Case Report

The Rotated Bipedicled Tram Flap: Maximising Breast Projection but Minimising Donor Morbidity - A Case Report

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Abstract

Autologous breast reconstruction using the transverse rectus abdominis myocutaneous (TRAM) flap remains a cornerstone of breast reconstructive surgery. However, with the classical TRAM flap, it is challenging to close a large post mastectomy defect in nulliparous and/or slim women. The resultant reconstructed breast also lacks projection. This case reported a novel modified TRAM flap technique performed in a nullipara. She had previously undergone a hysterectomy and oophorectomy for endometrial carcinoma via a pfannenstiel incision. She presented with a large left breast invasive micropapillary carcinoma (ER/PR negative HER2 3+) with only marginal response to neoadjuvant chemotherapy. She underwent a left mastectomy with axillary dissection and immediate breast reconstruction. The rotated bipedicled TRAM Flap was used to close the large defect, maximising breast projection while minimising donor site morbidity.

Keywords: Donor; invasive micropapillary breast carcinoma; morbidity; nullipara; projection; reconstruction; rotated; TRAM flap; site

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Introduction

Breast reconstruction following mastectomy restores physical form and psychosocial wellbeing. The transverse rectus abdominis myocutaneous (TRAM) flap remains one of the most frequently utilised due to its robust vascularity with ptosis, colour and consistency producing a close match to the contralateral breast. It offers the patient an attractive 2 in 1 outcome; a flatter abdomen and a new breast. The classical pedicled TRAM flap, with the large almost oval shaped overlying skin, stretches from the umbilicus (cephalic) to suprapubic area (caudal) limited by the anterior superior iliac spine (ASIS) on each side. Unlike parous and/or overweight/obese women, this may lead to significant wound tightness and risk of wound dehiscence in nulliparous and/or slim women. The resultant reconstructed breast also has a low projection. This case demonstrates the application of a modified bipedicled TRAM flap technique that achieves a high breast projection with narrower cephalo-caudal width; thus minimal donor site morbidity.

Case report

A 53-year-old widowed nullipara, presented with a three-month history of an enlarging painless left breast mass. Three years ago, she was diagnosed with a Stage I endometrial carcinoma and had undergone hysterectomy and bilateral oophorectomy via a pfannenstiel incision. An 8×8 cm mobile mass occupied almost the entire left breast with palpable left axillary lymph nodes. A core biopsy confirmed a left invasive breast carcinoma (ER/PR negative, HER2 3+). Neoadjuvant chemotherapy (three cycles of Epirubicin & Cyclophosphamide, followed by three cycles of Docetaxel, Trastuzumab & Pertuzumab) was administered with added three cycles of Trastuzumab & Pertuzumab. Despite a combination of chemotherapy and two targeted therapies, the tumour response was only marginal, prompting surgical intervention.

She underwent a left mastectomy, axillary dissection and immediate bipedicled TRAM flap reconstruction. As she did not have much excess lower abdominal tissue, to avoid a tight scar, the lower part of the TRAM flap was marked 3 cm cephalic to her well-healed pfannenstiel incision. The shape of the flap was semicircle or crescentic rather than oval (Figure 1).

Due to the narrow semicircular TRAM flap but large circular mastectomy defect, the two ends of the flap were innovatively folded in the cephalic direction. This formed a round base to fill the defect and at the same time form a good projection. To make the joining line less obvious, it was initially placed laterally at the 2 o'clock position, towards the left axilla. However, two weeks later, she developed an area of superficial skin necrosis. She underwent wound debridement and the flap was refashioning with the joining line rotated to lie straight cephalic at 12 o'clock (Figure 2). Wound recovery was satisfactory with no further complications (Figure 3).

Histopathology of the left breast (mastectomy specimen) revealed residual invasive carcinoma (micropapillary subtype) (Figure 4), ypT2(m)N3a, residual cancer burden class III, with lymphovascular invasion and 24 out of 29 positive axillary nodes.

Discussion

Her initial core biopsy was performed in another centre, which did not have the Epithelial Membrane Antigen (EMA) stain. Thus, it was just reported as an invasive carcinoma (ER/PR negative, HER2 3+). With a locally advanced malignancy, she underwent neoadjuvant chemotherapy with targeted therapy.

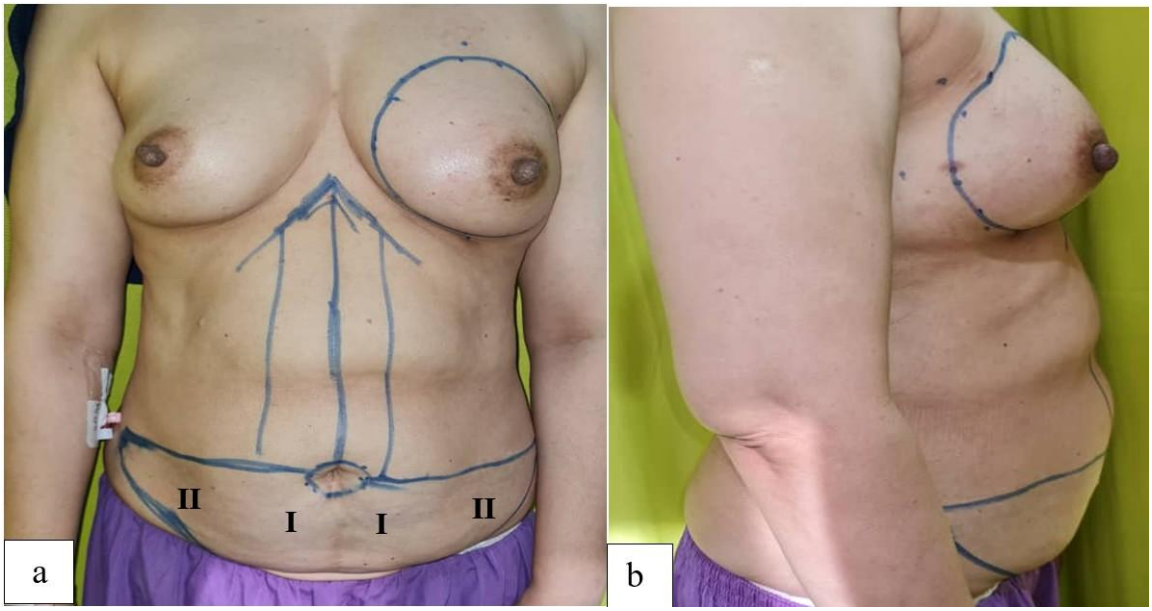

FIGURE 1: Pre-operative marking. (a) Frontal view with Zones I & II; (b) Side view

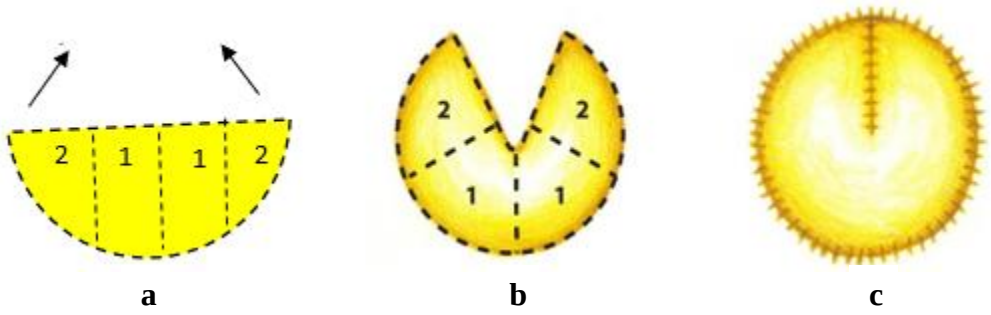

FIGURE 2: The two ends of the semicircular TRAM flap were rotated in the cephalic direction to form a mound with a good central projection. (a) A bipedicled TRAM Flap had good perfusion (Zones 1 & 2) on each side; (b) The entire flap can be folded to fill a large circular defect; (c) This formed a cone shaped structure with a central high projection

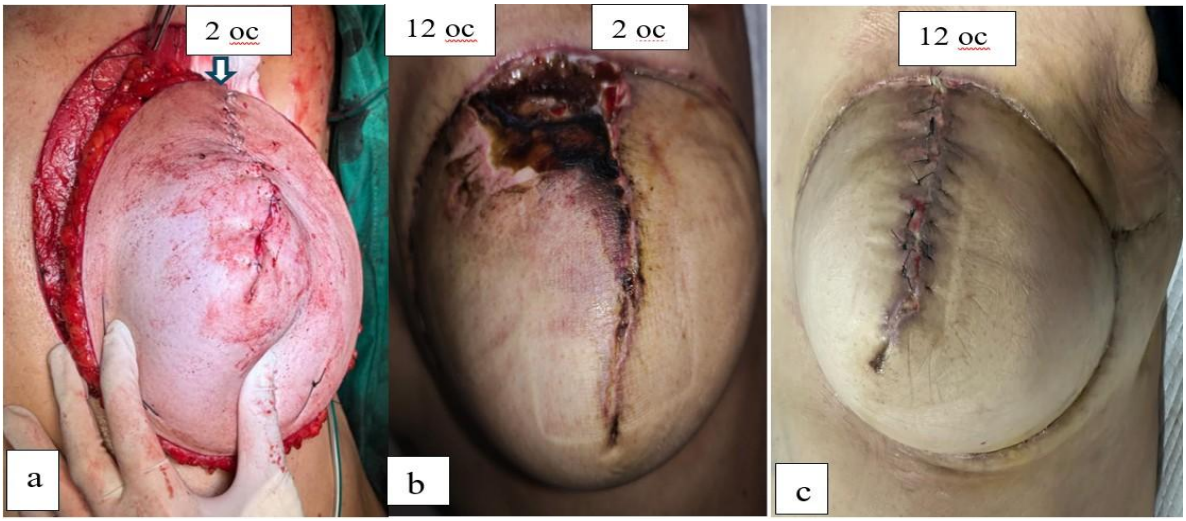

FIGURE 3: The reconstructed left breast post mastectomy (a) Initial placement; (b) Necrotic patch; (c) Post debridement

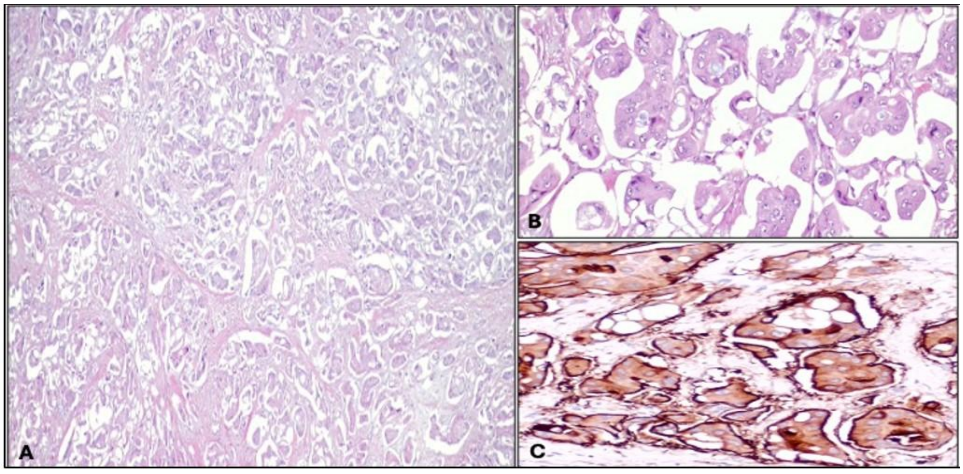

FIGURE 4: Histopathology of the tumour in the left mastectomy specimen. (A)The tumour cells were arranged in morular clusters and hollow tubules surrounded by clear empty spaces (H&E, 4x); (B) Higher magnification of the tumour cells showed pleomorphic vesicular nuclei with conspicuous nucleoli and indistinct cellular border (H&E, 20x); (C) Epithelial Membrane Antigen (EMA) stain highlighted the peripheral tumour cell membrane giving an “inside-out” growth pattern (EMA immunohistochemistry, 20x)

Despite these powerful medications, her cancer only responded marginally. This could be explained by her cancer biology, which was an invasive micropapillary carcinoma (IMPC). Siriaunkgul and Tavassoli first reported IMPC in 1993 (1). This rare subtype accounts for only 2–8% of all breast cancers (2). It has more aggressive biological behaviour; higher nodal metastases, locoregional recurrence and poorer prognosis than invasive ductal carcinoma (3,4). Histologically, IMPC is stained by the EMA with its distinct "inside out" growth pattern (5).

Major neoadjuvant trials evaluating pertuzumab and trastuzumab, such as NeoSphere (6) and Tryphaena (7) did not report outcomes separately for IMPC. However, evidence now indicates that HER2-positive IMPC is associated with significantly lower pathological complete response rates to neoadjuvant anti-HER2 therapy (5, 8), which is consistent with the suboptimal response observed in this case.

Adjuvant trastuzumab emtansine (T-DM1) has been recommended for her, supported by the Katherine trial (9), which demonstrated improved invasive disease-free survival in patients with residual HER2-positive disease after neoadjuvant therapy. Adjuvant radiotherapy will subsequently be delivered as part of standard locoregional management.

When first described by Hartrampf et al. in 1982, the TRAM flap was a pedicled flap based on the superior epigastric vessels. More recently, the muscle sparing free TRAM based on the deep inferior epigastric perforator artery and named the Deep Inferior Epigastric Perforator (DIEP) flap has been developed, with non-disruption of the abdominal wall (10, 11). However, as it needs microsurgical vascular anastomosis, this brings about its own set of risks and complications in relation to flap perfusion and remains the niche of only plastic surgeons.

The classical TRAM flap involves transposing skin, subcutaneous fat and a segment of rectus abdominis muscle from the lower abdomen to the chest wall. It would be best done in those with adequate abdominal tissue laxity. Due to the resultant abdominal tightness post-operatively, the TRAM flap is more suitable for women who have either completed their family or those who do not plan to conceive. The resultant abdominal wall weakness, due to the harvest of muscle and fascial components (12) will be minimised by intraoperative placement of a mesh. The patient will be advised to wear a corset when upright and to avoid straining the abdominal area at least for the first 3 months post-operatively.

This case utilised a modified pedicled TRAM flap technique to maximise breast projection while minimising abdominal morbidity by avoiding a large skin defect. Preoperative markings is essential. For unipedicled TRAM Flap, there are four zones whereby Zone I is ipsilateral and closest to the arterial supply and has the best perfusion. Zone II is lateral to Zone I and is on the same side of the arterial supply with slightly decreased blood supply. On the contralateral side are Zone III (next to Zone I) and Zone IV, lateral to Zone III. As Zone IV is furthest from the arterial supply, it is discarded due to poor perfusion. Occasionally Zone III may be discarded too. To use the entire flap, a bipedicled flap will be necessary, as in this patient. This is because there is arterial supply from the superior epigastric artery on each side and there will only be Zones I and II.

Despite an initial successful reconstruction, an area of superficial skin necrosis on the flap developed. The possible cause of this is high tension on the lateral part of Zone II because of the contralateral tilt (2 o'clock) location of the joint line. This situation is likely to have caused excessive stretching of the vascular supply resulting in ischaemia and necrosis of that area. Prompt debridement, repositioning of the joint line to lie centrally to overcome the initial stretching, and antibiotics, led to full resolution without significant flap loss. Based on this experience, the recommendation would be to place the joint line facing 12 o'clock to ensure equal and not excessive tension on Zone II on both ends of the flap.

The patient had minimal abdominal discomfort post-operatively as the scar line was not excessively tight. She was satisfied with the cosmetic result of the reconstructed breast and abdominal scar, which resembled a typical abdominoplasty scar. Although the DIEP surgeries are now preferred in many centres due to the advantage of muscle preservation, they require advanced microsurgical skills and thus is not widely available (13).

Conclusion

This novel bipedicled rotated TRAM flap is suitable to be used especially in nulliparous and slim women with large post mastectomy defects. The outcome is good breast projection minus a tight abdominal scar.

Conflict of interest: The authors declare no conflicts of interest.

Patient consent: The patient had provided consent for the use of her images for academic purposes.

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