

“Thoraco-Abdominal Flap”- A Simple Flap for Skin and Soft Tissue Cover Following Radical Surgery for Locally Advance Breast Cancer-The Malaysian Experience

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Abstract

Backgrounds: Locally advance breast cancer (LABC) is a major concern for clinicians due to its large numbers and its complex treatment. Skin and soft tissue cover after radical breast surgery is one of the most challenging issues.

Aim & Objectives: To evaluate the efficacy of thoraco- abdominal flap (TA) in terms of convenience, patient compliance and tolerability to adjuvant radical radiotherapy in operable LABC patients in which primary skin cover was not possible due to large post operative skin and soft tissue defects.

Methods: A prospective analysis of twenty patients with LABC, who underwent mastectomy and axillary clearance over a period of eighteen months were included in this study. Primary skin closure was not possible for any of these patients due to large skin and soft tissue defect produced after radical surgery. All of them were subjected to TA flap to cover the skin gap produced after surgery. Immediate postoperative outcomes, tolerability to postoperative radiotherapy (PORT) were analyzed.

Results: Out of these twenty patients, one patient (5%) had minor wound break down in the immediate post operative period which was managed by dressing and secondary suturing under local anesthesia. Rest all nineteen patients were discharged from hospital without any complications within the expected discharge time period (3-4 days). All of them tolerated PORT well. None of them showed any loco-regional or distal recurrence in 18 months follow up period.

Conclusions: In view of its simplicity, low cost, good postoperative compliance and well tolerability to PORT, it can be concluded that TA flap can be the first choice in LABC patients requiring skin and soft tissue cover after radical surgery.

Key Words: Locally advanced breast cancer; Post-operative skin and soft tissue defect; Thoraco-abdominal flap

Introduction

Breast cancer is the 3rd most common cancer worldwide.¹ It is the most common cancer in women all over world and one of the leading causes of cancer related death in females.² According to cancer registry Malaysia, it is the second leading cause of cancer admission in hospitals and fourth common cause of cancer related death in females. Incidence of breast cancer in Malaysia is 34 per 100,000 population and 3500 new cases are diagnosed each year and majority of these cases (44.1%) are diagnosed at stage II.³ World wide LABC comprises 10-25% of all breast cancer in developed countries and 40-50% in developing countries.^{2,4} Surgery plays a major role in the management of LABC along with chemo-radiation and hormone therapy.

Some form of chest wall reconstruction is usually required after radical surgery in most of these patients due to extensive skin and soft tissue loss which produces large defects that are many a time not suitable for primary closure.⁵ Over the decades, skin grafting, omental flaps, thoraco-abdominal (TA) flap and myocutaneous (MC) flaps have been tried to manage these skin and soft tissue defects.⁵⁻¹¹ The main aim of reconstruction in such patients should be an effective and simple closure with good quality skin cover so that they can go for early post operative chemo-radiotherapy to improve survival without significant morbidity.¹² Breast reconstruction using complex surgical procedure in LABC is controversial due to its guarded prognosis.¹³

This study was conducted to evaluate the operative simplicity, postoperative compliance of TA flap and its tolerability to postoperative radiotherapy (PORT). Another noble objective was to convey the message that TA flap is a simple and cost-effective versatile procedure for skin and soft tissue cover after radical surgery, especially for developing countries even with limited resources.

Methods

This prospective study was undertaken in the department of Surgery, Hospital Tangku Ampuan Afzan, Kuantan and Hospital Temerloh in Malaysia over a period of eighteen months. Total 20 female patients, aged between of 32 and 65 years, with LABC admitted for treatment were included in this study. Six of them already received neoadjuvant chemotherapy. Mastectomy and axillary clearance were performed in all these patients and all of them required TA flap for skin cover as a primary procedure. None of these

patients were suitable for primary skin closure due to large postoperative skin and soft tissue defect produced after radical surgery (Figure 1).

Exclusion criteria: all those breast cancer patients preoperatively either diagnosed as early breast cancer (EBC) or patient where skin was managed to closed with primary closure without flap, after modified radical mastectomy (MRM) or radical Mastectomy (RM) were not included in this study. One of the patient defaulted adjuvant chemo-radiation so, she was not included in the follow-up analysis.

Statistical Analysis: SPSS software package, version 16.0 was used for data storage and analysis.

Results

Among 20 patients, 4 patient undergone radical mastectomies (RM) due to significant involvement of pectoralis major muscle and the rest 16 patients were managed with modified radical mastectomy (MRM). In all the patients level I, II and III lymph nodes along with the clearance of intra pectoralis and intraneural fat. Achievement of good tumour free margins (around 2 cm) was the prime focus during mastectomy. For 18 cases laterally based TA flap and rest 2 patients medially based TA flap were used.

The analysis of results related to TA flap cover in terms of operative time, blood loss during operation, post operative morbidity, hospital stay, tolerability to radical radiotherapy and recurrence in follow up period are shown in the Table 1. In our study out of twenty patients, only one patient (5%) had minor flap necrosis at the superior edge with wound breakdown which was later on managed by dressing and secondary skin suturing under local anesthesia on 8th postoperative day. Except one patient with flap necrosis (discharged on 8th postoperative day), all the other patients were discharged from hospital on 3rd or 4th postoperative day. Mean hospital stay of the TA flap closure patient was 3.85 days (range 3 to 8 days) which is almost similar as MRM/RM patients with simple skin closure. All the patients were subjected to immediate post operative chemotherapy and radiotherapy as per schedule. All 19 patients (one patient defaulted PORT) tolerated post operative radiotherapy and chemotherapy well without any flap morbidity. None of the patients had any loco-regional or distal recurrences in the 18 months follow-up period. However, it is too early to comment on any recurrence.

Surgical Anatomy & Operative Technique of TA flap

TA flap is a rotation advancement fasciocutaneous flap which constitutes the skin and subcutaneous tissue of the anterior abdominal wall. It is based on two sets of direct perforating segmental arteries –the medial, arising from the deep epigastric arcade at the

lateral border of the rectus abdominis and the lateral, arising from the lumbar and subcostal arteries at the level of anterior border of the latissimus dorsi.^{14,15} Subfascial anastomoses are present between the medial and lateral perforators.^{16,17} For post operative defects on the medial side of the chest wall and axilla, a laterally based flap (fig. 2) and for lateral sided defects a medially based flap was used. Plane of dissection was maintained superficial to the rectus fascia and external oblique aponeurosis. The limits of the flap are anterior axillary line laterally for medially based flap and midline medially for the laterally based flap with the horizontal plane at the level of anterior superior iliac spine inferiorly.^{18,19} Donor site in all the cases could effectively close primarily after adequate mobilizations of the abdominal wall (Figure 3). Two vacuum drains, one in the axilla and the other under the TA flap were inserted. For skin closure, skin stapler and 2-0 nylon suture were used.

Discussion

Thoraco-Abdominal flap is an ideal option for chest wall reconstruction in case of LABC cases, especially for developing countries due to limited resources and large numbers of cases where cost effectiveness is a very important aspect to be considered. Review of the literature revealed various methods of reconstruction during different time periods. Before skin grafting era post radical mastectomy wounds were allowed to heal by secondary epithelialization alone.⁶ Skin grafting was practiced in 1950 but these patients had poor cosmesis, higher incidence of secondary infections, donor site morbidity and poor compliance to radiotherapy.^{7,10} In between 1970 and 1990, superior alternatives to skin grafting have emerged as advancement made in the fields of plastic and reconstructive surgery. Many reports²⁰⁻²³ were published regarding omental transposition and skin grafting to cover post mastectomy defects. Most of them have limited success^{20,21} except Cheung et al²² study in which 100% success rate was reported with a mean hospital stay of 16 days. Major drawbacks in this procedure are additional laparotomy and skin grafting leading to an increased wound morbidity, prolonged hospital stay and subsequent delay in adjuvant therapy.²³

Myocutaneous flaps have revolutionized the field of reconstructive surgery. Latissimus dorsi flap (LD) was first used by Ignio Tansini in 1896 for covering of post radical mastectomy defects.²⁴ It was reintroduced for chest wall cover as well as reconstruction of breast in 1975 and it was assumed as gold standard of reconstructions.^{25,26} In 1982 Hartramp transverse rectus abdominis myocutaneous flap (TRAM) was immersed²⁷ and after that from 1985 LD flap usage was significantly reduced. TRAM is a good flap for reconstruction of early breast cancer patients either as pedicle based or as a free flap. However, it is more time consuming and it needs operative expertise. TRAM also increased postoperative morbidities and prolonged hospital stay. Hence, subsequently there may be delay in the necessary adjuvant therapies. Considering all these inconveniences, TRAM currently is not much used for the post operative skin cover in LABC patients.²⁸

TA flap was first introduced by Brown et al. and was used for soft tissue cover following surgery of LABC and for breast reconstruction along with prosthesis.^{10,14,16,17} However, by the year 1980s with the advancements in MC flaps, TA flap usage started to decline.

Deo et al.¹⁸ did a comparative study in All India Institute of Medical Sciences, New Delhi, India (AIIMS) to show the outcome of two major groups (MC and TA flap) when used for covering of the skin and soft tissue defects produced after radical surgery of LABC cases. After analyzing the data scientifically it was established that TA flap was the best option for chest wall cover after radical surgery for LABC cases ($P < 0.001$). In their study mean operative time for MC flap were 110 ± 20 minutes where as for TA flap it was 35 ± 7 minutes with blood loss of 192 ± 77 ml and 40 ± 19 ml respectively. Morbidity in MC group was 5 cases but in TA flap group it was only 1 case, with the mean hospital stay 10 ± 4 days and 5 ± 2 days respectively.

In our study, the results of TA flap is comparable to the Deo et al¹⁸, except the operative time (49 ± 11.96 minutes) in our series was little more. This could be due to assistance by untrained medical officer in our hospital unlike in AIIMS, where the assistants are post graduate qualified doctors. Our results were also compatible to the studies done by Persichetti et al¹¹ and Purkayastha et al¹². Due to its various advantages all these authors also recommended TA flap as the best option for skin and soft tissue cover after radical surgery for LABC cases.

Conclusions

Majorities of LABC patients require some form of soft tissue and skin cover after radical surgery. After literature review and from our own experience, it is concluded that TA flap is one of the most ideal and simple flap for such cases.

Conflict of interest: Nil.

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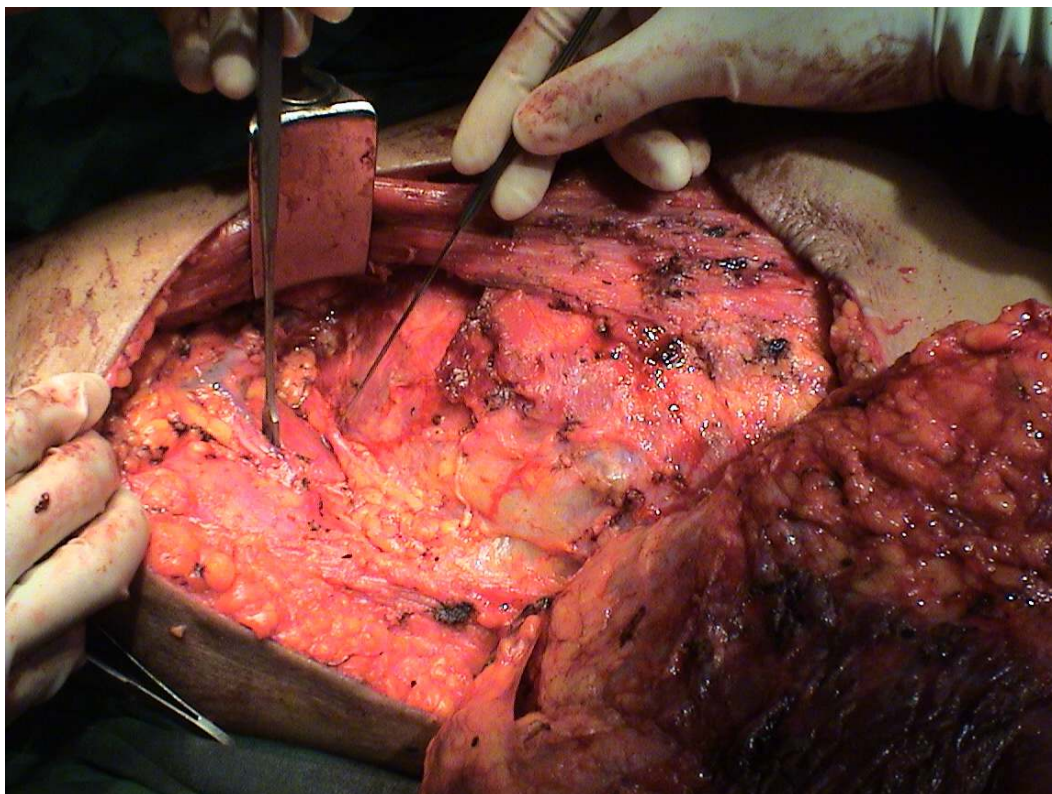
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Table 1: Showing the analysis of operative details, morbidity, hospital stay and follow-up

Operative details	
Mean op time*	49 ± 11.96 minutes
Mean blood loss*	45.25 ± 8.26 mls.
Morbidity	
Flap necrosis (Minor)	1(5%)
(Major)	0
Donor site morbidity	0
Mean hospital stay	3.85 days
Post operative radiotherapy (50Gy)	All 19 pts tolerated well.
Recurrence in 18 months	0 pts

* Mean op time and Blood loss are subjected to TA flap only excluding MRM/RM
MRM- Modified radical mastectomy; RM- Radical mastectomy

**Figure 1:** Large post MRM defect of Right breast showing Latissimus Dorsi pedicle and long thoracic nerve

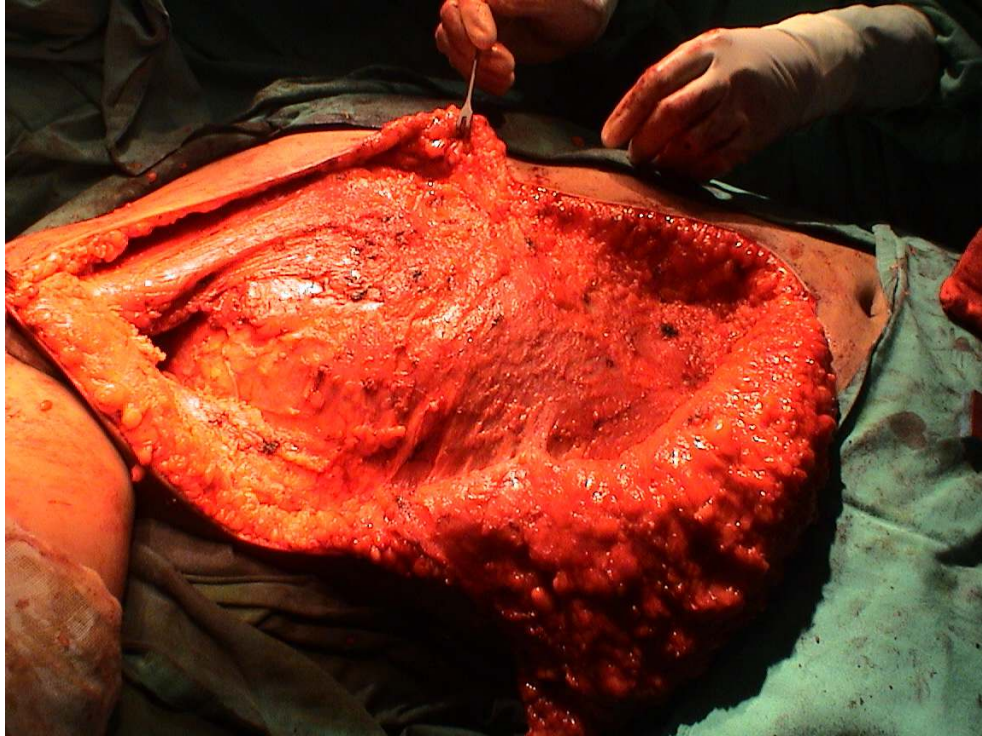


Figure 2: Laterally based Thoraco Abdominal flap plan for cover of the large post MRM defect



Figure 3: After primary closure of the TA flap