

Fascio-cutaneous flaps for chest wall reconstruction after massive inflammatory breast cancer: a case series

Renzo Panizza¹ · Marco Ghiglione¹ · Michela Massa¹  · Emanuela Grosso¹ · Enrico Zingarelli¹ · Silvia Scarrone²

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Abstract

Background Inflammatory breast cancer represents a rare condition that presents poor prognosis with high risk of recurrences and greatly affects patients' quality of life. The resective surgical treatment frequently requires challenging reconstructive solutions to restore a proper tissue layer for the chest wall. Reconstructive methods are nowadays still matter of debate.

Methods A retrospective review of all cases of massive inflammatory breast cancer that underwent mastectomy and reconstruction with fasciocutaneous flaps from October 2009 to September 2014 was performed at our department. Patient demographics, indications, flap specifics, complications, and number of operations were collected.

Results Our review identified five cases. A lateral thoracic flap was planned in two cases, a modified lateral thoraco-dorsal flap in one case, a combination of scapular and pubic flaps in other case, and a thoraco-epigastric and lateral thoracic flap association in the remaining case. The mean patient age was 60 years (range, 35 to 76 years). Flap dimensions ranged from 9cm to 14 cm in width and 20 to 24 cm in length. Partial necrosis of the flap distal part occurred in two cases requiring minor flap revision.

Conclusions Resective surgical treatment of inflammatory breast cancer might require a challenging reconstructive planning. In this scenario, fasciocutaneous flaps are an interesting

option due to their versatility, easiness of harvesting, low morbidity, and complications rate.

Level of Evidence: Level IV, therapeutic study.

Keywords Pedicled flap · Thoracic wall · Reconstruction · Quality of life

Introduction

Inflammatory breast cancer (IBC) is a rare but severe condition with an incidence of 1–5% in the USA [1], therefore it presents a poor prognosis due to its characteristics of locally advanced breast cancer. Since it represents a rare disease, performing large clinical trials becomes difficult.

A multidisciplinary approach including chemotherapy, surgery, and radiotherapy, has been developed in the last decades to improve the survival rate, however most women still have low survival and high recurrence rate.

Breast reconstruction after modified radical mastectomy (MRM) for IBC could be technically difficult because of the considerable extent of the disease on the chest wall with a consequent massive loss of tissue. The restoration of a proper tissue layer to protect the vital structures of the thorax becomes the first necessary procedure. [2, 3] The identification of disease-free surrounding tissues could be challenging. In our series, large fasciocutaneous flaps harvested from different regions were prepared to reconstruct massive surgical chest wall tissue defects.

Materials and methods

A retrospective review of all cases of massive IBC that underwent mastectomy and reconstruction with fasciocutaneous flaps from October 2009 to September 2014 was performed at

✉ Michela Massa
michelamassa01@gmail.com

¹ Plastic and Reconstructive Surgery, SS. Antonio e Biagio e Cesare Arrigo Hospital, Alessandria, Italy

² Operating Theatre Management, SS. Antonio e Biagio e Cesare Arrigo Hospital, Alessandria, Italy

Table 1 Characteristics of patients with IBC treated with a reconstruction of fascio-cutaneous flaps reconstruction after demolitive treatment at our Department

Patient	Fascio-cutaneous flaps choice	Flap dimensions	Secondary surgery
Patient 1 (Fig. 1a, b)	Lateral modified thoraco-dorsal flap	10 × 20 cm approximately	Revision of flap tissue necrosis (4 months later)
Patient 2 (Fig. 2)	Scapular-pubis flap	10 × 23 cm approximately	–
Patient 3	Thoraco-epigastric and lateral thoracic flaps	14 × 23 approximately	–
Patient 4 (Fig. 3)	Lateral thoracic flap	9 × 20 cm	–
Patient 5	Lateral thoracic flap	14 × 24 cm	Revision of flap tissue necrosis (3 months later)

our department. Patient demographics, indications, flap specifics, complications, and number of operations were collected.

Results

Five cases of IBC with massive involvement of the breast and surrounding tissues were treated with MRM and immediate chest wall reconstruction with fascio-cutaneous flaps (Table 1). The necessary oncological resection resulted in a massive defect of chest wall tissues that required an immediate coverage in order to restore a thicker layer to the underlying vital structures. Challenging large random fascio-cutaneous flaps were harvested from surrounding regions, respecting a mean of 2:1 length to width ratio.

The mean patient age was 60 years (range, 35 to 76 years). Flap dimensions ranged from 9 cm to 14 cm in width and 20 to 24 cm in length (Table 1).

A 70-years-old patient was treated with a modified lateral thoraco-dorsal flap, planned with the upper flap margin placed at the inframammary fold, harvested and rotated 90° superiorly and partially de-epithelized to cover the axillary vascular pedicle. (Fig. 1).

In the second case, a 35-years-old patient, diagnosed with an advanced stage of IBC, underwent preoperative chemotherapy and subsequent mastectomy involving the thorax tissues from the edge of the sternum out to the posterior axillary line and from

the clavicle to the 7th costal rib. A large fascio-cutaneous flap was harvested posteriorly from the lower scapular line and paravertebral line to the pubic line anteriorly. The ‘scapular-pubis’ flap was then rotated anteriorly with almost 110° rotation to cover the chest wall defect resulting from the surgical resection. (Fig. 2).

In another case a 55-years-old patient, who underwent total mastectomy due to IBC, presented later with an ipsilateral recurrence involving a great extent of chest wall tissues below the inframammary fold. Two flaps, a thoraco-epigastric flap, and a lateral thoracic flap, were harvested and rotated to close the massive defect.

In the remaining two cases, a 9 × 20 cm (Fig. 3) and a 14 × 24 cm modified enlarged fascio-cutaneous lateral thoracic flaps were planned, harvested and rotated anteriorly of 90°.

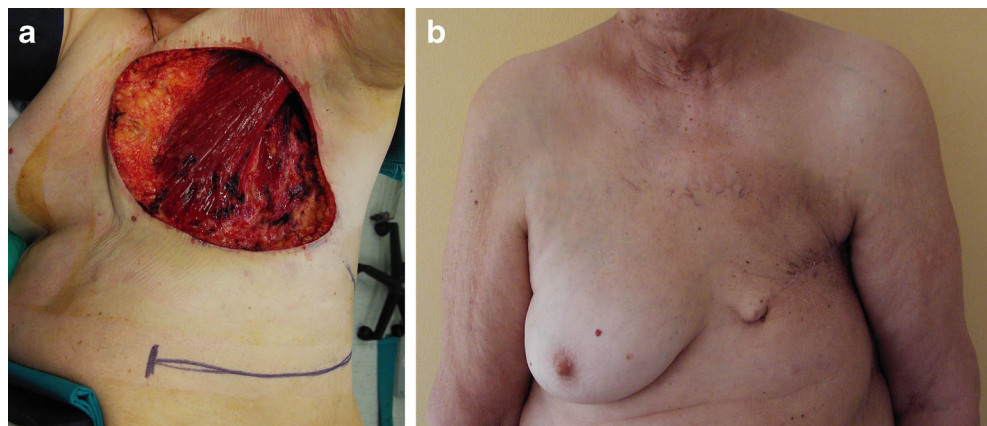
Severe complications were not observed in our series. Partial necrosis of the distal part of the flap occurred in two cases requiring minor flap revision. Delayed initiation of adjuvant chemotherapy was not required.

Overall, patients felt comforted with their new physical condition.

Discussion

Breast reconstruction in patients with inflammatory breast cancer has been considered a relative contraindication for many years.

Fig. 1 A 70-years-old patient after mastectomy for massive inflammatory breast cancer **a** surgical planning of defect reconstruction with a modified lateral thoraco-dorsal flap; **b** postoperative view after 1 year



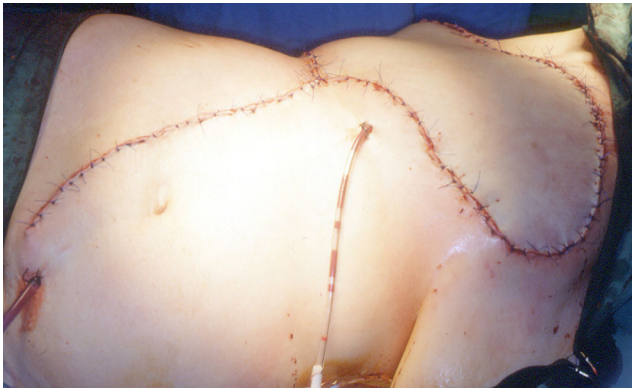


Fig. 2 a Reconstruction with a ‘scapular-pubis’ flap of a chest wall tissues defect in a young woman after surgical treatment for IBC

Whether or not immediate reconstruction should be proposed to patients with advanced breast cancer, including IBC, still represents a matter of debate. [4–6].

Chest wall tissues repair can be performed through the use of autologous grafts, fascio-cutaneous, musculocutaneous, or microsurgical flaps.

Chang et al. demonstrated that breast reconstruction using free flaps is feasible in patients with inflammatory breast cancer and excellent outcomes can be reached. [7].

Chin et al. reported 23 cases of breast reconstruction, among these more than two-thirds were performed immediately at the time of oncologic surgery; however, patients requiring reconstruction for large surgical chest wall defects were excluded. There were 70% of loco regional and distant recurrences after reconstruction and the median overall survival after reconstruction was 22 months with only four patients still alive after 5 years. No differences were reported between delayed and immediate reconstruction in term of outcomes. [8].

Autologous free flaps such as with DIEP or TRAM flaps are technically feasible to provide tissue for chest wall and breast reconstruction; however the appropriate timing in the planning of surgery and the following adjuvant treatments can be critical, especially when an immediate covering is required. It is recommended to wait a period of time of 6 months after completion of radiotherapy in order to minimize the risk of complications such as vessel damage and flap loss. [7].

The use of omentum flap for breast disorders should be reserved for huge defects not repairable with other techniques because of the greater rate of gastrointestinal complications and the unclear oncological risk. [9].

The latissimus dorsi is a reliable pedicled musculocutaneous flap, however it does not always provide enough tissue to cover massive defects, moreover it can cause long-lasting damages on the functionality of the shoulder [10].

In our series, massive surgical chest wall tissue defects resulted from the MRM and our concern was oriented to perform an immediate chest wall tissues reconstruction to restore a satisfactory tissue layer to the vital structures. In these cases, some difficulties can be encountered to find residual safe cutaneous tissue in the surrounding regions.

At the preoperative planning, patients were made aware of the seriousness of the clinical situation and advanced stage of the illness; patient and surgeon were in accordance to reconstruct the tissues with the objective to resolve the uncomfortable situation. The surgical plan was also influenced by factors such as the subsequent oncological treatments that patients have to face, the aggressive characteristics of the tumor with high risk of recurrence, and the low overall survival.

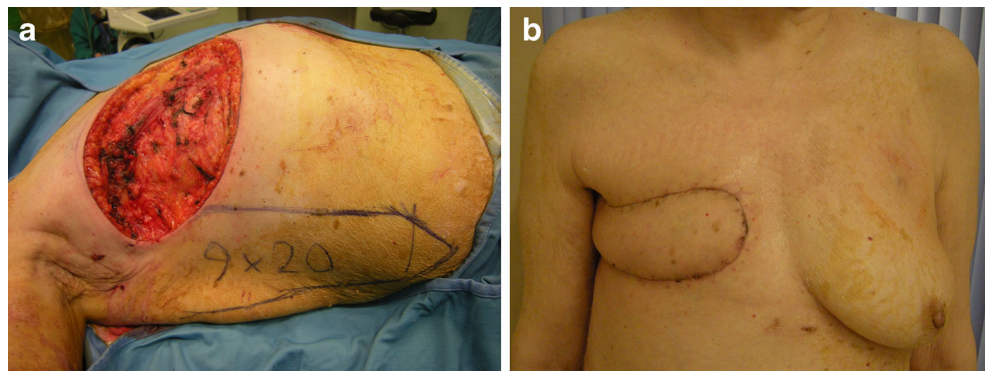
Large fascio-cutaneous flaps even combined and harvested from various regions were performed, since their versatility, easiness to harvest, good vascularization, and possibility to obtain large tissue dimensions in most cases.

Various fascio-cutaneous flaps can be planned for chest wall reconstruction in particular the thoraco-epigastric flap, the cyclops flap, and scapular or parascapular flaps. [2].

In our cases, we performed different types of fascio-cutaneous flaps: a large subscapular-pubis flap, a thoraco-epigastric flap and lateral thoraco-dorsal flap.

Teich-Alasia et al. demonstrated the efficacy of the subscapular-pubis flap which dimensions can be more than 40 cm long extending from the lower edge of the scapula to the pubis. The vascularization is guaranteed by the preservation of the perforators of the superficial epigastric vascular system. [11] The flap allows to cover massive defects of the chest wall in conditions in which surrounding tissues are not trophic enough or not completely disease safe to be used.

Fig. 3 a Intraoperative view during rotation of a 9 × 20 cm fascio-cutaneous lateral thoracic flap in a large defect of thoracic wall after breast resection. **b** postoperative view after 1 year



The thoraco-epigastric flap was described in the 80s by Cronin [12] as a cutaneous flap and subsequently modified including the muscular fascia. It has an axial pattern and its vascularization is due to the intercostal perforating vessels. [13, 14] The flap assures a good coverage of the chest wall but it is limited by its size. The donor scar is usually placed at the inframammary fold of the previous breast, symmetrical to the other breast.

The lateral thoraco-dorsal flap, a modified lateral thoracic flap [15] maintains similar characteristics of the thoraco-epigastric flap; however because of the laterally harvesting, it does not present the same problems such as absence of the medial new inframammary fold and difficulties to close the donor site. [16].

Complications such as flap necrosis might occur in cases of large flaps random harvesting. To prevent such events, a proper length to width ratio has to be maintained in order to respect the rich subdermal vascular plexus. Furthermore, some particular situations should be avoided, such as causing excessive tension on skin closure, by a proper planning of the pivotal point and flap movement avoiding excessive compression at the flap base or the occurrence of infection or hematoma formation.

Considerable improvements in term of quality of life were observed. Prior to surgery, women felt distress and discomfort because lesions were ulcerated, bleeding, painful, and malodorous.

Conclusions

Chest wall reconstruction after massive IBC resection could be a challenging situation. However, it is technically feasible. Surrounding soft tissues are not always available, therefore it becomes necessary to resort to regional or distant flaps. In our cases, harvesting large fascio-cutaneous flaps from different regions was considered the most appropriate option for these patients. Although in some cases it could be demanding, it represents the easiest technique. Patients felt relieved and overall satisfied with the cosmetic outcome. The massive involvement of the anterior thorax and the low survival rate lead us to avoid immediate breast reconstruction in these cases.

Compliance with ethical standards

Conflict of interests Renzo Panizza, Marco Ghiglione, Michela Massa, Emanuela Grosso, Enrico Zingarelli, and Silvia Scarrone declare that they have no conflict of interest.

Patient consent Patients provided written consent before their inclusion in this study. Additional consent was obtained for the use of their images.

Ethical approval For this type of retrospective study formal consent from a local ethics committee is not required.

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