



Revisiting the back as an option in breast reconstruction, from basic to cutting edge: a narrative review

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Abstract: There are several reconstructive options for women after a breast cancer mastectomy, particularly for autologous tissue-based reconstruction. Although the transfer of abdominal tissue is currently described as the preferred method, it may not be suitable for all patients. The purpose of this work is to examine the back as a reconstructive strategy for patients with breast cancer, especially in certain situations such as thin patients, the need for skin coverage, the presence of radiotherapy, and obese patients. Additionally, the back becomes an attractive option in special situations when there is a fundamental need to perform autologous reconstruction but not having the technical or human resources to perform a microvascular free flap. The latissimus dorsi (LD) flap is an excellent and reliable option for breast reconstruction but has been criticized for morbidity and complications. The sophistication of the surgery led to the discovery of the thoracodorsal artery perforator (TDAP) flap, which reduces the morbidity of harvesting the entire latissimus muscle. In recent years, the use of the LD flap has re-emerged due to various advancements and applications in technical situations. We believe that both flaps are of great use in breast reconstructive surgery, and aim to describe each of the flap's limitations, advantages and disadvantages.

Keywords: Latissimus dorsi flap (LD flap); dorsal flap; thoracodorsal artery perforator flap (TDAP flap); perforator flap; breast reconstruction; autologous reconstruction; hybrid reconstruction

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Introduction

Since Tansini described the latissimus dorsi (LD) myocutaneous flap in 1896, reconstructive surgeons have been using the flap for over 120 years (1). Its use in postmastectomy reconstruction was first reported by D'Este in 1912 (2), but only gained prominence after the flap was popularized by Olivari (3) and Mühlbauer (4) in the 1970's. After that, the LD has become a workhorse flap for many

reconstructive surgeons, for both immediate and delayed reconstructions, due to its ease of harvest and safety. Factors associated with its popularity include its direct dissection, versatility in orientation and design, and a consistent, reliable vascular pedicle.

The traditional drawbacks of this technique include a potentially insufficient volume that requires the combination of a prosthesis or expander, donor site complications,

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Figure 1 Flaps design and dissection. Above: traditional latissimus dorsi musculocutaneous flap. Below: thoracodorsal artery perforator (TDAP) cutaneous flap. Here the skin paddle must be designed including the perforator that is usually located 8 cm down from the posterior axillary pillar.

including dehiscence and seroma as well as joint discomfort (5-7). Additionally, the initial enthusiasm regarding LD use in breast reconstruction has been tempered over ensuing years by the advent of abdominally based pedicle and free tissue transfer options. Despite this, there are circumstances where the LD flap remains the primary option for salvage, for example in reconstructions with previous radiotherapy, implant infections, recurrent cancer after breast-conserving therapy, or in reconstructive failures (8-10).

Various techniques were designed to create an “extended” LD flap, with the aim of recruiting additional tissue to circumvent implant use. This first was described in 1987 by Hokin and Silfverskiöld and included lumbar fat extensions. In 1994, Papp and McCraw modified the design to carry fat on the surface of the latissimus muscle, thus creating the total autogenous latissimus breast reconstruction (11-13).

With the increased comfort and experience with perforator flaps, many surgeons abandoned the LD flap and migrated to the abdominal donor site as the first option, even with the possibility preserving the entire LD muscle. Angrigiani first described the thoracodorsal artery

perforator (TDAP) free flap in 1995 for postburn cervical resurfacing (14). The TDAP is a perforator flap based on the perforators that originate from the thoracodorsal pedicle. It offers a well-vascularized cutaneous flap that can be harvested in several dimensions. Raising the flap without sacrificing the muscle or the nerve is essential, and by sparing the muscle and the motor nerve, there is minimal muscle trauma and scarring which preserves the functional capacity of the upper extremity and limited dead space which significantly reduces the risk of seroma formation (Figure 1).

Hamdi *et al.* popularized the development of the TDAP flap for both oncoplastic breast reconstruction in the setting of breast conservation and as well as for breast reconstruction after mastectomy (15,16). Subsequently Brackley *et al.* described the use of combining an implant with the muscle-sparing TDAP flap for breast reconstruction (17). Later, Angrigiani *et al.* showed that the propeller TDAP flap can be designed obliquely reaching a length of more than 30 cm (18). In 2013, the concept was further advanced when the TDAP propeller flap was

combined with an acellular dermal matrix (ADM) hammock technique for single stage implant breast reconstruction (19). Published literature described additional variations of the TDAP, termed the muscle-sparing LD (MSLD) flap, harvesting a small cuff of LD surrounding a thoracodorsal perforator to the overlying skin while leaving the rest of the muscle in place in order to preserve LD function (20,21).

In thin patients who are unsuitable for abdominal tissue transfer but have had radiation to the chest wall, many would favor incorporating additional non-radiated tissue to supplement an implant-based reconstruction. Some authors developed the scarless LD flap approach, which avoids taking a skin paddle using a muscle flap alone that can be harvested through a small lateral extension of the mastectomy incision. The procedure is usually combined with a tissue expander but may also be done in single stage with an implant (22-24).

Endoscopically harvested LD flap is another scarless technique in immediate partial breast reconstruction which is gaining popularity in recent times and can be done through the same incision used for the sentinel node dissection (25). Recently, some groups have started performing a minimally invasive LD muscle flap using robot-assisted approach, as this would offer a better three-dimensional view of the field with comfortable and precise dissection (26-29). The drawbacks of this approach are its learning curve and costs, but it is definitely a field that will develop in the years to come.

Recently, the LD flap has had a resurgence in popularity. High volume fat graft to improve flap volume, quilting sutures at the donor site, associated technology during surgery, dynamism prevention and the changing patterns of reimbursement for free tissue transfer have been implicated for this resurgence. The purpose of this article is to describe the current indications, the applications and their advancements as well as the areas of controversy and how to improve the results surrounding the use of total autologous and implant-enhanced LD and TDAP flaps in breast reconstruction. We present the following article in accordance with the Narrative Review reporting checklist (available at <http://dx.doi.org/10.21037/abs-20-72>).

Methods

The studies used in this work were obtained from Ovid MEDLINE, CENTRAL, computerized searches, and hand searches of reference lists and systematic reviews. The language was limited to Spanish and English, plus studies

with more than 10 years of publication, with the exception of historical ones, were omitted.

Discussion

Indications and patient selection

Patients who wish to avoid prostheses or additional surgery on the contralateral breast for symmetry, have a history of ipsilateral breast radiation, or have a high probability for adjuvant radiation are candidates for autologous reconstruction. In our group, we have the conviction of choosing the reconstructive method according to the contralateral breast, considering not only the symmetry of volume and shape but also the breast's dynamic behavior and changes over time. Based on that assumption, we inform patients and reinforce the benefit in superior results and outcomes with autologous reconstruction. There are several reasons why an LD flap may be preferred over other reconstructive options (30).

The LD is first line for autologous breast cancer reconstruction for patients who are not eligible for an abdominal flap due to prior surgery, inadequate abdominal donor volume, or high-risk comorbidities such as diabetes, obesity, or tobacco use (31,32). Another scenario where the LD flap may be preferred is when microsurgical techniques are not available. Recent studies have found that very few patients have access to a specialist in microsurgery (33). Furthermore, microsurgical practice can be deterred by the length of the procedure and the associated poor reimbursement for free flaps for most health insurance carriers (34).

Pedicle TRAMs have become a popular alternative when microsurgery is not available; however, these flaps can have significant abdominal morbidity, especially in bilateral cases (35). LD flaps and their variants offer an excellent option for the patient seeking autologous reconstruction without microsurgery and also avoid donor site problems associated with pedicle TRAM. The LD flap is most commonly harvested as a pedicle flap with a lower index of fat necrosis in the obese population with fewer donor site complications compared to patients undergoing abdominal based flap reconstructions (36). In patients with a history of radiotherapy, the LD flap may be used to supply vascularized tissue to provide coverage for an implant obviating the need to lift an irradiated pectoralis major muscle, which can result in morbidity and an increase in associated capsular contracture. Contraindications to harvest of a pedicle LD

flap include prior thoracic operations where the muscle has been damaged or if the pedicle has been ligated as can occur during an axillary dissection. We believe the indications for the TDAP flap are exactly the same as the LD; however, caution should be taken since the TDAP often provide less volume, has more restricted mobility for certain defects, and requires comfort and experience with perforator dissection (37).

Applications and possible combinations

As the indications for breast conservative surgery (BCS) and radiation expand for both breast conservation and in the setting of a total mastectomy, the use of the LD and TDAP flaps are also expected to increase. However, given the versatility of these flaps, their use in immediate and delayed reconstruction and for breast conservation and mastectomy reconstruction should be better defined.

Breast conservation surgery reconstruction

Traditionally, it was commonly accepted that partial mastectomy defects can be closed primarily without detriment, but the cosmetic result can be unpredictable and patients are often dissatisfied particularly after radiation (38,39). BCS may lead to varying amounts of volume deficits depending on the dimensions of the resected tissue, and 10–30% of patients will be dissatisfied with the final aesthetic result, especially when more than 20% of the breast volume is removed (40). With increasing trends towards BCS, so-called “oncoplastic” reconstruction of partial mastectomy defects is gaining more and more traction as it offers superior cosmetic outcomes and comparable risks of complications as foregoing reconstruction (41,42). Oncoplastic breast surgery has emerged with the concept of combining tumor excision with clear margins followed by immediate breast reconstruction using the remaining breast tissue with clear psychological benefits (43).

While oncoplastic techniques typically are based on volume displacement using breast tissue, volume replacement techniques are often needed following larger resections or in smaller-breasted patients with less remaining breast tissue. Multiple reconstructive algorithms based on different flaps have been proposed, such as the lateral intercostal artery perforator, the lateral thoracic artery perforator flap, the TDAP, and the LD Flap. The choice depends on the size and location of the defect, as well

as the experience and preference of the surgeon. However, most favor using the lateral perforator-based flaps for lateral defects and the TDAP and LD for larger defects (14,44–46). Mericli *et al.* performed a retrospective study involving 47 women who underwent LD reconstruction following partial mastectomy and demonstrated an average BREAST-Q score of 4 out a maximum score of 5 for aesthetic satisfaction (47). In another recent study, Abdelrahman *et al.* compared aesthetic results of oncoplastic reconstructions between LD and TDAP and found that 80.9% of patients with an LD and 76.2% of patients with a TDAP were satisfied with their cosmetic results. None of the patients evaluated their outcome as “bad” (48) (*Figure 2* and *Video 1*).

Mastectomy reconstruction

The surgical treatment for breast cancer has evolved tremendously over time as the radical mastectomy has largely been replaced with skin-preserving mastectomy and even nipple-sparing mastectomy except for advanced and locally aggressive cancers. However, in many centers, wide skin resecting mastectomies are still routinely performed with the immediate need for a flap with a greater skin paddle, especially in the presence of previous radiotherapy.

LD and TDAP associated with tissue expander (TE) and implants

While the LD flap is safe and reliable, it often does not provide sufficient volume except in small-breasted patients. In order to address this main drawback, the flap often needs to be supplemented with implants or, if not possible, a TE followed by an implant in either an immediate or delayed fashion. Both reconstructions may be a successful strategy when used in appropriately selected patients. Studies have demonstrated delayed two-stage reconstruction is safer than direct-to-implant (DTI) in high-risk patients with tobacco use, poorly controlled diabetes mellitus, prior breast irradiation, thin mastectomy skin flaps, or who are morbidly obese. One emerging technology that may be useful in limiting complications is the use of intraoperative tissue angiography. While there are associated costs, it can be a useful adjunct for assessing mastectomy flap viability and aid in intraoperative decision-making for DTI.

We strongly believe that the ideal patient for a DTI with a LD or TDAP flap is a patient who had previous breast augmentation and wants to maintain her volume or even

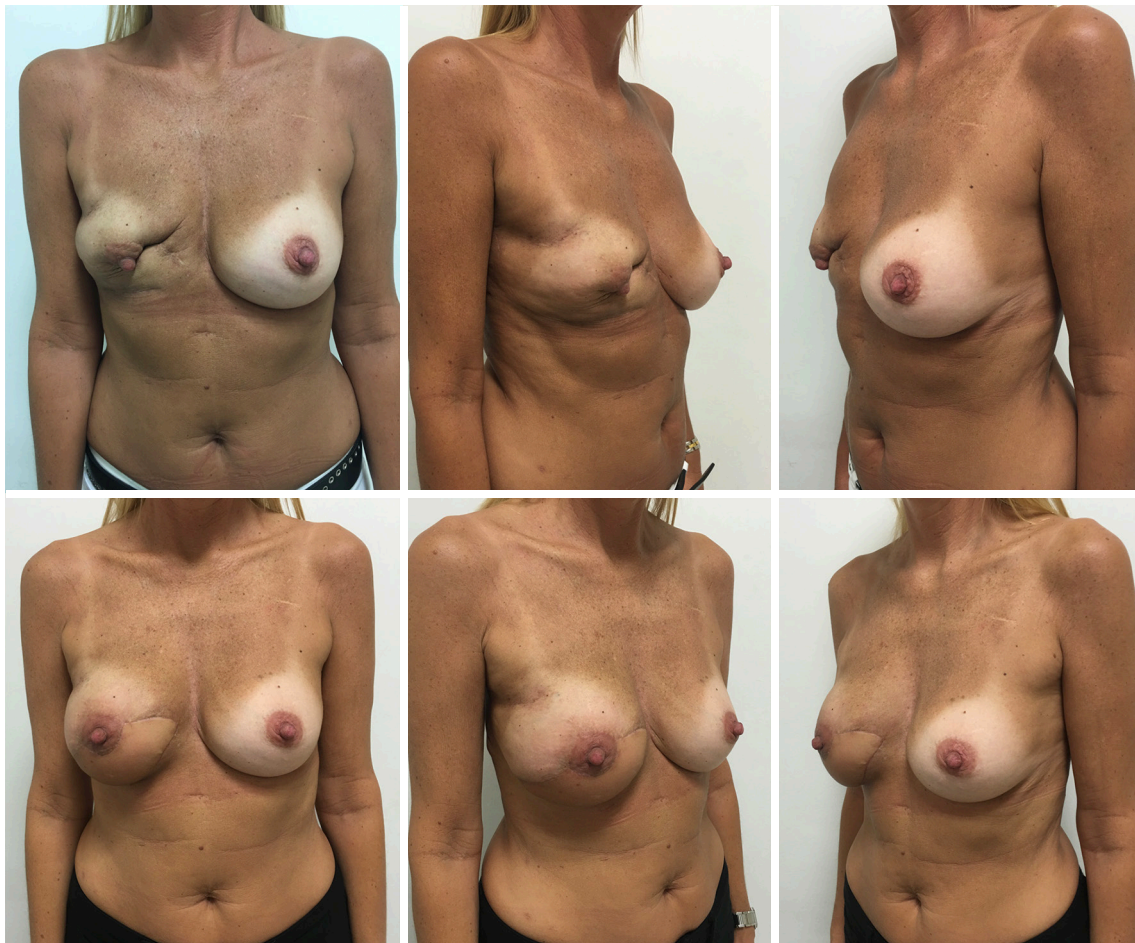


Figure 2 Salvage reconstruction following capsular contracture with LD flap. A 52-year-old patient with a history of bilateral breast augmentation who underwent breast conservation surgery on the right breast and post-operative radiotherapy. She then developed severe capsular contracture and radiation dermatitis requiring explanation of her breast implant (above). She then underwent reconstruction with an LD flap and immediate prosthesis (below). LD, latissimus dorsi.

less volume, has a minimal skin defect that does not require expansion, and has favorable anatomy. However, when the skin defect is large, the anatomy is distorted from an extensive resection, or the patient wishes to have a larger volume, we consider a two-stage reconstruction using a flap with an expander will provide a superior aesthetic benefit and a lower revision rate (*Figures 3-6 and Video 2*).

Cattelani *et al.* conducted a 7-year analysis of 59 consecutive women with recurrent breast cancer, previously treated with partial mastectomy and adjuvant radiation therapy, who then underwent completion mastectomy and reconstruction using an implant and LD flap. They reported 3.4% risk of major complications requiring implant removal and 6.8% minor complications, mostly partial flap necrosis

managed conservatively (49). In another recent study with 366 patients and 484 breasts, Patrinely compared ADM versus LD flap with TE, and showed no statistically significant differences in complications, reoperation rates, patient satisfaction, or overall cosmetic outcomes (50). The current literature indicates a higher cost of reconstruction with ADM versus LD flap but a shorter surgery period and shorter postoperative stay period. However large-scale comparative studies are still lacking (51,52). The “skinless” LD technique is alternative option that would be suitable for patients with thin mastectomy skin flaps who are not candidates for free abdominal tissue but who have undergone prior radiation. Studies hypothesize the LD muscle would behave similarly to ADM and is an alternative



Figure 3 Latissimus dorsi flap reconstruction following breast conservation with breast implant. Both patients with a history of prior conservative surgery and radiotherapy, presented with recurrent disease and underwent a completion mastectomy and immediate reconstruction with an LD flap and prosthesis 255 cc (above) and 175 cc (below). No contralateral procedures were necessary as the reconstruction was able to restore excellent symmetry and achieve an acceptable aesthetic result.

in TE based breast reconstruction (22,23).

Using the LD has a greater advantage in the irradiated field as it enables all implants to be covered with healthy tissue, clearly reducing the degree of capsular contracture caused by the already irradiated pectoral major and also a positive impact in improving the quality of mastectomy flaps with a history of radiotherapy as well.

LD and TDAP for total autologous breast reconstruction with and without fat grafting

There are a wide variety of modifications that can be performed to the LD and TDAP flaps in order to complete

a fully autologous reconstruction and is predominantly determined by the size and shape of the contralateral breast. There are numerous benefits to an autologous reconstruction, including the natural feel and appearance, a lower incidence of potential reoperations, and the absence of complications related to implants such as extrusion, capsular contracture, infection, poor cosmetic outcomes after radiation therapy and the recently suggested link to anaplastic large cell lymphoma with textured implants (53-55).

In 2013, Hanwright conducted a retrospective study of 12,986 patients of which 3,636 patients were obese, and demonstrated an increased risk of complications



Figure 4 Latissimus dorsi flap with implant breast reconstruction. A 68-year-old patient presents for reconstruction with a history of bilateral mastectomy without reconstruction associated with radiotherapy to the left breast due to prior partial mastectomy (above). A single stage reconstruction was performed using a muscle-sparing LD flap with an implant on the left side. On the right side, an abdominal advancement flap was made, and a definitive implant was placed. Nipple areolar reconstruction was performed 6 months later (below).

in autologous breast reconstruction compared to TE in patients with high BMI. Of all the autologous breast reconstructions, the LD flap had the lowest 30-day morbidity (56). In another study, Demiri demonstrated an increased risk of major complications in LD flaps with an implant, including implant extrusion and capsular contracture compared to LD flaps augmented with autologous fat (57). In light of these findings, it is possible to plan a completely autologous reconstruction using the LD flap even in patients with medium or even large contralateral breasts. When it is found during preoperative planning that the volume provided by the back is insufficient, the flap can be augmented with fat grafting

immediately or in a staged fashion to achieve the necessary volume to achieve symmetry. Fat grafting is widely used in breast reconstruction today, in both small and large volumes (58); however, its safety was initially considered controversial, but it has now been proven to be an excellent adjunct in breast reconstruction (59-61). A recent study demonstrates fewer complications, shorter operative time and hospital stay in patients undergoing reconstruction with fat grafted LD flaps compared to abdominal free flaps in obese patients (62). In this study, lipofilling was performed through the LD flap including the muscle, skin paddle, pectoralis major and serratus muscles, and mastectomy skin flaps. Another study demonstrated similar findings with

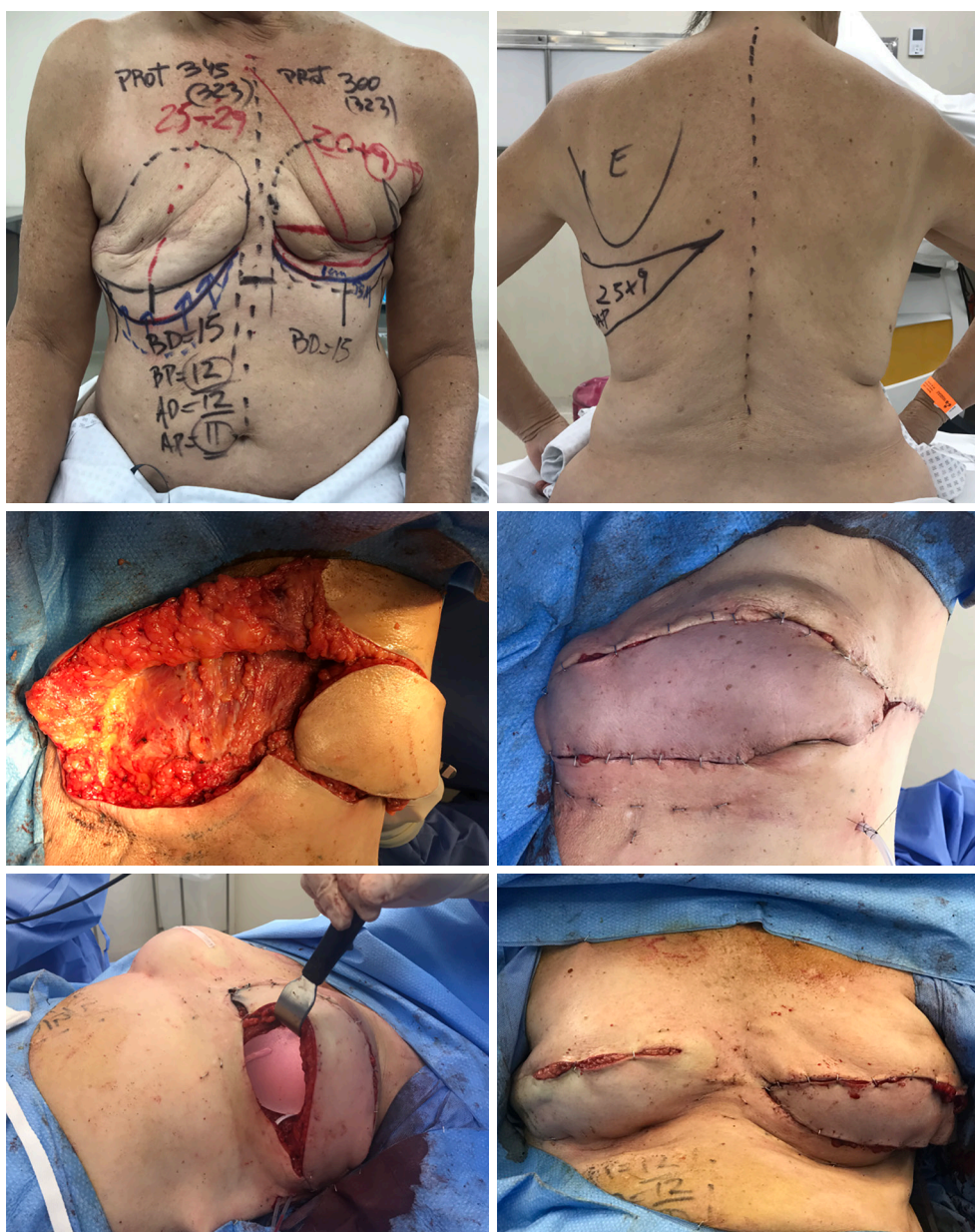


Figure 5 Surgical markings for breast reconstruction. Surgical planning and markings of the abdominal advancement flap for the patient depicted in *Figure 4*. The initial skin markings were made for a TDAP flap, but due to the presence of a small perforator, the TDAP was aborted and an LD flap was performed (above). The LD flap was transposed to reconstruct defect (center). The one-stage reconstruction was completed with immediate placement of breast implants under the flaps (below). TDAP, thoracodorsal artery perforator; LD, latissimus dorsi.

promising outcomes in immediate breast reconstruction (63) (*Figures 7,8*).

In the authors' experience, immediate fat grafting into the mastectomy skin flaps should be performed with extreme caution, but can be performed safely in

a delayed fashion. In the setting of prior radiation, we have found lipofilling of the LD flap to be a useful tool in reconstructing a breast using entirely autologous tissue. This can be performed with an expander in place where the entire volume of an expander is replaced with

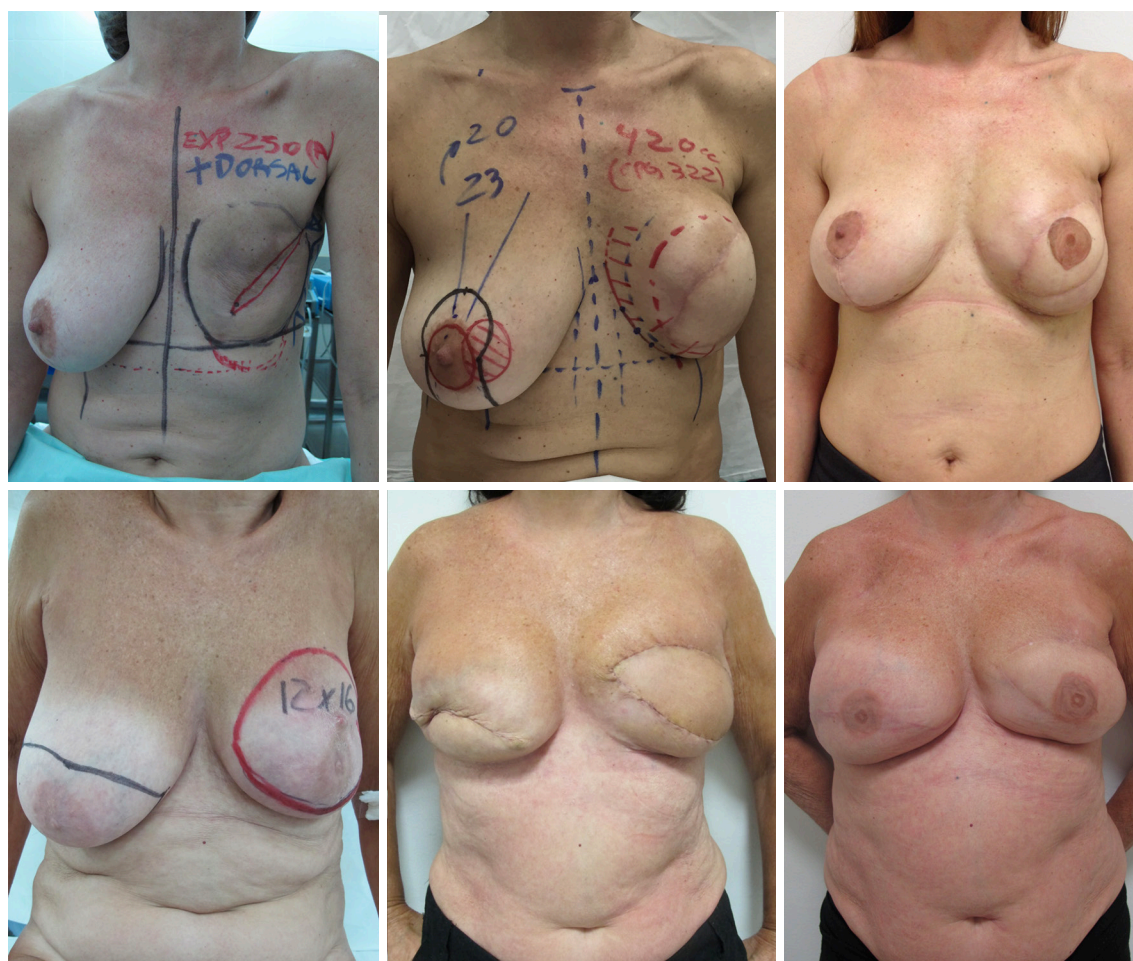


Figure 6 Delayed and Immediate breast reconstruction with LD flap and tissue expanders. The patient presents for delayed reconstruction following a mastectomy and radiotherapy. An LD flap was performed with a tissue expander and exchanged for an anatomic silicone implant with a contralateral mastopexy 6 months later (above). Another patient with a history of a left partial mastectomy with adjuvant radiation then underwent bilateral mastectomies for recurrent disease. On the right side, the patient had prepectoral placement of an expander, but on the left side, an immediate LD flap was performed to cover the expander because of the prior radiotherapy (below). LD, latissimus dorsi.

autologous fat thereby obviating the need for an implant. A contralateral reduction mammoplasty for symmetry can be performed simultaneously during the last round of fat grafting or in a separate operation. With the experience gained from combining implants, flaps and fat grafting, we were able to replace the volume of the expander for fat and the final removal of the expander with total autologous reconstruction in a second and eventual third surgery where we can also perform a contralateral symmetrization through a breast reduction (*Figure 9* and *Video 3*).

Another very powerful tool for completing a total autologous reconstruction is the use of an extended LD and then enhance it with fat grafting in a second time, thereby

reaching an even greater volume without the need for a prosthesis. We believe this is an excellent alternative for achieving a total autologous reconstruction especially in centers where microsurgery has not been developed.

Design and technical tips to minimize morbidity and enhance results

Although the LD and TDAP flaps can be designed in many orientations, we recommend designing the flap along the lines of tension of the back. In this way. The issues of scar appearance and surface contour of the back can be significantly improved. By beveling the skin flaps, the deeper



Figure 7 Total mastectomy reconstruction using LD and TDAP flaps. Thin patient with prior history of partial mastectomy and radiation who underwent reconstruction following a mastectomy (top). Another patient with previous irradiated lumpectomy and subsequent mastectomy who underwent reconstruction with a TDAP flap with second stage lipofilling (center). Another patient who was not interested in implants who opted for reconstruction with a TDAP and fat grafting to the upper pole (below). TDAP, thoracodorsal artery perforator; LD, latissimus dorsi.

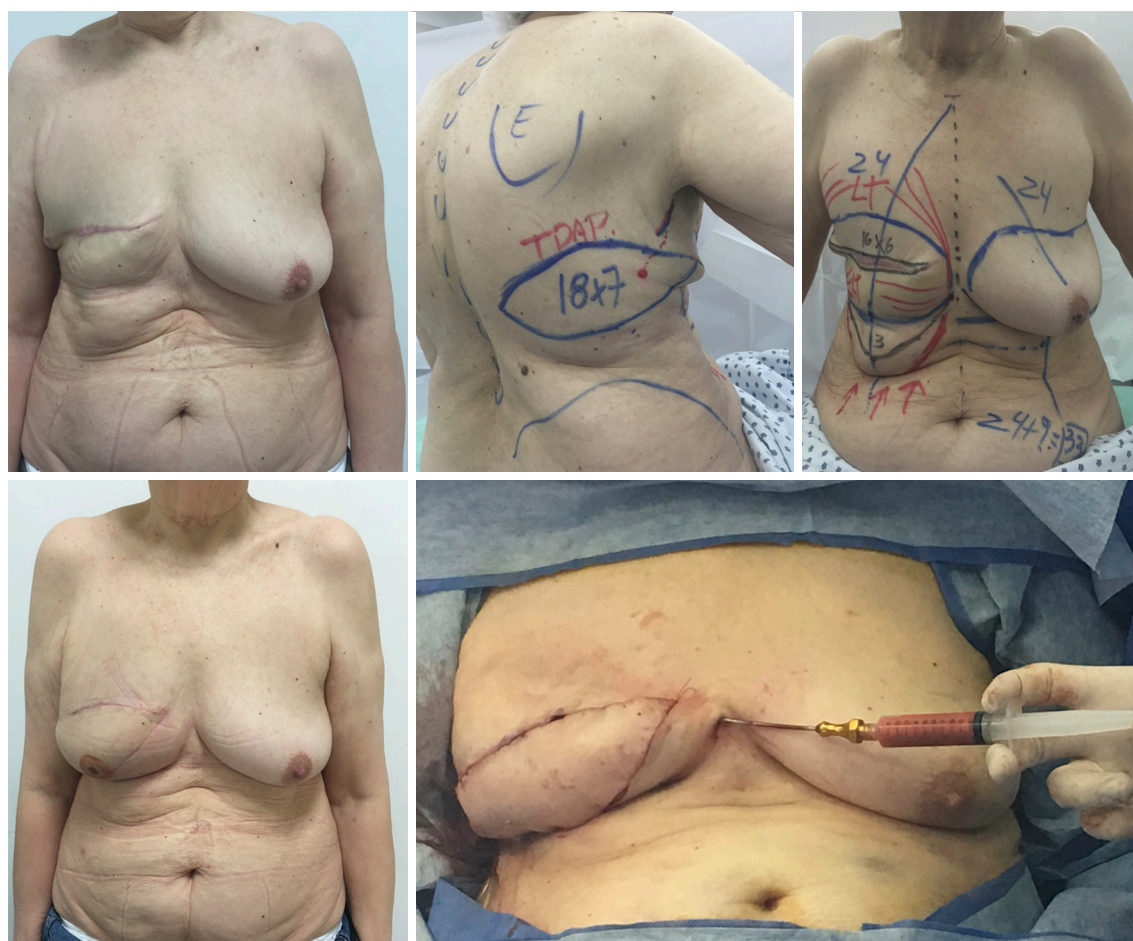


Figure 8 Thoracodorsal artery perforator flap with autologous fat grafting. A 67-year-old patient presents for delayed reconstruction and was not interested in an abdominal free flap. She opted to proceed with reconstruction using a TDAP and lipofilling to the upper pole as well as an abdominal advancement flap also augmented using fat grafting. TDAP, thoracodorsal artery perforator.

fat layer can be left on the latissimus muscle and harvested with the LD flap, particularly superiorly and medially, to increase the volume and maximize the utility of the LD myocutaneous flap. Once the flap is released, the authors recommend to divide the tendon almost entirely after the pedicle is clearly identified to avoid injury to the pedicle. By dividing the tendon, this increases the mobility of the flap and also limits the animation of the muscle; however, we recommend preserving the anterior 10% of the insertion intact to prevent inadvertent traction on the pedicle when the flap is passed anteriorly (6). Despite almost completely dividing the tendon, contraction can still create significant distortion in the shape of the breast. For this reason, it is recommended that the thoracodorsal nerve also be divided during flap elevation. Some recommend resecting at least 4 cm of the thoracodorsal nerve (64). While we concur with

resecting a segment of the nerve to avoid any animation deformity, we believe it should be performed by surgeons with knowledge in microsurgery techniques since there is a risk of injuring the vascular pedicle.

As for the design of the TDAP paddle, it is limited based on the location of the perforator, so the scar is often higher than that of a LD and often crosses the axillary line, which may be visible in some patients. The size of the flap that can be harvested is based on the size of the perforator but can be as large as the skin paddle taken with an LD flap. With respects to using the TDAP for breast reconstruction, the flap can be designed as a propeller flap or as a transposition flap by dissecting the perforator through the muscle to gain more mobility of the flap. The perforator can be skeletonized and dissected to the origin of the thoracodorsal pedicle in order to achieve the maximum mobility of

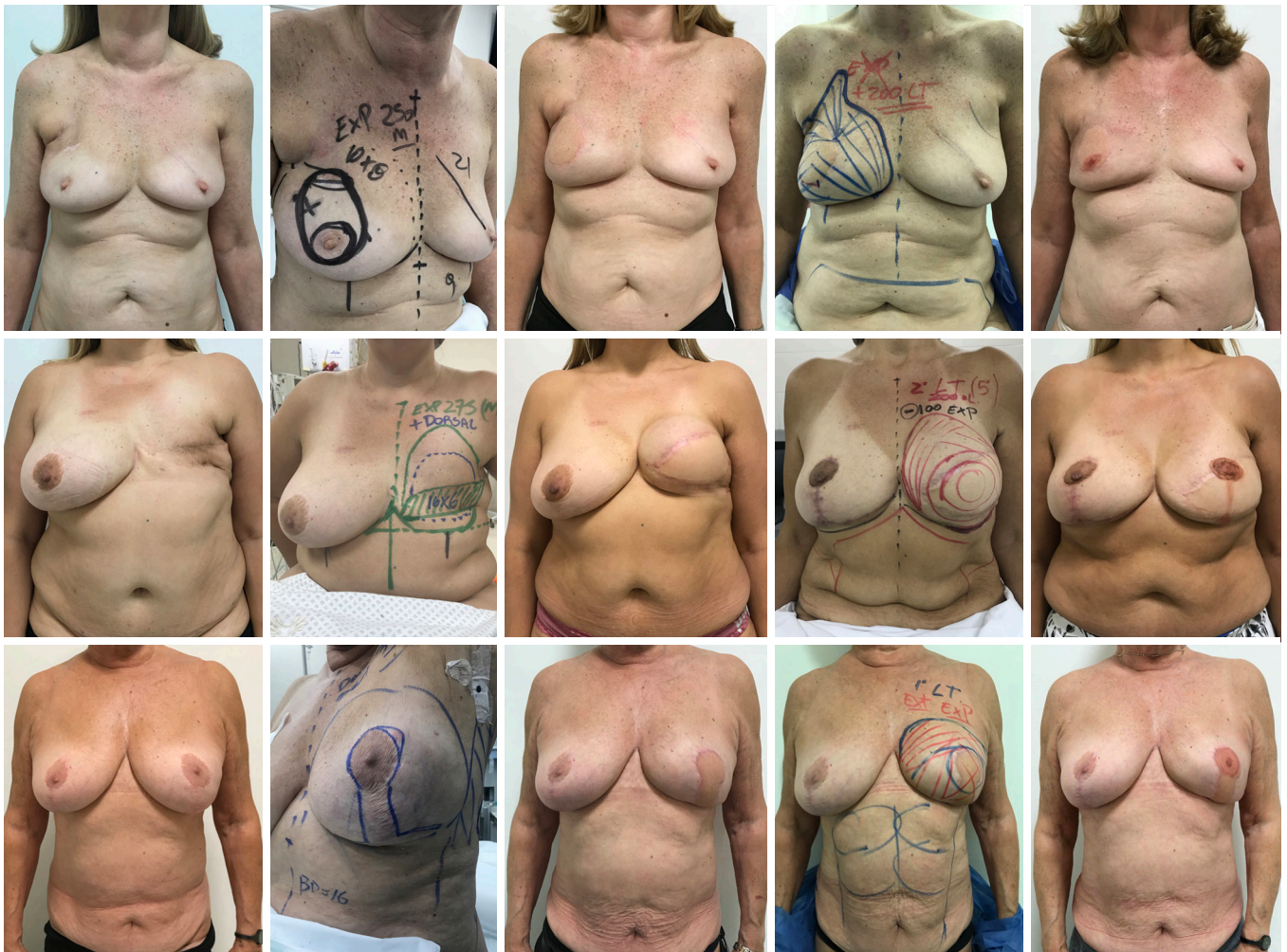


Figure 9 Autologous fat grafting and LD flap reconstruction. Patient presents with recurrent disease following breast conservation with adjuvant radiation. An LD flap was performed at the time of the mastectomy with placement of a 250 cc tissue expander. After 6 months, the patient underwent removal of the expander and only autologous fat grafting. A total of 200 cc of fat was injected to avoid using implants (above). Another patient who underwent autologous fat grafting to an LD flap. An abdominal flap was not possible as she had a previous abdominoplasty. In this case the expander was also replaced entirely with lipofilling, but she required two sessions of autologous fat grafting to achieve the appropriate volume (center). Another patient with a history of breast reduction presented a retroareolar tumor, so a mastectomy was performed with vertical cutaneous resection and reconstruction with an extended LD flap associated with a 350 cc prepectoral expander filled with 200 cc. After 5 months, the expander was removed and a lipofilling of 200 cc of fat was performed at that time. This procedure was performed considering that the patient did not desire definitive implants and that the LD would provide volume and matrix for future lipofilling and protection of the expander on the vertical scar (below) (*Video 3*). LD, latissimus dorsi.

the flap.

One of the hallmark studies performed by Hamdi *et al.* proposed an algorithm for pedicle perforator flaps in breast reconstruction. The authors' algorithm is based on the quadrants of the reconstruction and recommended using lateral based flaps for lateral defect, while larger defects should be reconstructed with a TDAP flap. They

advised starting the flap dissection inferior and laterally to identify the perforator. If the perforator is diminutive and inadequate, the authors recommend converting to a partial or traditional LD flap (65). Other authors have suggested using preoperative angiograms to determine the size of perforators to determine what type of flap to harvest (66-68).

The possibility of performing a TDAP flap is interesting,

with a previously traumatized axillary region and without a thoracodorsal pedicle, as in this case the perforator is also fed by secondary circuits.

Complications

Donor site seroma is the most common complication following harvest of a LD flap. Some have recommended maneuvers such as quilting sutures (progressive tension sutures), fibrin sealant or both to minimize the risks of a seroma. Others advise limited use of the upper extremity (69,70). Flap ischemia is a rare complication given the robust vascular pedicle, and total flap necrosis is most likely secondary to inadvertent injury to the thoracodorsal vessels during flap harvest, tension on the pedicle during flap inset, or traction or torsion on the pedicle during transposing the flap to breast. An extremely rare complication following LD harvest is a lumbar hernia (71,72). Other rare complications include limitation is the shoulder and upper extremity with measurable reductions in shoulder joint stability, strength, range of motion, and general functionality. The overwhelming majority of these complications improve and resolve after 6 to 12 months (73-75).

A number of retrospective studies have examined the impact of LD flap harvest on shoulder function. The results range from fatigue with overhead activities, to occupational problems. However, this may be difficult to distinguish from the sequelae of undergoing a total mastectomy with an axillary lymph node dissection and adjuvant radiation therapy. In a prospective study, De Oliveira *et al.* demonstrated that LD flap reconstruction had no impact on shoulder range of motion. Smoking, axillary cords, and an axillary node dissection were associated with significant functional morbidity and limited abduction (76). In 2013 the same author re-examined shoulder range of motion after immediate reconstruction with LD one year following reconstruction. Tissue adhesion and scar formation were associated with functional limitations; however, early implementation of physical therapy starting immediately after surgery resulted in no clinically significant functional morbidity (77). Despite the low risk of donor site morbidity, we believe it is very important to discuss all these possibilities, especially in the case of active, athletic patients. We have not had any patient with shoulder damage in our practice.

Some studies demonstrated that immediate breast reconstruction using a LD flap led to a decrease in muscle volume of up to 50% without radiotherapy and up to 69%

after postoperative radiotherapy. Particular care should be taken in determining the size of an extended LD flap if the LD is thick or if it occupies a large portion of the flap (78,79). Some of these authors suggest using larger prostheses, but since the volume changes are not predictable, we prefer future corrections with fat transfer.

As for the morbidity of the TDAP, there are no concerns for hyper animation of the breast, shoulder pain or instability, loss of the contour by sacrificing the posterior pillar, or large seromas (80). However, there are potential complications that can occur as with any perforator cutaneous flap such as bleeding, infection, or delayed wound healing. Issues like partial flap loss and fat necrosis are more commonly secondary to poor perfusion that can occur from injury to the perforator or perhaps harvesting a flap that extend beyond the perforasome of the TDAP perforator.

The surgeon must be aware of the possibility of irregular images and structures while working with fat grafting, and therefore alert the patient. The experience will reduce complications, but certainly the most important thing is to know where to send the control images to be made and this center should have experience in interpreting those findings.

Summary

The LD and TDAP flaps represent workhorse flaps for breast reconstruction with limited risks of complications, and represent an attractive option for autologous reconstruction when the abdominal donor site is not usable or when microsurgical resources and experience are limited. Supplementation with an implant or autologous fat can help augment the flap volume to match the size and symmetry of the contralateral breast. In the authors' experience, if resources and technical skills are available, a TDAP flap should be performed if there is adequate volume and a robust perforator is present. However, a LD is recommended for those with less experience in perforator flaps or when more volume is needed.

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