

# Prospective Study of Versatile Oncological Uses of Thoracodorsal Artery Perforator Flap in Breast Cancer Surgery

Original  
Article

*Mostafa Gawish, Tarek Elfaoumy, Ibrahim Elashmawie, Mahmoud Elhousiny, Haitham Fayed*

*Department of Surgery, Faculty of Medicine, Alexandria University, Alexandria, Egypt.*

## ABSTRACT

**Background:** Since its introduction by Angrigiani the Thoracodorsal Artery Perforator (TDAP) flap has become a popular choice in many aspects of breast reconstruction. It can provide either volume for partial or total breast reconstruction or as coverage for chest wall defects.

**Aim:** The aim of this study is to assess the technique of TDAP flap as a versatile tool for different purposes in breast cancer surgeries as regard; feasibility, complications and cosmetic outcome.

**Patients and Methods:** This is a prospective study which was conducted on 30 female patients with breast cancer who were aiming for either breast conservative surgery or total reconstruction after mastectomy or those who needed chest wall coverage after mastectomy. Patients were admitted to the Surgical Oncology Unit, Alexandria Main University Hospital.

**Results:** In most of our patients (21 case 70%), TDAP flap was used for immediate partial breast reconstruction after BCS. Complications was detected in 60% of cases yet most of these complications were minor ones and were managed conservatively. Only 2 cases (6.7%) had total flap loss. Doner site morbidity was minimal as only 4 cases expressed post operative seroma. Most of our patients (80%) were satisfied with the aesthetic and functional outcomes after surgery. Shoulder function was nearly unaffected as compared to preoperative assessment.

**Conclusion:** The TDAP flap represents a valuable option in breast reconstruction, offering reliable results with low donor site morbidity. It is particularly advantageous in cases where other reconstructive options are limited or when muscle preservation is a priority.

**Key Words:** Breast cancer, BCT, Breast reconstruction, TDAP flap.

**Received:** 06 January 2025, **Accepted:** 25 January 2025, **Published:** 1 July 2025

**Corresponding Author:** Mostafa Gawish, MSc, Department of Surgery, Faculty of Medicine, Alexandria University, Alexandria, Egypt. **Tel.:** 01004945107, **E-mail:** dr.mostafa.gawish@gmail.com

**ISSN:** 1110-1121, July 2025, Vol. 44, No. 3: 1037-1045, © The Egyptian Journal of Surgery

## INTRODUCTION

Breast cancer remains the most prevalent malignancy among women worldwide, accounting for significant morbidity and mortality. According to the World Health Organization, it represents approximately 24.5% of all cancers in women globally<sup>[1]</sup>. The surgical management of breast cancer involves either mastectomy or breast conservative surgery which affects body image, psychological well-being, and quality of life of a breast cancer patient. As a result, oncoplastic breast surgery and breast reconstruction have become a critical aspect of comprehensive cancer care, aimed at restoring breast appearance, enhancing body image, and improving overall quality of life. In recent decades, these procedures have seen a steady increase, driven by advances in surgical techniques and a multidisciplinary approach to cancer management<sup>[2,3]</sup>.

Oncoplastic breast surgery includes either volume replacement or volume displacement. In the last decade, perforator flaps have emerged as a lifeboat in volume replacement techniques as they provide excellent cosmetic outcome without the need for symmetrisation. Although being the first described perforator flap for breast reconstruction, TDAP flap has been largely replaced by other chest wall perforators as LICAP, AICAP and LTAP for partial breast reconstruction. However, its use remains of benefit when large volume replacement is needed especially in inner and central quadrants where other flaps would not provide sufficient volume with acceptable cosmetic outcome<sup>[4,5]</sup>.

Breast reconstruction techniques can be categorized into implant-based and autologous tissue-based approaches. Implant-based reconstruction is the most

frequently utilized method due to its relatively short operative time and simpler surgical procedure. However, complications such as capsular contracture, implant rupture, and aesthetic dissatisfaction often necessitate revision surgeries. Additionally, patients with a history of radiation therapy may experience higher rates of implant-related complications, making autologous reconstruction a more appealing alternative<sup>[6]</sup>. Among autologous options, the latissimus dorsi (LD) flap has been a valid option for total breast reconstruction, as it provides an easy technique with natural appearance especially when combined with lipofilling and avoids the long-term risks associated with implants. However, the LD flap is not devoid of complications, particularly donor site morbidity and shoulder function affection<sup>[7,8]</sup>.

The thoracodorsal artery perforator (TDAP) flap, first described in the early (1990s) by Angrigiani *et al.*, is a muscle-sparing alternative that has gained traction in breast reconstruction. The TDAP flap offers several advantages over traditional latissimus dorsi flaps, including reduced donor site morbidity, better preservation of shoulder function, and a decreased risk of muscle atrophy. Its versatility extends beyond breast reconstruction, having been successfully utilized for head and neck, extremity, and trunk reconstruction as well. Within the context of breast reconstruction, the TDAP flap serves both primary and secondary roles, making it a valuable option for patients who are unsuitable for abdominally based flaps or require revision surgery<sup>[9,10]</sup>.

Although TDAP flaps provide significant benefits, challenges persist in optimizing outcomes and minimizing complications. The risk of complications such as flap necrosis, fat necrosis, and wound dehiscence can be influenced by factors including prior radiation therapy, comorbidities, and surgical technique<sup>[10]</sup>.

This study aims to assess the clinical outcomes associated with TDAP flap in breast cancer surgeries, with a focus on complication rates, patient satisfaction, and aesthetic results. This research seeks to provide more robust evidence supporting the use of TDAP flaps in breast cancer surgeries either as volume replacement or total reconstruction and to better define their role in modern reconstructive breast surgery.

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## PATIENTS AND METHODS:

### Study Design

This study is a prospective analysis of patients who underwent thoracodorsal artery perforator (TDAP) flap breast reconstruction between October 2022 and February 2024 at Surgical Oncology Unit, Alexandria Main University Hospital. Institutional Review Board (IRB) approval was obtained before data collection, ensuring compliance with ethical standards for patient confidentiality and data handling.

### Patient Selection

Patients included in the study were those who underwent partial or total breast reconstruction using TDAP flaps following mastectomy for breast cancer.

#### *Inclusion criteria were:*

1. Female Patients with breast cancer.
2. Underwent breast conservative surgery or mastectomy (unilateral or bilateral) with subsequent reconstruction using TDAP flap techniques.
3. Indications for reconstruction included primary reconstruction following mastectomy or secondary reconstruction for revision of previous surgeries (e.g., implant complications, volume discrepancies).

#### *Exclusion criteria included:*

1. Patients undergoing reconstruction for non-malignant causes (e.g., cosmetic procedures or benign conditions).
2. Cases where other types of flaps (e.g. latissimus dorsi) were primarily used.
3. Patients with Previous surgeries in the scapular region with extensive scarring.

### Preoperative Assessment

All patients underwent a comprehensive preoperative evaluation that included medical history, physical examination, and assessment of risk factors such as smoking, diabetes, and prior radiation therapy. Imaging studies (e.g., mammography, ultrasound, or MRI) were used to assess the breast anatomy and aid in surgical planning. The choice of the TDAP flap was based on patient-specific factors, including body habitus, previous surgeries, and the availability of donor tissue.

### Surgical Technique

The TDAP flap was harvested as a perforator flap without muscle inclusion. Preoperative Doppler ultrasound was used to identify suitable perforators while the patient in the lateral position to simulate surgical position during flap harvesting, typically located 8 to 10cm below the axillary fold along the anterior edge of the latissimus dorsi muscle. The flap dimensions were planned based on the defect size and the purpose of flap usage, with a pinch test performed to ensure primary closure of the donor site<sup>[11]</sup>.

After tumour excision either after mastectomy or BCS, in most cases patient was turned to lateral position with arm abduction 90 degrees to facilitate flap dissection. Only in minority of patients, a single supine position was used for both tumour excision and flap mobilization which was only feasible for propeller flaps mobilization into the outer quadrants.

Flap dissection was done in the superficial plane over the fascia covering the latissimus dorsi muscle as this would help in perforator identification during dissection and believed to decrease post operative donor site complications as seroma. It usually starts from posterior to anterior until reaching the area of perforators where dissection should be slowed with cold scissors and bipolar diathermy to avoid perforator spasm or injury. One could usually find a dominant cutaneous perforator with two venae comitantes which was separated from the surrounding muscle tissue with cold scissors and side branches was ligated using vascular clips as shown in Figure (1a). Continuous irrigation with saline and sometimes papaverine solution should be done during time of perforator dissection. If no reliable perforator was found, the flap could be tuned into a muscle sparing one<sup>[12]</sup>.

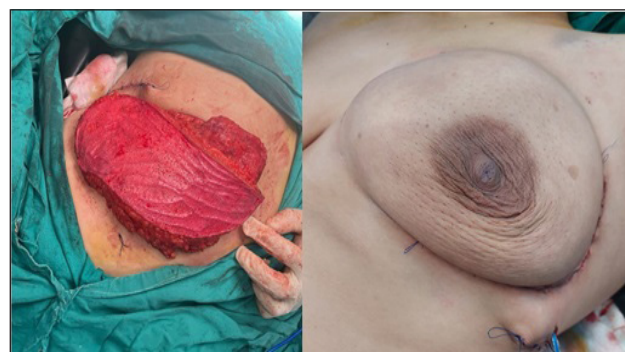
For primary breast reconstruction, the TDAP flap was used immediately following mastectomy for total breast reconstruction or after breast conservative surgery as partial volume replacement, whereas in secondary cases, it was used to correct volume deficiencies, salvage procedures, or other deformities from previous reconstructions.

When used as a propeller flap. It was rotated anteriorly based on the dominant cutaneous perforator from the descending branch of the thoracodorsal artery without further perforator dissection into the muscle and then the flap is rotated into the defect<sup>[13,14]</sup>. If further mobilization is required, a pedicled island flap should be performed by complete perforator dissection and separation from the surrounding muscle tissue with great care to preserve the vascular pedicle and the thoracodorsal nerve then the flap was tunnelled into the muscle through a muscle splitting incision around the perforator and then complete dissection of the pedicle through the axilla until the flap is rotated into its position inside the breast without tension. Figure (1b) shows TDAP flap after mobilization into the upper inner quadrant. Donor site was closed primarily, and drains were placed as needed. When no reliable perforators were identified during flap dissection, a muscle sparing type flap was used including a cuff of muscle tissue around the perforators to ensure flap perfusion while preserving the thoracodorsal nerve in all cases<sup>[15]</sup>.



**Figure 1:** (A,B) Flap dissection and mobilization.

If total volume replacement is intended for breast reconstruction after conservative mastectomies, an extended TDAP flap was designed as a Banana shaped flap which included a large sized skin padel and more subcutaneous fat providing additional volume to the flap as shown in Figure (2a). This technique is particularly of great importance in high BMI patients who had large skin padel on their back where most of the flap volume lies in the dermo-glandular flap itself not the muscle. Also, this muscle sparing technique greatly decreases donor site complications in such patients as compared to conventional LD flap<sup>[16]</sup>. Figure (2b) shows final volume after flap mobilization into the breast. As coverage for chest wall defects, TDAP flap provide a good muscle sparing option either as a pedicled or propeller flap with low donor site morbidity compared to conventional LD flap. It should be considered for chest wall coverage when other local flaps like thoraco-abdominal or thoraco-epigastric flaps are insufficient for defect coverage as in previous abdominal surgeries or low BMI patients as shown in Figures (3a, b)<sup>[17]</sup>.



**Figure 2:** (A,B) Flap dissection and mobilization.



**Figure 3:** (A,B) Fungating breast cancer Excised with TDAP coverage.

Primary closure of the donor site is done without tension. Drainless closure of the donor site was our preferred approach after TDAP flap harvesting without increase in rate of complications<sup>[18]</sup>. Then the patient is returned to supine position and further flap mobilization is done through the axilla until the flap reached its final position without tension. Flap suturing with 3/0 vicryl was done to fix the flap periphery to the surrounding breast tissue.



### Postoperative Care and Follow-Up

Postoperative care included routine monitoring for flap viability through clinical examination (colour, capillary refill, and temperature). Drains were removed when output was less than 30ml for two consecutive days. Patients were followed for a minimum of 12 months postoperatively, with evaluations at regular intervals to monitor for complications and assess functional and aesthetic outcomes.

### Data Collection and Outcome Measures

Data were collected from electronic medical records, including demographic information, comorbidities, operative details (flap dimensions, operative time), and postoperative outcomes. Complications were categorized as early (within 30 days) or late (beyond 30 days). Major complications included flap loss, significant fat necrosis requiring surgical intervention, and wound dehiscence requiring reoperation. Minor complications included seroma, hematoma, minor wound dehiscence, and manageable infections.

### Statistical Analysis

Statistical analysis was done using SPSS ver 25 (.....).

Descriptive statistics were used to summarize patient demographics, flap characteristics, and outcomes. Chi-square tests were employed to evaluate the association between complication rates and risk factors such as age, BMI, smoking status, and history of radiation therapy. A  $p$ -value of  $<0.05$  was considered statistically significant.

## RESULTS:

### Patient Demographics and Clinical Characteristics

A total of 30 patients underwent TDAP flap breast reconstruction during the study period. The mean age was  $47.4 \pm 7.5$  years (range: 34-62 years), and the mean body mass index (BMI) was  $28.7 \pm 5 \text{ kg/m}^2$  (range: 19-39  $\text{kg/m}^2$ ). Most of the cases (60%) involved left-sided breast cancer, while 40% were right-sided. Only 8 cases (26.7%) had positive family history while rest of the cases (22 cases) had negative family history. Small and medium size breasts were the preferred cup sizes for reconstruction with TDAP flap in about 20 cases (66.7%). 11 cases (36.7%) received neoadjuvant chemotherapy with variable degree of radiological response. Patients' demographics are presented in Table (1).

**Table 1:** patients' Characteristics:

	Mean $\pm$ SD	Range
Age	47.4 $\pm$ 7.5 years	34-62 years
BMI	28.7 $\pm$ 5 $\text{kg/m}^2$	19-39 $\text{kg/m}^2$
Family history	26.7% positive 73.3% Negative	8 cases 22 cases
Parity	Nullipara 3.3% Multipara 96.7%	1 case 29 cases
OCP	33.3% positive History of OCP (10 cases) 66.7% negative (20 cases)	10 cases 20 cases
Menstrual status	Premenopausal 53.3% Postmenopausal; 46.7%	16 cases 14 cases
Smoking	None 90% (27 cases) Smokers 10% (3 cases)	27 cases 3 cases
Complaint	Mass 83.3% Discharge 3.3% Skin changes 3.3% Accidental 3.3% Recurrence 6.7%	25 cases 1 case 1 case 1 case 2 cases
Side	60% left (18 cases) 40% right (12 cases)	18 cases 12 cases
Breast cap size	A 26.7 B 40% C 23.3 % D 3.3% Previously mastectomized	8 cases 12 cases 7 cases 1 case 2 cases
Neoadjuvant chemotherapy	36.7% had NAC	11 cases

### Lesion characteristics:

The mean tumour size was  $2.99 \pm 0.94 \text{ cm}$  while average tumour distance from skin was  $0.76 \text{ cm} \pm 0.45 \text{ cm}$ . Most patients (93.3%) presented with invasive ductal carcinoma (IDC), and stage II breast cancer was the most common stage at presentation (80%). Most of the cases 83.3% had moderately differentiated adenocarcinoma and luminal type breast cancer was the most common hormonal type 70% of cases. Tumour multifocality was found in 14 cases

(46.7%) denoting that large volume replacement can be achieved to compensate for the excised volume. In 70% of cases, tumour was located in the upper inner and central quadrants, these sites are usually difficult to be replaced with other chest wall perforators and TDAP flap should be strongly considered in such difficult sites of volume replacement. Detailed tumour characteristics are presented in Table (2).

**Table 2:** Tumour Characteristics:

	Percentage	Number of cases
Histological type	93.3% IDC (28 cases) 6.7% ILC (2 cases)	28 cases 2 cases
Stage	80% stage II	24 cases
Tumour size	2.99±0.94cm	1.5-6.3cm
Distance from skin	0.76±0.45cm	0.1-1.8cm
Site	UOQ 13.3% LOQ 6.7% LIQ 3.3% UIQ 40% Central 30% Multicentric 6.7%	4 cases 2 cases 1 case 12 cases 9 cases 2 cases
Focality	Unifocal 53.3% Multifocal 46.7	16 cases 14 cases
Tumour grading	Moderately differentiated 83.3% well differentiated 16.7%	25 cases 5 cases
Hormonal profile	Luminal A 40% Luminal B 30% Triple negative 16.7% HER2neu enriched 13.3%	12 cases 9 cases 5 cases 4 cases

### Operative results

The Mean Operative Time was 174.13±21 minutes. In 28 cases we used two positions for both tumour excision and flap mobilization while in only 2 cases we could mobilize a propeller flap to the lateral quadrants through a single supine position. Flap dimensions were determined according to the desired volume of replacement from partial to complete breast reconstruction. The mean flap dimension was 25.4×10.4cm in the total volume replacement group, 11.8×7.28 in the partial volume replacement group and 20.5×9cm in the chest wall coverage group. Also Specimen Weight differed according to the type of operation. The mean weight of the specimen was 122.8±17.797 grams for partial volume replacement group, 677.8±67.86 grams for the total volume replacement group and 468.75±170 grams for the coverage group. Only single drain was sufficient in 90% of cases as a drainage of the recipient site. In only 3

cases (10%) we used multiple drains to drain associated axillary dissection area. Drains were typically removed after 7.3±2.7 days slightly higher in the total volume replacement group. No drain was needed in the doner site area with very little reported post operative seroma. Detailed operative results are presented in Table (3).

### Flap charactercisis:

In 17 patient (56.7%), we could dissect and mobilize conventional pedicled island flap. However, in 5 patients we could not identify nor skeletonize a reliable perforator, so we shifted to a muscle sparing flap technique. In only 3 patients we used a propeller flap technique as volume replacement for outer quadrants. Extended TDAP was used in 5 patients for total breast reconstruction (Table 3).

**Table 3:** Operative details:

	Percentage	N
Operative time	174±21min	130–220min
Drains	90% single 10% multiple	27 cases 3 cases
<b>Specimen weight</b>		
Total replacement	122.8±17.7gm	21 cases
Partial replacement	677.8±67gm	5 cases
Coverage	468.7±170gm	4 cases
Timing of drain removal	7.3±2.7 days	
<b>Axillary management</b>		
SLNB	SLNB 53.3%	16 cases
Clearance	Clearance 40%	12 cases
Not done	Not done 6.7%	2 cases

	Percentage	N
<b>Flap type</b>		
Pedicled island flap	56.7%	17 cases
Muscle sparing flap	10%	3 cases
Propeller flap	16.7%	5 cases
Extended TDAP	16.7%	5 cases
<b>Flap dimensions</b>		
Total volume replacement	25.4×10.4cm	
Partial	11.8×7.28	
Coverage	20.5×9cm	

### Complications

Out of 30 cases, 18(60%) experienced some form of complication. Most of them (77.8%) had been managed conservatively. Only two cases required readmission and were followed in our hospital for a period. Two patients were reoperated because of flap loss.

- Early Complications (within 30 days): (Table 4)
  - o Flap congestion occurred in 6 cases (20%), with 2 cases progressing to partial flap necrosis.
  - o Seroma formation was noted in 3.3% of cases, and hematoma in another 3.3%.
  - o Infection was reported in 6.7%, and wound dehiscence in 13.3% of cases.
  - o Total flap loss occurred in 2 cases (6.7%), requiring further surgical intervention.
- Late Complications (beyond 30 days): (Table 4)
  - o Fat necrosis was observed in 2 cases (6.7%), both managed conservatively.
  - o Partial flap volume loss was noted in 2 cases and subsequently treated with lipofilling.

### Donor Site Morbidity: (Table 4)

Postoperative donor site seroma occurred in 4 cases (13.3%), predominantly in those undergoing muscle-sparing or extended flap techniques. One patient (3.3%) developed wound dehiscence at the donor site, which healed with conservative management. No cases of significant long-term shoulder dysfunction had been reported.

### Patient Satisfaction

Patient satisfaction was assessed through postoperative surveys. Of the 26 patients who completed the satisfaction questionnaire, 21(80.8%) were satisfied with the aesthetic outcomes, while 5(19.2%) expressed dissatisfaction, mostly related to complications like fat necrosis or partial flap loss.

### Aesthetic Outcomes

The surgeon-assessed aesthetic score showed that 53.8% of cases were rated as "excellent," 26.9% as "good," and 15.4% as "fair." Only one case was rated as "poor" due to flap loss.

### Shoulder function:

The mean preoperative simple shoulder test value was  $94.3 \pm 4.4$  (91-100). The mean postoperative simple shoulder test value was  $92.9 \pm 5.4$  (83-100). The difference was not statistically significant ( $p > 0.05$ ) indicating no effect on shoulder function using this technique.

### Factors affecting complications:

There was no significant correlation between age, BMI, neoadjuvant chemotherapy, type of surgery, flap type, and early or late complications ( $p > 0.05$ ). However, a higher rate of complications was observed in smokers, though the association was not statistically significant ( $p = 0.49$ ). Moreover, a significant association was found between late complications and lower patient satisfaction. We observed that once there was fat necrosis or partial flap loss, patients were highly unsatisfied. ( $p = 0.001$ ). There was a significant correlation between surgeon aesthetic score and early and late complications. We observed that once there was fat necrosis or partial flap loss, the aesthetic score is severely downgraded ( $p < 0.001$ ).

**Table 4:** complications:

Early complications	%	Late complications	%	Donor site morbidity	%
Flap congestion	20%	Fat necrosis	6.7%	seroma	13.3%
Seroma formation	3.3%	Partial volume loss	6.7%	Wound dehiscence	3.3
Infection	6.7%			Shoulder dysfunction	0%
Wound dehiscence	13.3%				
Total flap loss	6.7%				

## DISCUSSION

The results of this study demonstrate that the thoracodorsal artery perforator (TDAP) flap is a versatile and reliable option for breast reconstruction either primary or secondary, with a high rate of patient satisfaction and acceptable complication rates. Our findings are consistent with the literature, which supports the use of TDAP flaps as an effective technique for both primary and secondary breast reconstructions, especially in patients unsuitable for abdominal-based flaps or in centres with unavailable microsurgery services<sup>[9]</sup>.

### Comparison with Other Techniques

The TDAP flap offers distinct advantages over traditional musculocutaneous flaps, such as the latissimus dorsi flap, by preserving muscle function and reducing donor site morbidity. It is now considered as the natural evolution of LD flap replacing its role in many aspects of breast reconstruction. It is more preferred to LD flap for partial breast reconstruction as it can provide the desired volume replacement with minimal donor site morbidity. For total breast reconstruction, extended TDAP flap should be strongly recommended over LD flap especially in high BMI patients as most of the flap volume lies in the skin padel itself not the muscle. Previous studies have reported that sparing the latissimus dorsi muscle can result in better postoperative shoulder function, which aligns with our findings of minimal long-term shoulder dysfunction among patients<sup>[19]</sup>. Additionally, compared to the widely used DIEP flap, the TDAP flap does not rely on abdominal tissue, making it a suitable alternative for patients with previous abdominal surgeries or insufficient abdominal fat<sup>[15]</sup>.

When compared to other chest wall perforator flaps (CWPFs), TDAP flap was the first flap to be used in breast reconstruction in early 90s yet its role in partial breast reconstruction has been largely replaced by other CWPFs like AICAP, LTAP and LICAP<sup>[20]</sup>. However, TDAP flap should be strongly recommended for partial breast reconstruction either immediate or delayed in certain tumour sites mainly upper inner and central quadrants where other CWPFs may not reach such sites nor provide enough volume. TDAP flap has a long vascular pedicle enabling the flap to reach any quadrant inside the breast. Yet, it should be considered when other CWPFs are not suitable for desired reconstruction in order to preserve the thoracodorsal axis for future use if needed<sup>[5,21]</sup>.

As a salvage technique for secondary breast reconstruction, TDAP flap can be the only available CWPF for either implant salvage or chest wall defect coverage after tumour recurrence especially if radiotherapy was previously administered<sup>[20]</sup>. LICAP

flap can't be harvested after mastectomy as lateral intercostal perforators are damaged with specimen removal. Also, AICAP flap can't be harvested if previous irradiation to the chest wall was done which would significantly damage the skin quality and its vascular perforators. LTAP flap should not be considered if axillary dissection was previously done due to high possibility of lateral thoracic artery injury. The only limiting condition for TDAP harvesting is previous damage to the thoracodorsal bundle which should be tested before flap harvesting by testing LD muscle function for possible previous nerve injury and with duplex US for perfusion assessment<sup>[11]</sup>.

### Complication Rates

Our overall complication rate was 60%, with early complications such as flap congestion and wound dehiscence being the most common. Flap congestion occurred in 20% of cases, which is consistent with reported rates of 15-25% in other studies involving perforator flaps. Although total flap loss was observed in 6.7% of cases, this rate is within the acceptable range for complex reconstructive procedures and comparable to other series on TDAP flaps<sup>[21]</sup>.

Fat necrosis was a notable late complication in this study, occurring in 6.7% of cases, particularly in patients who had undergone radiation therapy. Radiation exposure is a known risk factor for fat necrosis, as it can impair tissue vascularization and healing. As compared to other perforator flaps as LICAP and AICAP, TDAP flap was found to have the least incidence of fat necrosis as compared to other CWPF particularly due to consistent and reliable blood supply. Previous literature suggests that the rate of fat necrosis following autologous breast reconstruction can range from 5% to 20%, depending on factors such as flap type and patient history. Our findings support the need for careful patient selection and preoperative counselling regarding the potential for fat necrosis, particularly in those who would receive post operative radiotherapy<sup>[4,22,23]</sup>.

### Donor Site Morbidity

Donor site complications were relatively uncommon in this study, with seroma formation observed in 13.3% of cases and wound dehiscence in 3.3%. These rates are lower than those reported for latissimus dorsi muscle-based flaps, where donor site seromas can occur in up to 40% of cases. The lower incidence of donor site complications in our cohort may be attributed to the muscle-sparing nature of the TDAP flap and the supra-fascial plane of flap dissection over the LD muscle<sup>[24]</sup>.

As regard shoulder function, our study showed that TDAP flap dissection doesn't affect shoulder function

on long term basis as compared to conventional LD flap<sup>[25]</sup>. A simple shoulder function test was used to compare between shoulder status pre and post operative and results were highly comparable denoting the efficacy of TDAP flap in preserving shoulder function of the patients<sup>[26]</sup>.

### Impact of Patient Factors on Outcomes

Our analysis did not show a statistically significant correlation between age or BMI and the rate of complications. This finding contrasts with some studies suggesting that higher BMI is associated with an increased risk of flap-related complications, such as seroma and fat necrosis. The lack of significant association in our study could be due to the relatively small sample size or the uniform surgical technique employed across different BMI categories<sup>[9]</sup>.

Smoking, a known risk factor for wound healing complications, did show a trend toward higher complication rates; however, the association was not statistically significant. This may be due to the low number of smokers in our cohort (10%) and the preoperative cessation protocols in place. The effect of neoadjuvant chemotherapy on outcomes was similarly non-significant, suggesting that it does not drastically impact the success of TDAP flap reconstructions in our experience, consistent with some reports in the literature<sup>[9]</sup>.

### Aesthetic and Functional Outcomes

Patient satisfaction was high, with 80.8% of patients expressing satisfaction with the cosmetic outcome, and surgeon-assessed aesthetic scores were favourable in the majority of cases. This is in line with previous studies reporting high satisfaction rates following TDAP flap reconstruction<sup>[27]</sup>. The aesthetic advantage of TDAP flaps lies in their pliability and the ability to mold the tissue to achieve natural breast contours, particularly in patients with complex deformities or previous reconstruction failures<sup>[12]</sup>.

### Study Limitations and Future Directions

Although this study is prospective in nature however, the relatively small sample size may limit the generalizability of our findings. Future studies should aim to include larger patient cohorts to validate these outcomes further. Moreover, exploring the use of advanced imaging techniques for perforator selection and monitoring could help reduce complication rates, particularly in high-risk patients.

### CONCLUSION

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The TDAP flap represents a valuable option in the armamentarium for breast reconstruction, offering reliable results with low donor site morbidity. It is particularly advantageous in cases where other

reconstructive options are limited or when muscle preservation is a priority. Our study supports the continued use of the TDAP flap in various reconstructive scenarios, emphasizing the importance of patient selection, surgical technique, and multidisciplinary care for optimizing outcomes.

### DECLARATIONS

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Ethics approval and consent to participate and consent to participate

This research was performed at the Department of General Surgery, Alexandria University. Ethical Committee approval and written, informed consent was obtained from all patients.

### FUNDING

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The authors received no financial support for the research, authorship, and/or publication of this paper.

### CONFLICT OF INTEREST

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There are no conflicts of interest.

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