



Contents lists available at ScienceDirect

## Journal of the Egyptian National Cancer Institute

journal homepage: www.sciencedirect.com



Full length article

## The role of thoracodorsal artery perforator flap in oncoplastic breast surgery

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## ARTICLE INFO

## Article history:

Received 17 November 2016  
 Received in revised form 12 January 2017  
 Accepted 15 January 2017  
 Available online xxx

## Keywords:

Perforator flaps  
 Volume replacement  
 Oncoplastic breast surgery  
 Thoracodorsal artery perforator flap  
 Breast cancer

## ABSTRACT

**Background and aim:** Thoracodorsal artery perforator flap (TDAP) is one of the relatively new techniques in breast reconstruction. In this study, we try to evaluate the outcome of this flap in oncoplastic procedures.

**Methods:** This study included 40 patients of stage II breast cancer who underwent partial mastectomy with skin excision at the National Cancer Institute of Cairo University between 2011 and 2014. The resultant defects were immediately reconstructed using the thoracodorsal artery perforator flap. Operative time and complication rates were recorded. The cosmetic outcome was assessed through a questionnaire. **Results:** The mean operative time was 227 min. The total complication rate was 20% with flap congestion being the most common complication. The cosmetic outcome was acceptable with 80% of patients rating their outcome as either good or excellent. The subjectively assessed functional outcome showed a mean time of 10 days postoperative for patients to regain their full range of shoulder movements.

**Conclusion:** Thoracodorsal artery perforator flap can play a significant role in oncoplastic surgery and breast reconstruction with acceptable cosmetic and functional outcome.

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## Introduction

The surgical management of breast cancer has witnessed a considerable evolution in the past few decades. Breast conserving therapy is the mainstay treatment for early stage breast cancer at the time being [1]. The advent of oncoplastic surgery has brought new dimensions to breast conserving surgery and included the aesthetic principles of breast surgery to cancer management [2].

The significant developments in the surgical management of breast cancer have been paralleled by similar advancements in reconstructive surgery.

Earlier when mastectomies were prevailing, it made perfect sense to look for flaps with large volumes of tissue and muscle bulk such as the TRAM or the conventional LD flaps. The harvest of these flaps often left significant morbidities such as the abdominal wall weakness and the seroma in the back.

Nowadays the breast surgeon is more than often faced with smaller defects for which such bulky flaps offer a surplus of tissue

with unacceptable morbidities compared to the smaller defects these flaps have to reconstruct.

Improvements in our knowledge of the vascular anatomy have enabled the design of a new type of fasciocutaneous flaps, which are based on perforating vessels only [3]. Thus, donor site morbidity is markedly reduced.

Koshima and Soeda introduced the concept of “perforator flaps” in 1989, when they reported the use of a flap consisting of paramedian skin and fat based on a muscular perforator to reconstruct defects in the groin and the tongue [4].

In 1995, Angrigiani et al. described the Thoracodorsal Artery Perforator flap (TDAP) for the first time [5]. However, Hamdi et al. were the first to describe the use of TDAP in breast reconstruction in 2004 [6].

## Patients and methods

This study was done after approval of the ethical committee at the National Cancer Institute of Cairo University.

This study included 40 patients with early stage breast cancer who underwent partial mastectomy at the National Cancer Institute of Cairo University in Egypt between 2011 and 2014. Our inclusion criteria were:

Peer review under responsibility of The National Cancer Institute, Cairo University.

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<http://dx.doi.org/10.1016/j.jnci.2017.01.004>

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Please cite this article in press as: Amin AA et al. The role of thoracodorsal artery perforator flap in oncoplastic breast surgery. J Egyptian Nat Cancer Inst (2017), <http://dx.doi.org/10.1016/j.jnci.2017.01.004>

- Pathologically proven breast cancer cases of stage II A or II B who required partial mastectomies and who sought reconstruction and consented to a dorsal donor site.
- Breast cancer patients with unfavourable breast/tumour ratio who were downstaged by neoadjuvant chemotherapy to allow breast conservation.
- Patients requiring skin excision such as those:
  - With tumours close or attached to but not infiltrating the skin.
  - With misplaced scars of previous, open biopsies, which needed wider excision due to infiltrated margins.
- Patients who needed excision of 20% or more of their breast volume, i.e. patients who needed volume replacement.

All forty patients underwent:

- History and physical examination
- Routine labs
- Metastatic work up
- Preoperative counseling session by the operating surgeon to explain the operative procedure and expected complications.
- Patients underwent a handheld Doppler mapping and marking of the thoracodorsal artery perforators on the night before surgery by the operating surgeon.
- Preoperative marking of the area to be resected and the area of flap harvest with dimensions being recorded.
- Preoperative photographing with a digital camera in three views: anteroposterior, oblique and lateral.
- Intraoperatively during TDAP flap harvest it was recorded if the perforators found were compatible in number and distribution to those marked by the preoperative Doppler mapping or not.
- Operative time was recorded.
- Postoperatively during hospital stay flaps were followed up for colour, temperature and capillary circulation and drains for colour and amount of output and early complications were recorded.
- Patients were reviewed by operating surgeon one week then two weeks postoperatively and postoperative photographs were taken in three views and all complications that have developed were recorded and dealt with.
- Drains were removed when their output was equal to or less than 50 cc.
- Patients were then referred to receive their adjuvant treatment according to their final pathology report.
- After finishing their adjuvant treatment patients were invited again to be reviewed by the operating surgeon where they were photographed in three views and were asked to answer a five scale subjective questionnaire evaluating the cosmetic outcome of their reconstructive procedure. This was graded as: excellent (5), good (4), fair (3), poor (2) or very poor (1). The criteria they were asked to evaluate were symmetry, colour match, consistency of the flap, the appearance of their scars and overall satisfaction.
- The functional effects were generally assessed in a subjective manner through asking the patients in the same questionnaire about the time elapsed until they regained the full range of motion of their shoulder movements.
- The preoperative and postoperative pictures for each patient were displayed on a computer screen to a panel composed of a breast surgeon, a radiotherapist and a breast nurse. No members of the panel were involved in the study. The panel was asked to evaluate the cosmetic outcome of each case and give it a grade on a scale of 5 similar to the questionnaire answered by the patients. Again the criteria the panel had to evaluate were symmetry in shape and size, visibility of scars (raised or depressed, hyper or hypopigmentation, narrow or wide), symmetry of both inframammary folds and overall appearance.

## Patients

The mean age of our patients was 41 years (range 34–52). There were two patients suffering from type II diabetes mellitus, while two other patients were suffering from hypertension.

The clinical staging of the study group at initial diagnosis is displayed in [Table 1](#) according to the American Joint Committee on Cancer staging system.

There were six patients staged II B (4 [T3N0], 2 [T2N1]), who had an unfavorable breast/tumour ratio for breast conservation. They received neoadjuvant chemotherapy with good subjective response. All patients received adjuvant chemotherapy and radiation therapy.

## Results

The mean operative time was 227 min (range 310–180 min). The average size of the flaps harvested was 18 × 9 cm. (Range of length 14–23 cm and range of width 7–12 cm).

Two flaps (5%) were harvested completely based on the perforator vessels while in 90% a 2 cm piece of latissimus dorsi muscle was included in the pedicle to protect the perforator vessels ([Figs. 1 and 2](#)).

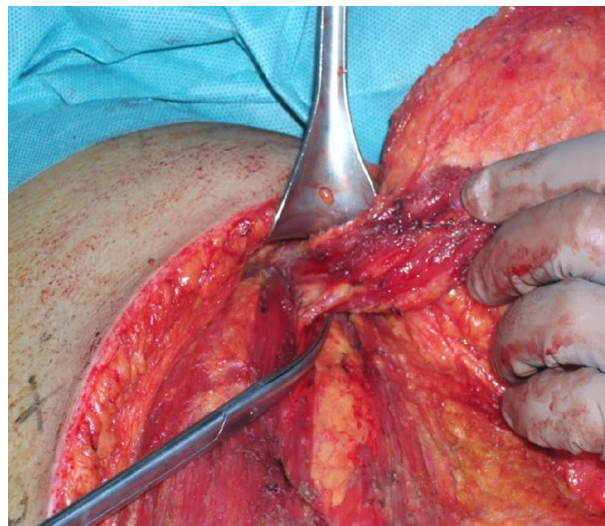
Our series of preoperative Doppler mapping showed, that at least one perforator or two are present, in 80% of cases, in a quadrant formed through the intersection of four lines:

Two horizontal lines 9 and 11 cm downwards from the level of the posterior axillary fold with the arm abducted 90 degrees and two vertical lines 1 and 4 cm medial to the anterior border of latissimus dorsi ([Fig. 3](#)).

Intraoperatively, the perforating vessels found coincided with the preoperative Doppler mapping in 85% of cases.

**Table 1**  
Clinical staging of patients.

Stage	Number of patients
II A (T2N0)	7
II B (T2N1)	29
II B (T3N0)	4



**Fig. 1.** Perforator vessels upon which flap is based.

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