

Reconstruction at The Edge of Oncologic Safety: Immediate Latissimus Dorsi Flap After Neoadjuvant Chemotherapy in Locally Advanced Triple Negative Breast Cancer

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ABSTRACT

Triple negative breast cancer (TNBC) is an aggressive subtype characterized by rapid progression, early recurrence, and limited targeted therapies. Neoadjuvant chemotherapy (NACT) is standard in locally advanced TNBC to improve resectability and assess tumor response. Immediate breast reconstruction (IBR) after NACT was historically approached with caution because of concerns regarding wound complications, treatment delay, and oncologic safety; growing evidence, however, now supports its oncologic safety when patients are carefully selected, so that the clinically relevant question has shifted from whether IBR should be offered to how candidates should be chosen. A 49 years old woman presented with a 6 × 8 cm ulcerated right breast mass and ipsilateral axillary lymphadenopathy. Biopsy confirmed grade II invasive carcinoma of no special type (NST), ER/PR/HER2 negative. After three cycles of cyclophosphamide, doxorubicin, and paclitaxel, a partial clinical response was achieved. She underwent modified radical mastectomy with axillary dissection and immediate pedicled latissimus dorsi (LD) flap reconstruction for an 8 × 18 cm defect. Final pathology showed residual disease with Miller–Payne grade 3 response and negative lymph nodes. Recovery was uneventful, and adjuvant therapy commenced without delay. With appropriate patient selection, negative margins, and multidisciplinary planning, immediate LD flap reconstruction can provide reliable coverage in high risk fields without compromising oncologic outcomes. This case supports the feasibility and oncologic prudence of immediate LD flap reconstruction after NACT in selected patients with locally advanced TNBC, while underscoring that broader conclusions require validation beyond a single case.

Keywords: Breast reconstruction, latissimus dorsi flap, neoadjuvant chemotherapy, triple negative breast cancer



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Introduction

Triple negative breast cancer (TNBC) is a highly aggressive molecular subtype defined by rapid proliferation, early recurrence, and the absence of actionable hormone or HER2 targets, contributing disproportionately to breast cancer-related mortality.^{1,2} TNBC accounts for approximately 10–15% of all breast cancers and presents significant therapeutic challenges, especially in the locally advanced setting.² Neoadjuvant chemotherapy (NACT) is now a central component of treatment for operable, locally advanced TNBC, facilitating tumor downstaging, in vivo assessment of chemosensitivity, and improved surgical resectability.³ Standard NACT regimens typically combine an anthracycline (doxorubicin or epirubicin) with a taxane (paclitaxel or docetaxel); the addition of a platinum agent, most commonly carboplatin, further increases pathological complete response rates, particularly among BRCA1/2 mutation carriers, although its effect on long term event free and overall survival remains under active investigation.⁴ Pathological complete response (pCR) following NACT is a validated surrogate endpoint for improved disease free survival (DFS), event free survival (EFS), and overall survival (OS) in TNBC.^{3,5} However, pCR rates remain suboptimal, typically ranging from 40–55%, and a substantial proportion of patients still require extensive mastectomy, resulting in soft tissue deficits and reconstructive challenges.^{5,6}

The physical and psychological consequences of mastectomy have prompted the development of (IBR), which has been shown to improve body image and quality of life without diminishing patient satisfaction.⁷ Patients with locally advanced TNBC have historically been regarded as high risk candidates for IBR because of their elevated risk of locoregional and distant recurrence, the aggressive biology of the tumor, and the frequent need for intensive adjuvant therapy, factors that raise theoretical concerns about masking recurrence, delaying systemic treatment, and impairing wound healing in an already chemotherapy exposed field.^{8,9} Achievement of pCR should inform, rather than solely dictate, the decision to pursue IBR; the choice of reconstructive strategy is more directly guided by the extent of the post mastectomy defect, confirmation of negative margins, the quality of the remaining skin and soft tissue, the anticipated need for post mastectomy radiotherapy (PMRT), and the patient's overall fitness for a combined oncologic reconstructive procedure.^{9,10} Accumulating evidence from recent series and meta analyses indicates that immediate autologous reconstruction after NACT, including with the latissimus dorsi (LD) flap, can be performed with acceptable complication rates and without adverse effects on DFS or OS, provided that patient selection and multidisciplinary planning are rigorous, evidence that has shifted the clinical debate from whether IBR should be offered at all toward how candidates should best

be selected.⁸⁻¹⁰ Among autologous techniques, the LD flap is recognized as a reliable and versatile option, providing consistent vascularity, acceptable donor site morbidity, and adaptability to a wide range of chest wall defects.^{7,10}

This is particularly relevant for patients anticipated to require PMRT, which is commonly indicated after mastectomy for locally advanced disease: pedicled autologous flaps such as the LD flap are more resistant to radiation induced fibrosis and capsular contracture than implant based reconstructions, carry a lower risk of infection and implant exposure in a previously irradiated or chemotherapy exposed field, and provide durable, well vascularized soft tissue coverage even for large or ulcerated defects.^{10,11} Advanced imaging modalities, particularly contrast enhanced breast MRI, may further refine candidate selection by providing a more accurate estimate of residual disease burden after NACT than clinical examination alone, supporting both the timing of surgery and the oncologic rationale for proceeding with immediate reconstruction.¹² The intersection of locally advanced TNBC, NACT, and immediate LD flap reconstruction therefore represents a complex yet increasingly relevant clinical scenario. This case report aims to illustrate the feasibility and oncologic prudence of immediate LD flap reconstruction following NACT in locally advanced TNBC and to contribute to the still limited body of evidence regarding the oncologic safety and reconstructive outcomes of IBR in this high risk population, emphasizing the balance between optimal cancer control and restoration of physical and psychological wellbeing.

Case

A 49 years old woman presented with a progressively enlarging mass in the right breast that had been noticed approximately one year prior to presentation. The mass initially appeared as a small, marble sized lump and enlarged rapidly over six months, eventually reaching the size of a hand ball. As the tumor progressed, ulceration developed at the central portion of the breast, accompanied by malodor. There were no associated respiratory symptoms, bone pain, or constitutional complaints. The patient had no personal or family history of malignancy. Her gynecologic history included menarche at 12 years of age, three full term pregnancies with breastfeeding for up to two years, and menopause at the time of presentation. Her medical history was notable for well controlled hypertension treated with amlodipine.

On physical examination, the patient was in moderately ill condition with a Karnofsky performance status of 70%. Examination of the right breast revealed a firm, irregular, nontender mass measuring approximately 6 × 8 cm, with poorly defined margins (Figure 1A). The nipple areolar complex and a large portion of the breast skin showed evidence of healed ulceration consistent with a previously fungating carcinoma, along with residual satellite

nodules. Palpation of the right axilla identified a single mobile lymph node at level I measured approximately 3 cm in diameter, without matting or fixation to surrounding structures. Examination of the left breast and contralateral axilla was unremarkable. No signs of distant metastasis were identified on general physical examination.

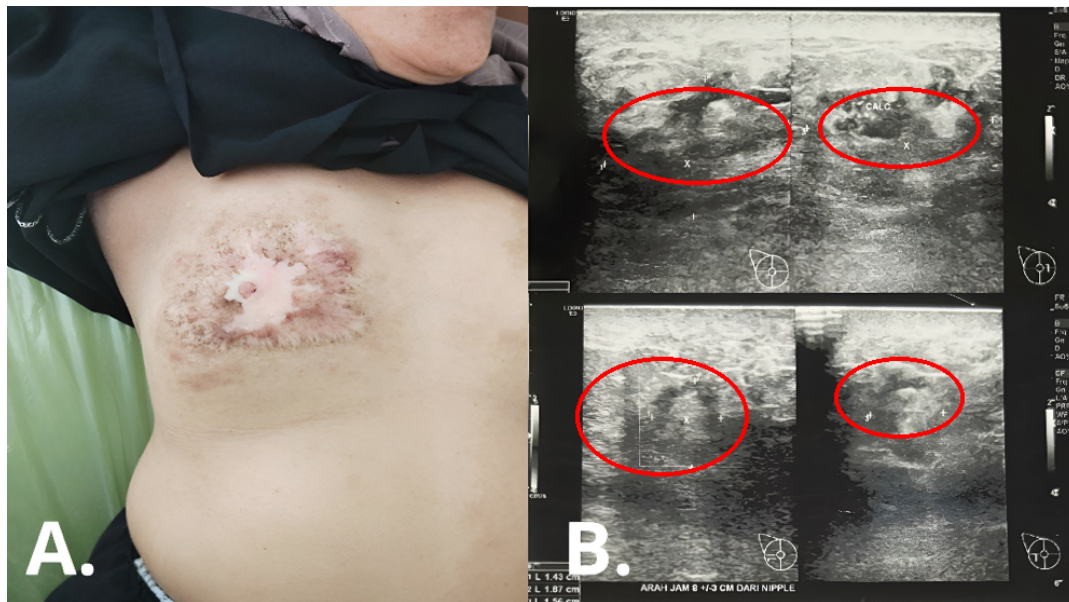


Figure 1. Preoperative clinical presentation and imaging findings. (A) Clinical photograph of the right breast demonstrating a centrally ulcerated lesion with surrounding skin changes consistent with locally advanced breast carcinoma. (B) Breast ultrasonography (red circles) showing irregular hypoechoic masses with heterogeneous echotexture, categorized as BI-RADS 6, suggestive of biopsy proven malignancy.

Breast ultrasonography demonstrated multiple masses in the right breast consistent with BI-RADS 6 lesions, along with multiple enlarged right axillary lymph nodes at level I (Figure 1B). The left breast was within normal limits. Chest radiography and abdominal ultrasonography showed no evidence of distant metastatic disease. Routine laboratory investigations, including complete blood count, renal and hepatic function tests, and coagulation profile, were within acceptable limits for surgical intervention, with no evidence of systemic inflammatory or metabolic derangement.

An incisional biopsy of the breast lesion revealed NST with moderate differentiation (histopathological grade II) (Figure 2A). Immunohistochemical analysis showed negative expression of estrogen receptor, progesterone receptor, and HER2, consistent with TNBC (Figure 2B); Ki 67 immunohistochemical staining had not yet been performed at the time of reporting and was recommended in the most recent pathology evaluation for further assessment of tumor proliferative activity. The patient subsequently underwent NACT consisting of

cyclophosphamide, doxorubicin, and paclitaxel for three cycles. Response to NACT was assessed clinically through serial breast and axillary examination, corroborated by breast ultrasonography prior to surgery; formal radiological restaging with contrast enhanced imaging was not performed in this setting, which is acknowledged as a limitation of the pre surgical work up. A partial clinical response was achieved.

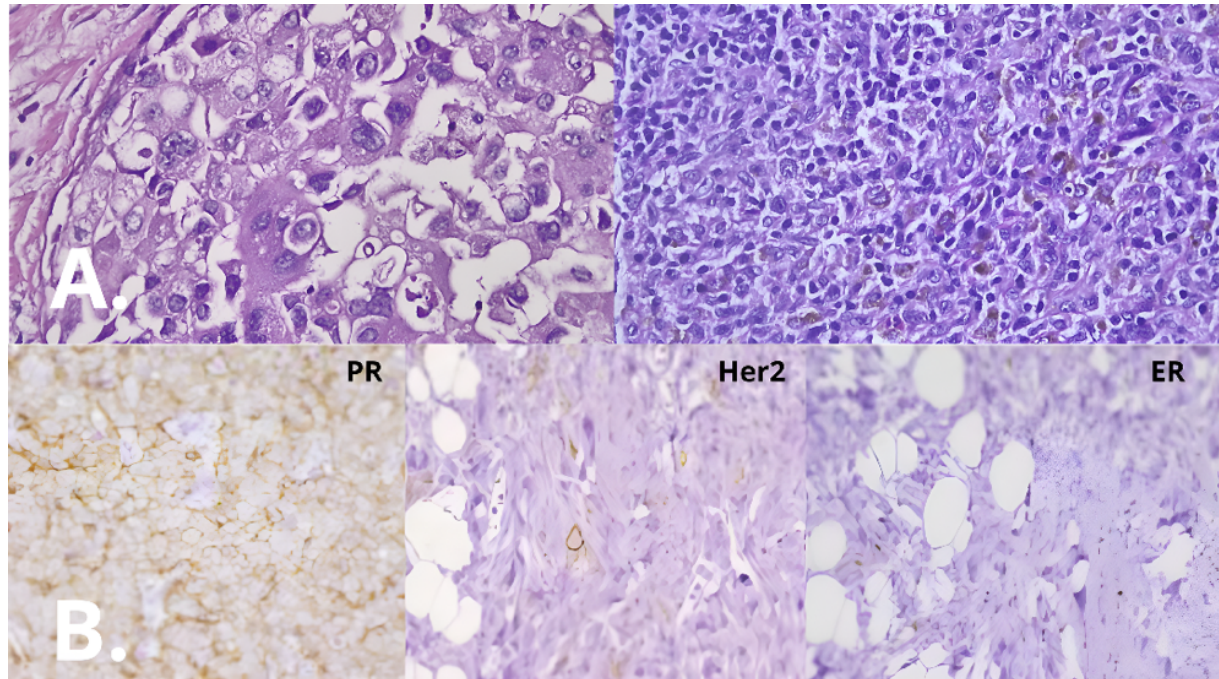


Figure 2. Histopathological and immunohistochemical findings from the tumor specimen. (A) Hematoxylin and eosin (H&E) staining showing NST, histological grade II, with marked nuclear pleomorphism, brisk mitotic activity, an infiltrative growth pattern, and a moderate desmoplastic stromal response (original magnification $\times 200$ – 400 ; scale bars not available in the original photomicrographs). (B) Immunohistochemical staining demonstrating absence of nuclear staining for estrogen receptor (ER) and progesterone receptor (PR) (positivity threshold $\geq 1\%$ of tumor nuclei per current ASCO/CAP guidelines) and absence of membranous HER2 staining (score 0 per ASCO/CAP HER2 testing criteria), consistent with TNBC.

Following neoadjuvant therapy, the patient underwent right modified radical mastectomy with axillary lymph node dissection, followed by immediate reconstruction using a pedicled LD flap to address a post mastectomy chest wall defect measuring approximately 8×18 cm. Preoperative skin marking of the LD flap was performed with the patient in the sitting position to delineate the anterior, posterior, superior, and inferior borders of the LD muscle. A skin island measuring approximately 20×10 cm was designed obliquely over the muscle,

oriented to allow adequate rotation to the anterior chest wall while facilitating primary closure of the donor site (Figure 3A). Surface markings of the anticipated mastectomy margins and chest wall defect were made concurrently (Figure 3B).



Figure 3. Preoperative surgical planning and flap design. (A) Preoperative marking of the LD flap on the donor site, outlining the muscle borders and planned skin island. (B) Surface marking of mastectomy margins and anticipated chest wall defect prior to reconstruction.

After completion of the mastectomy, the patient was repositioned into a lateral decubitus position to allow access to the donor site. The ipsilateral arm was abducted to no more than 90 degrees and supported appropriately to prevent brachial plexus and ulnar nerve injury. A skin incision was made according to the preoperative markings, and subcutaneous dissection was carried out to expose the underlying LD muscle.

The muscle was dissected free from its surrounding attachments, separating it laterally from the serratus anterior muscle, medially from the paraspinal and thoracolumbar fascia, superiorly from the fibers of the trapezius muscle, and inferiorly from the teres major muscle (Figure 4A). Dissection was performed predominantly with sharp technique using Metzenbaum scissors along the fascial and myofascial planes, combined with blunt finger dissection of the loose areolar tissue overlying the neurovascular pedicle to minimize thermal or traction injury. The muscle was harvested together with a thin layer, approximately 0.5–1 cm, of overlying subcutaneous fat to preserve the subdermal vascular plexus supplying the skin island. The thoracodorsal vascular pedicle was identified at its entry point on the deep surface of the muscle, following standard anatomical landmarks along the lateral border of the LD, and was dissected and meticulously preserved to maintain flap viability; pedicle integrity was

confirmed visually and by palpation of pulsatile flow. Adequate pedicle length and mobility were confirmed to ensure tension free transfer (Figure 4B). Once the flap was fully mobilized, a subcutaneous tunnel was created from the donor site to the anterior chest wall. The flap was then rotated anteriorly through the tunnel, taking care to avoid kinking or compression of the vascular pedicle.

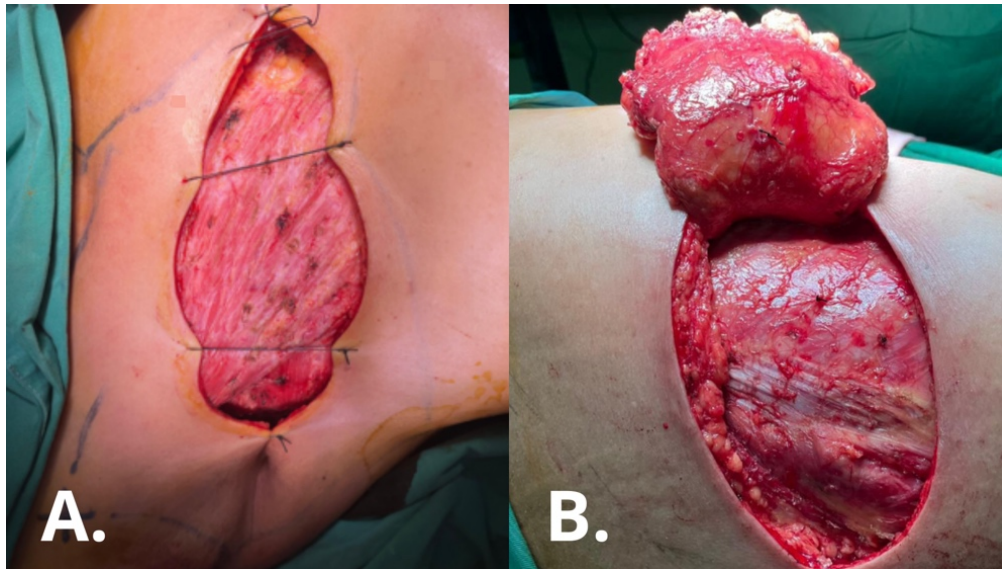


Figure 4. Intraoperative flap harvest and mobilization. (A) The LD muscle flap dissected and elevated from the donor site, demonstrating the skin island and underlying muscle prior to full mobilization. (B) The flap fully mobilized on its thoracodorsal vascular pedicle, confirming adequate pedicle length and viability prior to transfer through the subcutaneous tunnel to the chest wall defect.

Flap viability was assessed intraoperatively based on skin and muscle color, capillary refill, and brisk dermal bleeding at the flap margins; perfusion of the distal skin paddle was further confirmed by confirmed by brisk bleeding from a small superficial incision at the flap edge before final inset. The LD flap was inset into the chest wall defect and fixed circumferentially to the wound margins, with additional quilting sutures placed between the flap and the underlying chest wall using interrupted absorbable sutures to obliterate dead space and reduce shear forces, thereby lowering the risk of seroma formation. Two closed suction drains, one at the donor site and one at the recipient site, were placed and maintained until output fell below 30 mL over 24 hours. The donor site was closed primarily in layers and covered with a well padded compression dressing, and the ipsilateral shoulder was immobilized in a sling for the initial postoperative days to protect the pedicle and minimize donor site shear. The recipient site skin was closed without tension.

The patient was returned to the supine position, and final inspection confirmed adequate flap perfusion and satisfactory wound closure (Figure 5A). Histopathological examination of the surgical specimen demonstrated residual invasive carcinoma with post chemotherapy changes, showing a 30–40% reduction in tumor cellularity consistent with Miller-Payne grade 3 response. No metastatic carcinoma was identified in the excised axillary lymph nodes, which showed features of sinus histiocytosis on histopathological examination (not separately illustrated). The final pathological staging confirmed locally advanced TNBC without evidence of distant spread. The postoperative course was uneventful, with satisfactory wound healing and preserved flap viability, allowing timely continuation of adjuvant oncologic management (Figure 5B).

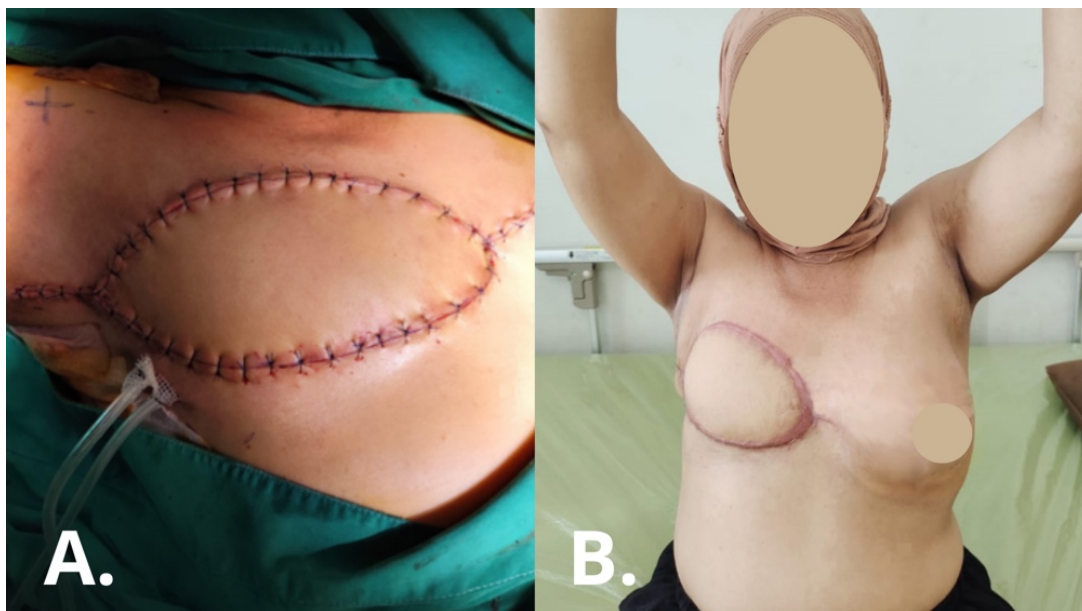


Figure 5. Immediate postoperative and follow up outcomes. (A) Immediate postoperative appearance following inset of the pedicled LD flap, demonstrating adequate flap perfusion and primary donor site closure. (B) Postoperative follow up showing satisfactory chest wall contour restoration and preserved upper limb mobility.

Discussion

This case illustrates the oncologic risks inherent to locally advanced TNBC presenting as an ulcerated, fungating tumor, clinical features that have historically raised concerns regarding infection, impaired wound healing, and the safety of immediate reconstruction, reinforcing the perception that surgery in this context occurs at the “edge” of oncologic safety.⁹ In the present patient, three cycles of anthracycline/taxane based NACT produced a partial clinical response sufficient to permit a margin negative mastectomy, which, together with the absence of nodal metastasis on final pathology, provided the oncologic basis for offering

immediate rather than delayed reconstruction.

Immediate reconstruction can be considered oncologically acceptable when several criteria are met: a documented response to NACT, achievement of negative surgical margins, absence of comorbidities that could impair healing, adequate soft tissue coverage, and a low likelihood that adjuvant therapy will be meaningfully delayed.^{1,11} Several of these criteria were met in this case: the patient demonstrated a clinical response to NACT, negative surgical margins were achieved, her performance status permitted a combined procedure, and postoperative recovery allowed adjuvant therapy to proceed without clinically significant delay. Appropriate patient selection for IBR after NACT further requires careful evaluation of nodal status, performance status, and the patient's ability to tolerate both complex surgery and subsequent adjuvant therapy;¹³ multidisciplinary decision making was accordingly central to balancing oncologic safety with the patient centered benefit of avoiding a staged reconstruction.

The LD flap was selected for this patient based on its well established reliability, robust vascularity, and versatility in covering moderate to large chest wall defects such as the 8 × 18 cm defect encountered here.^{9,14} Its pedicled blood supply confers resilience in tissue previously exposed to systemic chemotherapy, an important consideration given the extent of prior tumor ulceration and skin compromise. Although implant based reconstruction is commonly performed, it carries a higher risk of infection, implant exposure, and wound complications in compromised fields, particularly in patients anticipated to receive PMRT, as this patient was.^{12,14} Compared with abdominally based free flaps, which may be limited by patient comorbidities, prior abdominal surgery, or operative complexity, the LD flap offered dependable coverage with lower technical demands and shorter operative time, factors that favored this approach for this particular patient.

A major concern surrounding immediate reconstruction in locally advanced TNBC is the potential delay of adjuvant therapy, which may adversely affect disease free and overall survival, particularly in this aggressive subtype.¹⁵ In this case, postoperative recovery was uneventful, flap viability was preserved, and adjuvant treatment was initiated without clinically significant delay. This experience aligns with published evidence demonstrating that immediate autologous reconstruction, including LD flap reconstruction, does not inherently delay adjuvant chemotherapy when perioperative management is optimized.^{11,12} This case is consistent with published evidence suggesting that immediate reconstruction can be oncologically safe in carefully selected patients and are consistent with the broader literature indicating that time to adjuvant chemotherapy, rather than the reconstructive procedure itself,

is a key determinant of outcome in TNBC.¹⁵

Beyond oncologic safety, immediate reconstruction offers meaningful psychosocial and functional benefits. For patients presenting with previously ulcerated or fungating tumors, restoration of chest wall integrity and body contour plays a critical role in psychological recovery and quality of life.⁹ In this case, the LD flap provided durable soft tissue coverage and an acceptable aesthetic outcome, supporting functional recovery without compromising cancer control.¹⁴

Future patient selection may also incorporate emerging biomarkers, further refine patient selection for immediate reconstruction in locally advanced TNBC. Tumor infiltrating lymphocytes (TILs) have gained attention as prognostic and predictive markers in TNBC: higher stromal TIL density in the pre-treatment biopsy is associated with a greater likelihood of pCR to NACT, while higher residual TIL density after NACT is independently associated with improved recurrence free and overall survival, even among patients with residual disease.¹⁶ In the present case, formal TIL quantification was not performed, but incorporating this parameter into future practice could help identify which patients with residual disease after NACT still carry a favorable enough prognosis to justify immediate, rather than delayed, reconstruction, potentially serving as an adjunct to Miller–Payne grading and margin status in multidisciplinary decision making. Germline BRCA1/2 mutation status is similarly relevant, as carriers often demonstrate enhanced sensitivity to platinum-based chemotherapy and may achieve higher pCR rates with platinum containing regimens;⁴ pre-treatment knowledge of BRCA status may therefore help anticipate the extent of tumor regression before NACT and inform reconstructive planning. Importantly, accumulating evidence indicates that, with appropriate patient selection, immediate autologous reconstruction after NACT does not increase complication rates, delay adjuvant therapy, or compromise oncologic outcomes.^{13,17}

Conclusion

Immediate autologous reconstruction with a pedicled LD flap can be feasible from an oncologic and reconstructive perspective in selected patients with locally advanced triple-negative breast cancer following neoadjuvant chemotherapy NACT, but this conclusion must be interpreted cautiously given the absence of comparative data and the limited follow-up inherent to a single case report. Successful application of this approach depends on careful patient selection, confirmation of negative surgical margins, adequate control of systemic disease, and close multidisciplinary coordination among surgical oncology, plastic surgery, and medical oncology teams to ensure that adjuvant therapy timelines are preserved. When these conditions are met, the LD flap offers reliable vascularized coverage for extensive chest wall

defects, even in previously ulcerated or chemotherapy-exposed fields, while also providing meaningful reconstructive advantages, including durable defect coverage, preserved upper-limb function, and improved body image and quality of life. Although broader conclusions cannot be drawn from a single case, and longer-term oncologic follow-up in this patient remains necessary, this report adds to the limited evidence base supporting immediate LD flap reconstruction in patients at the margins of conventional reconstructive indications when guided by strict patient selection and multidisciplinary judgment.

Conflict of interest

All authors declare that they have no conflicts of interest.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical images. The preparation and publication of this case report were approved by the Department of Surgery, Division of Surgical Oncology, Hasanuddin University.

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