breast that preserves its natural shape and volume with minimal donor site morbidity. The team detailed a novel technique that utilizes omentum-based fat grafting scaffolds[22]. Termed the omental fat-augmented free flap (O-FAFF) operation, this technique represents a paradigm shift in breast reconstruction, aiming to overcome some of the limitations of traditional methods.

CLINICAL CONSIDERATIONS

Omental-based breast reconstruction, exemplified by techniques like the omental fat-augmented free flap (O-FAFF), offers a promising option for patients unsuitable for conventional autologous reconstruction methods or individuals seeking a quicker recovery with fewer scars and reduced donor site morbidity compared to traditional autologous techniques.

This approach is particularly relevant for individuals with a low body mass index (BMI) who often lack sufficient tissue in typical donor sites such as the abdomen or thigh, posing challenges for autologous breast reconstruction[22]. Some alternative options may include multiple "stacked" flaps, extending flap territory, and serial fat grafting. However, there is a limit to how much fasciocutaneous tissue can be harvested from low BMI individuals for stacked and extended territory flaps[23]. Additionally, only performing fat grafting for breast reconstruction necessitates multiple grafting, making it less durable for women of any BMI[24]. By leveraging the abundant adipose tissue of the omentum, even in patients with low BMI, the O-FAFF technique overcomes these limitations, presenting a viable solution for those desiring autologous breast reconstruction.

Moreover, patients who do not have adequate traditional donor sites due to body habitus or prior surgeries like abdominoplasty or thighplasty may encounter donor site challenges in traditional autologous reconstruction, making the omental flap an appealing alternative. The omental flap's use circumvents issues associated with previous surgeries, facilitating successful breast reconstruction. These patients find omental-based reconstruction a suitable alternative also because the O-FAFF technique augments the omental flap with harvested fat, enhancing tissue volume for comprehensive breast reconstruction[22].

However, successful patient selection is pivotal in determining the suitability of omental-based breast reconstruction. While the technique is advantageous for low BMI patients, patients with higher BMIs may still benefit, especially if traditional donor sites are unsuitable or if they are averse to implant-based reconstruction and prefer natural tissue options[22]. There is also no definitive breast size limitation with O-FAFF, as omental volume can be augmented with fat grafting. However, very large breasts (> 1,000 g) may be challenging to fully reconstruct with the O-FAFF alone. Also relevant to note is that BMI does not necessarily correlate with omental fat volume[1,25].

Furthermore, the decision for omental-based breast reconstruction requires adequate cutaneous coverage over the anterior chest to envelop the tissue. Patients with compromised skin overlying the breast may not be suitable candidates for this approach[22]. Additionally, certain patient factors, including a history of abdominal inflammatory disease, prior abdominal surgery, or immunocompromised status, may contraindicate omental-based reconstructions. These considerations underscore the importance of meticulous patient evaluation and selection to ensure optimal outcomes and patient satisfaction.

Surgeons should engage in thorough discussions with patients regarding reconstructive options, considering their preferences and expectations. Since the omental volume cannot be evaluated preoperatively, a discussion of expected breast size should be discussed to avoid unrealistic expectations. Moreover, patient selection should account for overall health status and potential comorbidities that may affect surgical outcomes. While generally well-tolerated, patients with significant medical conditions may require careful evaluation and optimization before surgery. Aesthetic goals and expectations regarding breast reconstruction outcomes should also guide patient selection[22].

PREOPERATIVE PLANNING

A comprehensive preoperative assessment is conducted to determine the patient's suitability for omental-based breast reconstruction. The seamless execution of immediate O-FAFF reconstruction demands a coordinated team among breast surgeons, plastic surgeons, and minimally invasive surgeons. Several stages of the procedure can be conducted concurrently, notably mastectomy, laparoscopic omentectomy, and fat harvesting, to minimize operating time. The operative times for the O-FAFF procedure were found to have a mean of 572.0 ± 122.8 min for total operative time, including a mean of 227 ± 6.1 min for omental harvest time. Unilateral cases entailed a reconstructive time of 182 ± 10 min and bilateral cases had a mean time of 265 ± 16 min[22]. As with any complex surgical procedure, there is a learning curve associated with the O-FAFF technique, with operative times decreasing as the surgeon becomes more efficient with the omental harvest, augmentation, and shaping techniques[1,22,25].

It is also important to note that one of the current challenges associated with utilizing the omentum in surgery is the inability to accurately predict its volume before the operation[17,18]. Despite attempts using different imaging modalities such as computed tomography (CT), ultrasonography, and magnetic resonance imaging (MRI), accurately estimating the volume of the omentum remains elusive. Additionally, neither patient weight nor body mass index (BMI) reliably predicts omental volume[24].

ANATOMY

The omentum plays crucial roles in neovascularization, immune regulation, tissue regeneration, and hemostasis, earning its historical reference as the “abdominal police”. Beyond its role in adipose tissue storage, it serves as a protective barrier for visceral organs by supporting critical physiological processes such as hemorrhage control and scar formation. As such, the omentum has applications in limb salvage, osseous reconstruction, and wound coverage due to its vascularity and regenerative properties[2,3,22-24,26].

The greater omentum originates from the greater curvature of the gastric wall. Its dimensions vary from 14 to 36 cm in length and 20 to 46 cm in width, with a surface area ranging from 300 to 1,500 cm^2 and a weight of 300 to 2,000 g [Figure 1A][24,26]. Comprising of fatty tissue, blood vessels, lymphatics, and lymph glands, the omental flap's vascular supply is primarily derived from the celiac trunk, specifically through the gastroepiploic vessels, which run between its layers, ensuring robust vascularization to the tissue[26]. These vessels originate from branches of the gastroduodenal and splenic arteries. The right gastro-omental artery stems from the gastroduodenal artery, while the left counterpart arises from the splenic artery. These arteries traverse the omentum majus, emitting gastric and omental branches before ultimately merging to form a network. Notably, the right gastro-omental artery typically exhibits a bigger diameter compared to its left counterpart. Additionally, the venous drainage system of the omentum mirrors its arterial supply, ultimately draining into the portal system[24].

OPERATIVE TECHNIQUE

The laparoscopic omentectomy technique, combined with meticulous flap preparation and microsurgical inset, allows for the successful reconstruction of the breast mound using omental-based flaps. Postoperative management strategies ensure optimal patient outcomes, including effective pain control and early ambulation. Comparative analysis provides valuable insights into pain management outcomes following omental-based breast reconstruction[22].

Laparoscopic omental harvest. Laparoscopic omentectomy is conducted simultaneously with mastectomy to decrease surgical duration. Carbon dioxide gas is used for abdominal insulation, and trocars are inserted for laparoscopic access. The omentum is dissected from the greater curvature of the stomach and the

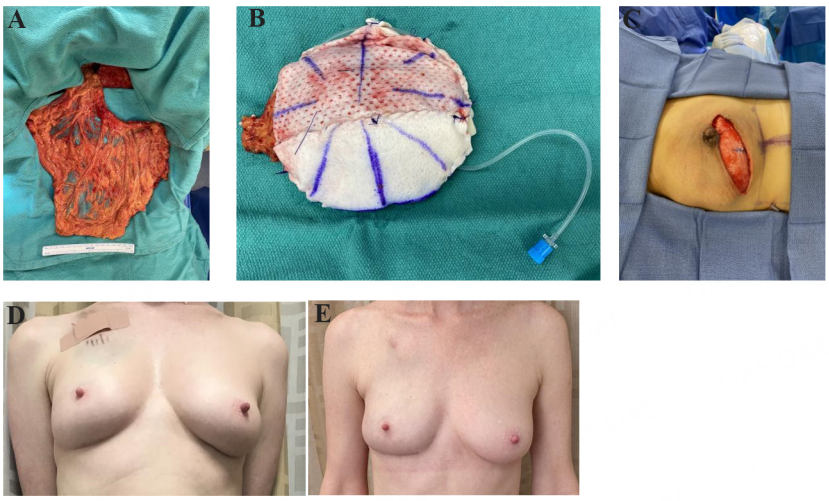

Figure 1. (A) The laparoscopic harvesting of the greater omentum is performed simultaneously with the dissection of the internal mammary vessels to prepare for microvascular anastomosis. Fat for the augmentation of the omental free flap is obtained through liposuction; (B) A contour acellular dermal matrix sheet is shaped around an inflated tissue expander, and its edges are secured with polydioxanone II sutures to form a pocket for the omental fat augmentation flap. An opening is preserved to facilitate the delivery of the vascular pedicles (gastroepiploic vessels) for (C) microanastomoses to the internal mammary vessels. The augmentation of the omental free flap is completed using the Coleman lipoinjection technique; (D) Pre-op *vs.* (E) Post-op.

transverse colon, maintaining the gastro-omental vascular arcade. Attention is taken to carefully dissect the omentum off the mesocolon without injuring the blood supply to the colon. The right and left gastroepiploic vessels are harvested with the omental flap after clipping the short gastric vessels. The omentum is externalized through an extraction site located above the umbilicus, and its weight is recorded[22]. Laparoscopic omental harvest offers a smoother postoperative course, including reduced risk of hernia or bulge, and reduced abdominal scarring. While careful attention must be paid to close laparoscopic incisions without incorporating large amounts of subcutaneous fat to prevent skin dimpling, these incisions are small and offer less amount of scarred tissue, and improved aesthetic outcomes over the horizontal abdominal scar from an abdominal free flap or longitudinal scar of an open omental harvest. Postoperative care of laparoscopic scars is well studied, and involves protection against infection, maintenance of moisture barrier, and protection against hypertrophic scarring if available[5].

Open omental harvest. Open omental harvest increases donor site morbidity. Previous studies have demonstrated the potential for poor abdominal wall aesthetic outcomes resulting from traditional methods of abdominal wall harvest, such as an elevated abdominal incision or hernia. Open omental harvest techniques for optimal aesthetic outcomes should parallel cosmetic abdominoplasty and involve fascial plication as well as mesh reinforcement of the abdominal wall. This technique is described in detail by Deptula *et al.*[5]. Briefly, an inlay mesh is sutured to the linea alba, followed by central fascial plication. Fascial plication improves abdominal contour, and the use of mesh decreases the risk of hernia. Postoperative care of an open omental harvest scar involves the use of steri-strips with infection protection, maintenance of moisture barrier, and strategies to protect against hypertrophic scarring[5].

Fat Harvest. Fat extraction involves the removal of adipose tissue from the thighs, abdomen, and flanks through liposuction, aiming to procure material for omental augmentation. Following extraction, the fat undergoes processing via devices like the Lipografter® or analogous systems and is quantified according to the targeted breast weight.

Construct Preparation. The appropriate breast sizer is chosen in accordance with the dimensions of the patient's native breast and chest wall. A fenestrated acellular dermal matrix (ADM) shell is shaped to fit around the inflated breast sizer using air [Figure 1B]. This tailored ADM conforms to the sizer, with a specific medial aperture reserved for the gastroepiploic vessels. Attempting to overexpand the pocket risks distorting the skin envelope and compromising the projection of the reconstruction. The omental flap is placed within the ADM shell, followed by direct fat grafting into the omental adipose tissue using the Coleman lipoinjection technique[22]. While acknowledging that the ADM carries potential downsides such as increased infection sensitivity and cost, its utilization here is deliberate to provide support and shape. Moreover, direct autologous fat transfer (AFT) into the omentum may offer better visualization and accessibility compared to a second-stage procedure, as the surgical field is less obscured by scar tissue and previous surgical alterations. This approach facilitates more precise fat graft placement and better contouring of the breast mound, ultimately contributing to improved aesthetic outcomes[22]. Recent studies suggest dermal autografts as viable alternatives to ADM in tissue expander breast reconstruction. Comparable outcomes in operative time, complications, and patient satisfaction were noted, along with significant cost savings[27].

Microsurgical Inset. The mastectomy skin is closed primarily. Microanastomosis connects the gastroepiploic vessels to the internal mammary vessels. The ADM/omental construct is then sutured into the prepectoral plane against the chest wall, with a drainage tube placed in the breast pocket [Figure 1C]. Finally, the mastectomy skin is closed primarily[22].

POSTOPERATIVE MANAGEMENT

Upon admission, patients undergo monitoring of flaps, administration of intravenous fluids, and management of pain. Flap assessment involves both clinical observation and the use of transcutaneous Doppler signals. Given the lack of a skin paddle as is seen in DIEP, msTRAM, or fTRAM, careful attention must be paid when marking areas of Doppler signal during the immediate postoperative period. Oftentimes, the Doppler signals may be heard throughout the reconstructed breast. Patients are advanced from a clear liquid on postoperative day 1 to a regular diet as tolerated. Postoperative pain is assessed using a 10-point scale and pain management includes scheduled acetaminophen and narcotic medications as needed. Patients are encouraged to ambulate on postoperative day 1, and drains are typically removed around 2 weeks after surgery[22]. Additionally, the average hospital stay is 3 days. All patients experience the restoration of bowel function by the time of discharge, usually occurring within 2-3 days following the operation.

ADVANTAGES

Omental Fat-Augmented Free Flap (O-FAFF) presents several advantageous clinical outcomes over traditional autologous breast reconstruction methods, addressing key concerns and limitations in omental-based reconstructions. First, it minimizes donor-site morbidity and reduces complications such as scarring, bulges, and abdominal wall weakness, which are prevalent in conventional autologous procedures. Furthermore, the laparoscopic approach for O-FAFF harvest involves minimal intramuscular dissection and leaves only small port site incisions on the abdomen. This approach leads to enhanced patient outcomes, including reduced pain scores, decreased time in hospital stays, decreased scarring, lower risks for infection, and quicker recovery times compared to traditional autologous techniques[5].

By addressing key concerns and limitations associated with conventional autologous breast reconstruction methods, the O-FAFF technique offers a promising alternative that minimizes donor-site morbidity and reduces the risk of abdominal wall complications, while providing improved patient outcomes and

recovery experiences.

Additionally, O-FAFF resolves the challenge of limited omental volume for reconstruction by incorporating fat transfer augmentation, thus restoring natural breast volume effectively[22,25,28]. The average volume added through fat transfer augmentation varies depending on individual patient factors and aesthetic goals, typically ranging from 100 to 360 milliliters. The mean ratio of fat:omental weight was 0.73 (range 0.22-1.38) for unilateral reconstruction and 1.97 (range 0.24-3.8) for bilateral cases[22]. Precise injections are performed into the omental adipose tissue to achieve optimal contouring and projection of the reconstructed breast. Surgeons opt for direct adipose fat transfer (AFT) into the omentum during the initial surgery to capitalize on enhanced visualization and integration of fat grafts.

The O-FAFF approach also minimizes morbidity and reduces complications such as scarring, bulges, hernias, and abdominal wall weakness, and avoids the need for a second-stage procedure[21]. To date, the patients have not had ileus, bowel obstruction, or other intraabdominal complications postoperatively. Nguyen *et al.* utilized MRI confirmation to demonstrate the viability of grafted fat, with no instances of fat necrosis observed[29]. Omentum volume was comparable to resected mastectomy volumes, effectively restoring a natural breast shape [Figure 1D and E]. The appearance of the reconstructed breast closely maintained a comparable projection attributable to the ADM construct and a supple texture due to the inclusion of autologous tissue[29]. Long-term assessments have indicated a consistent size and shape of the omentum within the reconstructed breast, even following radiation therapy[3,15,18,19]. Patient satisfaction regarding breast volume following laparoscopically harvested omentum for autologous breast microvascular reconstruction has consistently been high[20]. Nonetheless, concerns persist regarding potential complications, such as iatrogenic intra-abdominal injury and challenges during subsequent abdominal surgeries. Encouragingly, patients who underwent abdominal surgery post laparoscopic omental flap surgery experienced minimal intra-abdominal adhesions, suggesting favorable outcomes in such circumstances[20].

A significant advancement in the technique involves employing ADM to form a casing for the omentum, initially shapeless, as demonstrated by Nguyen *et al.*[22]. The premise was that merely inserting the omentum into the mastectomy pocket could alter the natural contour of the skin envelope and potentially flatten the projection of the nipple-areolar complex. However, through precise control of the ADM pocket dimensions, the surgeons not only avoided distortion of the skin envelope but also successfully maintained the desired projection and shape of the reconstruction. This precise control allowed for a result resembling the silicone shell of a synthetic implant, ensuring optimal aesthetic outcomes, as shown by high postoperative patient satisfaction. Volume studies have yet to be conducted[20]. Furthermore, the pocket facilitates optimal integration of grafted fat with the omentum, improving vascularization. This preservation of the omentum inherently softens, and fluidity enables it to seamlessly conform to the shape of the native skin envelope. Nevertheless, it is important to note that while the use of ADM offers advantages, there are also potential downsides associated with its use.

The O-FAFF technique addresses a historical limitation by augmenting limited omental volume with fat transfer[25]. Standard preoperative CT scans cannot accurately assess omental volume variability. In cases with lower BMI, relying solely on omentum weight does not correspond to breast weight, necessitating fat grafting to restore natural breast volume[25]. The omentum's vascular and lymphatic-rich nature makes it ideal for free-fat engraftment, avoiding common issues such as volume loss or fat necrosis seen with free-fat injections. Clinical examination and serial photography reveal stable volume retention and breast contour in 95.8% of non-irradiated reconstructed breasts. MRI imaging shows no evidence of fat necrosis, even in

cases with lower pole volume loss. Studies demonstrated the omental flap's resilience to radiation therapy, with no significant association between adjuvant radiotherapy and accelerated fat graft loss. However, there were reported instances of compromised fat engraftment, prompting consideration for repeat fat augmentation[30-32]. Additionally, there were reports of axillary omental VLNT in conjunction with O-FAFF reconstruction, with no development of lymphedema observed during the study's follow-up. Though the limitation of predicting omental volume remains, further investigation can revolutionize the field of breast reconstruction by popularizing the O-FAFF technique as a viable alternative to traditional breast reconstruction methods (autologous and implant-based).

DISADVANTAGES

Breast reconstruction utilizing the omentum presents unique challenges, notably in accurately estimating tissue volume and evaluating preoperative imaging[30]. Surgeons should plan for subsequent fat grafting procedures to gradually augment the breast volume to the desired size, if needed. Approximately 30%-40% of patients require additional fat grafting after the initial O-FAFF reconstruction to achieve the desired volume, often 1-2 rounds[25]. Patient satisfaction data shows high rates of satisfaction with reconstructive volume when using the O-FAFF technique[1,25]. It is also beneficial to perform fat grafting directly into the omental adipose tissue to maximize the initial reconstructed volume[22]. Bilateral reconstruction may be constrained by the amount of tissue obtained, although the O-FAFF technique aims to address such limitations.

If the harvested omental volume is deemed inadequate or unsuitable for reconstruction during the procedure, the surgical team has several options. Intraoperative assessment of omental volume and quality is critical. If the omentum appears inadequate, proceed with harvesting and augmenting whatever volume is available, with plans for later fat grafting. Alternatively, the procedure can be aborted in favor of other reconstruction methods[1,22,25]. If the omentum is deemed unsuitable intraoperatively, options include aborting and proceeding with tissue expander/implant reconstruction or utilizing another autologous flap like DIEP or PAP if the patient is a candidate. The decision depends on patient preference and intraoperative findings[1,22,25]. The choice should be based on a thorough preoperative evaluation, intraoperative findings, and a comprehensive discussion with the patient regarding their goals and expectations.

Complications observed in omental-based reconstructions, such as flap ischemia, infection, and fat necrosis, parallel those seen in other autologous procedures[33,34]. Confirming adequate blood flow to the omentum is crucial in these reconstruction cases, a process typically validated through computed tomography (CT) angiography[22]. Moreover, distinctive complications involving abdominal organs, though rare, may pose limitations for specific patient populations[35]. Another challenge arises from the malleable and flat nature of the omentum, which requires expertise in aesthetic contouring during reconstruction to create projection and achieve a natural shape[34]. Experience with using the omentum for breast reconstruction is crucial to minimize the risk of flap damage and ensure proper shaping of additional tissue for contouring[22,29].

COMPLICATIONS

Revision surgery after O-FAFF reconstruction typically involves minor volume enhancement using additional autologous fat grafting, without revisions at the abdominal donor site. This contrasts with other autologous breast augmentation methods, where donor site revisions, such as scar revision and hernia repair, are relatively frequent[36]. For instance, breast reconstruction utilizing abdominal free tissue transfer often leads to postoperative complications like abdominal wall weakness, bulges, and hernias, in addition to a lengthy transverse abdominal scar[36,37]. Moreover, O-FAFF patients, in comparison to those undergoing

abdominal free-flap procedures, displayed lower mean pain scores and reduced narcotic use. Crucially, no donor site complications, such as ileus, bleeding, infection, or hernias, were reported among O-FAFF patients, although it was acknowledged that patients with lower BMI inherently have a lower baseline risk for such complications. Long-term adverse consequences of omentectomy have not been identified.

CONCLUSION

In summary, the Omental Fat-Augmented Free Flap stands as a noteworthy option in breast reconstruction, presenting a hopeful alternative to traditional autologous and implant-based methods. By employing the omentum as a scaffold enhanced by fat grafting, the O-FAFF technique tackles critical issues related to limited donor tissue availability, donor site complications, and aesthetic results.

DECLARATIONS

Authors' contributions

Made substantial contributions to the conception and design of the study and performed data analysis and interpretation: Devisetti N, Sarpong C, Hu, AC, Yesantharao PS, Liu FC, Carrion K, Nguyen DH

Performed data acquisition, as well as providing administrative, technical, and material support: Devisetti N, Sarpong C, Hu, AC, Yesantharao PS, Liu FC, Carrion K, Nguyen DH

Availability of data and materials

Not applicable.

Financial support and sponsorship

Not applicable.

Conflicts of interest

All authors declared that there are no conflicts of interest.

Ethical approval and consent to participate

Not applicable.

Consent for publication

The participant provided written consent for her information to be used in this study.

REFERENCES

1. Ma IT, Deptula P, Nguyen DH. Evolution in breast reconstruction using the omentum. *Ann Breast Surg* 2021;5:18-18. DOI
2. Kiricuta I. [The use of the great omentum in the surgery of breast cancer]. *Presse Med (1893)* 1963;71:15-7. PubMed
3. Ni C, Zhu Z, Xin Y, et al. Oncoplastic breast reconstruction with omental flap: a retrospective study and systematic review. *J Cancer* 2018;9:1782-90. DOI PubMed PMC
4. Nahabedian MY, Patel K. Autologous flap breast reconstruction: surgical algorithm and patient selection. *J Surg Oncol* 2016;113:865-74. DOI PubMed
5. Deptula P, Nguyen D. Abdominal wall closure in autologous breast reconstruction: optimizing aesthetics. *JS* 2021;9:128. DOI
6. Mohan AT, Zhu L, Vijayasekaran A, Saint-Cyr M. Autologous breast reconstruction in low body mass index patients: strategies for maximizing skin envelope and breast volume. *Clin Plast Surg* 2020;47:611-9. DOI PubMed
7. Brown M, Namnoum JD. Indications and controversies for implant-only based breast reconstruction. *Clin Plast Surg* 2018;45:47-54. DOI PubMed
8. 2017 Plastic Surgery Statistics. American society of plastic surgeons. Available from: https://www.plasticsurgery.org/news/plastic-surgery-statistics?sub=2017+Plastic+Surgery+Statistics [Last accessed on 20 Jun 2024].

9. Mazzaferro D, Song P, Massand S, Mirmanesh M, Jaiswal R, Pu LLQ. The omental free flap-a review of usage and physiology. *J Reconstr Microsurg* 2018;34:151-69. DOI PubMed
10. Hultman CS, Culbertson JH, Jones GE, et al. Thoracic reconstruction with the omentum: indications, complications, and results. *Ann Plast Surg* 2001;46:242-9. DOI PubMed
11. Nguyen AT, Suami H, Hanasono MM, Womack VA, Wong FC, Chang EI. Long-term outcomes of the minimally invasive free vascularized omental lymphatic flap for the treatment of lymphedema. *J Surg Oncol* 2017;115:84-9. DOI PubMed
12. Upton J, Mulliken JB, Hicks PD, Murray JE. Restoration of facial contour using free vascularized omental transfer. *Plast Reconstr Surg* 1980;66:560-9. DOI PubMed
13. Browning FS, Eastwood DS, Price DJ, Kester RC. Scalp and cranial substitution with autotransplanted greater omentum using microvascular anastomosis. *Br J Surg* 1979;66:152-4. DOI PubMed
14. Yagi S, Kamei Y, Fujimoto Y, Torii S. Use of the internal mammary vessels as recipient vessels for an omental flap in head and neck reconstruction. *Ann Plast Surg* 2007;58:531-5. DOI PubMed
15. Zaha H, Inamine S. Laparoscopically harvested omental flap: results for 96 patients. *Surg Endosc* 2010;24:103-7. DOI PubMed
16. Cothier-Savey I, Tamtawi B, Dohnt F, Raulo Y, Baruch J. Immediate breast reconstruction using a laparoscopically harvested omental flap. *Plast Reconstr Surg* 2001;107:1156-63; discussion 1164. DOI PubMed
17. Zaha H, Onomura M, Nomura H, Umekawa K, Oki M, Asato H. Free omental flap for partial breast reconstruction after breast-conserving surgery. *Plast Reconstr Surg* 2012;129:583-7. DOI PubMed
18. Zaha H, Abe N, Sagawa N, Unesoko M. Oncoplastic surgery with omental flap reconstruction: a study of 200 cases. *Breast Cancer Res Treat* 2017;162:267-74. DOI PubMed
19. Jimenez AG, St Germain P, Sirois M, Hatheway M, Lethbridge R. Free omental flap for skin-sparing breast reconstruction harvested laparoscopically. *Plast Reconstr Surg* 2002;110:545-51. DOI PubMed
20. Alphen TC, Fechner MR, Smit JM, Slooter GD, Broekhuysen CL. The laparoscopically harvested omentum as a free flap for autologous breast reconstruction. *Microsurgery* 2017;37:539-45. DOI PubMed
21. Toyserkani NM, Jørgensen MG, Tabatabaeifar S, Damsgaard T, Sørensen JA. Autologous versus implant-based breast reconstruction: A systematic review and meta-analysis of Breast-Q patient-reported outcomes. *J Plast Reconstr Aesthet Surg* 2020;73:278-85. DOI PubMed
22. Nguyen DH, Rochlin DH, Deptula PL, Zak Y, Dua M, Wapnir IL. A novel fat-augmented omentum-based construct for unilateral and bilateral free-flap breast reconstruction in underweight and normal weight women receiving nipple or skin-sparing mastectomies. *Ann Surg Oncol* 2023;30:3048-57. DOI PubMed
23. Zaha H, Sunagawa H, Kawakami K, Touyama T, Yonaha T, Ohshiro N. Partial breast reconstruction for an inferomedial breast carcinoma using an omental flap. *World J Surg* 2010;34:1782-7. DOI PubMed
24. Liebermann-Meffert D. The greater omentum. Anatomy, embryology, and surgical applications. *Surg Clin North Am* 2000;80:275-93, xii. DOI PubMed
25. Liu FC, Thawanyarat K, Navarro Y, Nguyen DH. Current research on the use of the omental flap in breast reconstruction and post-mastectomy lymphedema: a focus on omental-vascularized lymph node transfer. *Life* 2023;13:1380. DOI PubMed PMC
26. Nicola V. Omentum a powerful biological source in regenerative surgery. *Regen Ther* 2019;11:182-91. DOI PubMed PMC
27. Rinker BD. Alternatives to acellular dermal matrix in breast reconstruction: outcomes from dermal autograft assisted tissue expander breast reconstruction in 104 consecutive patients. *Prs-Glob Open* 2020;8:11-2. DOI PMC
28. Kamei Y, Torii S, Hasegawa T, Nishizeki O. Endoscopic omental harvest. *Plast Reconstr Surg* 1998;102:2450-3. DOI PubMed
29. Nguyen DH, Ma IT, Choi YK, Zak Y, Dua MM, Wapnir IL. Creating a biological breast implant with an omental fat-augmented free flap. *Plast Reconstr Surg* 2022;149:832-5. DOI PubMed
30. Figueiredo JC, Naufal RR, Claro de Oliveira F Jr, Arias V, Bueno Pereira PR, Inaco Cirino LM. Prefabricated flap composed by skin and terminal gastromental vessels. Experimental study in rabbits. *J Plast Reconstr Aesthet Surg* 2010;63:e525-8. DOI PubMed
31. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 2009;6:e1000097. DOI PubMed PMC
32. al-Kattan KM, Breach NM, Kaplan DK, Goldstraw P. Soft-tissue reconstruction in thoracic surgery. *Ann Thorac Surg* 1995;60:1372-5. DOI PubMed
33. Claro F Jr, Sarian LO, Pinto-Neto AM. Omentum for mammary disorders: a 30-year systematic review. *Ann Surg Oncol* 2015;22:2540-50. DOI PubMed
34. Fabrizio T, Guarro G, Filippini A, La Torre G, Grieco MP. Indications for limitations of the omental pedicle flap in immediate breast reconstruction - surgical results evaluation and breast-Q© 2.0 survey. *J Plast Reconstr Aesthet Surg* 2022;75:1352-9. DOI PubMed
35. Costanzo D, Klinger M, Lisa A, Maione L, Battistini A, Vinci V. The evolution of autologous breast reconstruction. *Breast J* 2020;26:2223-5. DOI PubMed
36. Calderoli H, Keiling R. [Covering of substantial loss of substance in breast cancer with local complications. Apropos of 57 cases]. *Acta Chir Belg* 1985;85:1-8. PubMed
37. Calderoli H, Rohr S, Bachellier C, et al. [Locoregional recurrence of breast cancer. Long-term course of 49 cases treated by excision and omentoplasty]. *Chirurgie* 1989;115:767-77. PubMed