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Original Article

Chest Wall Resection and Reconstruction for Thoracic Malignancies: A Single-Center Case Series of Eight Cases from Northeast India

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ABSTRACT

Background: Chest wall resection for primary and secondary thoracic malignancies remains surgically challenging because adequate oncologic clearance must be balanced against preservation of respiratory mechanics and chest wall stability.
Methods: We performed a review of eight consecutive patients who underwent chest wall resection and reconstruction for malignant chest wall tumors between 2024 and 2026 at a tertiary cancer center in Northeast India. Demographic characteristics, tumor pathology, operative details, reconstructive techniques, postoperative outcomes, and oncologic outcomes were analyzed.
Results: Eight patients (mean age 42.8 years; 62.5% female) underwent complex chest wall resection. Indications included breast carcinoma (n=4), chondrosarcoma (n=2), SCC (Squamous Cell carcinoma)invading sternum(n=1) and osteosarcoma (n=1). Five patients required sternal resection and three underwent rib-only resections. R0 resection was achieved in all patients. Rigid reconstruction was performed in six patients and non-rigid reconstruction in two. Latissimus dorsi flap coverage was used in six cases. Mean hospital stay was 11.2 days. No respiratory complications occurred. One patient developed mesh infection requiring removal (Clavien–Dindo grade IIIb). At follow-up, six patients remained disease-free, while two developed metastatic disease or died from progression.
Conclusions: Chest wall resection with immediate reconstruction can be performed safely with acceptable morbidity and excellent local control. Rigid reconstruction combined with vascularized soft-tissue coverage provides durable chest wall stability and favorable functional outcomes.

Keywords: Chest wall resection; chest wall reconstruction; sarcoma; recurrent breast cancer; latissimus dorsi flap; thoracic oncology.

INTRODUCTION

Chest wall tumors comprise a heterogeneous group of primary and secondary malignancies which require individualized surgical management. Chest wall resection is indicated for malignant and non-malignant conditions involving the thoracic cage. The most common indications include primary chest wall tumors such as chondrosarcoma, osteosarcoma, Ewing sarcoma, and soft tissue sarcomas. It is also performed for locally recurrent or metastatic malignancies, particularly recurrent breast cancer and lung cancer with chest wall invasion. In addition, extensive chest wall infections, radiation-induced necrosis, and selected traumatic chest wall defects may require resection and reconstruction to restore structural integrity and function. Successful management requires a multidisciplinary approach to achieve optimal oncological and functional outcomes.(1,2)

Complete oncologic resection remains the cornerstone of treatment for both primary chest wall sarcomas and selected locally recurrent breast cancers. Contemporary reconstruction techniques allow restoration of chest wall stability and protection of intrathoracic structures.(1) With the advent of synthetic materials for chest wall reconstruction as well as

fasciocutaneous or myocutaneous flaps for large chest wall defect closure, the rate of post-operative complications has reduced dramatically in recent years. Chest wall reconstruction is imperative, particularly in patients with large chest wall defect size, in order to prevent respiratory failure due to flail chest. (3) This case series reports our institutional experience with chest wall resection and reconstruction in eight consecutive patients managed at a tertiary cancer center in Northeast India.

METHODS

A review was conducted of eight consecutive patients who underwent chest wall resection and reconstruction for malignant tumors. Data collected included age, sex, diagnosis, extent of resection, reconstructive technique, flap coverage, perioperative outcomes, complications, margin status, adjuvant treatment, and follow-up status.

Primary outcomes included achievement of R0 resection, postoperative morbidity, respiratory complications, and oncologic status at follow-up. Complications were graded according to the Clavien–Dindo classification.

RESULTS

The cohort included five women and three men with a mean age of 42.8 years (range 28–60 years). Three patients had recurrent breast carcinoma, two had chondrosarcoma,one SCC with sternal infiltration, one metaplastic breast cancer and one had osteosarcoma.

Table 1. Patient Demographics and Diagnosis

Sl. No.	Age	Sex	Diagnosis
1.	51	F	Breast cancer sternal recurrence
2.	60	M	Sternal chondrosarcoma
3.	28	M	Sternal osteosarcoma
4.	38	F	Breast carcinoma Recurrance
5.	36	F	Breast cancer chest wall recurrence
6.	54	F	Chest wall chondrosarcoma
7.	36	F	Metaplastic Breast Cancer
8.	40	M	SCC invading sternum

Sternal resection was required in five patients, while three underwent rib-only chest wall resection. Rigid reconstruction was performed in six patients using titanium mesh or stainless-steel wire-based techniques. Two patients underwent non-rigid reconstruction. Latissimus dorsi flap coverage was used in five patients, omental flap in one patient, and combined omental plus latissimus dorsi flap in two patients

Table 2. Surgical Procedures and Reconstruction

Case	Resection	Reconstruction	Flap
1	Subtotal sternum + ribs	Titanium mesh	LD flap
2	Subtotal sternum + ribs	Wire + cement	Omental flap
3	Manubrium + clavicle + ribs	Wire reconstruction	LD flap
4	Ribs 7–9	Rigid fixation	LD flap
5	Ribs 3–5	Non-rigid reconstruction	LD flap
6	Ribs 9–11	Non-rigid reconstruction	Omental + LD flap
7	Ribs 3–5 + sternum	Rigid fixation	LD flap
8	Sternum + bilateral ribs 3–5	Rigid fixation	Omentum + LD flap

All patients achieved microscopically negative (R0) margins. Mean hospital stay was 11.2 days. No respiratory complications occurred. Four patients required one day of postoperative ventilatory support. One patient developed mesh infection requiring mesh removal (Clavien–Dindo grade IIIb).

At follow-up, six patients had no evidence of disease. One patient with recurrent breast carcinoma developed brain and bone metastases, one patient with metaplastic breast cancer developed ling metastasis at 3 months, while one patient with dedifferentiated chondrosarcoma died from progressive metastatic disease.

Fig.1 Squamous Cell Cancer infiltrating sternum and bilateral ribs.

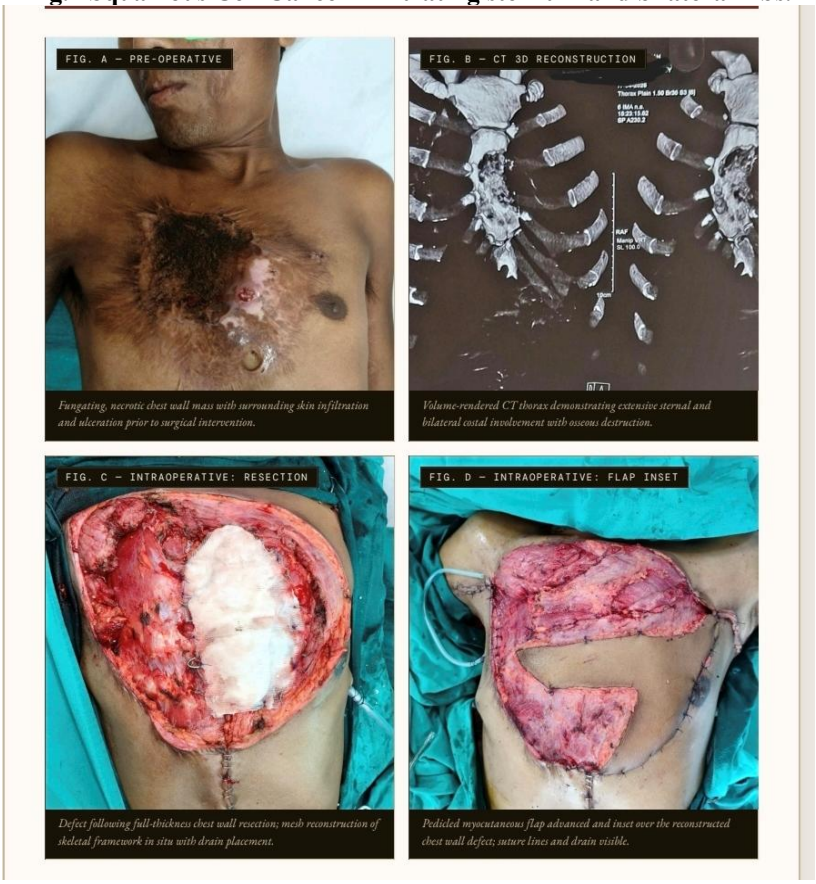


Fig. 2 Metaplastic Breast Cancer with Chest wall invasion

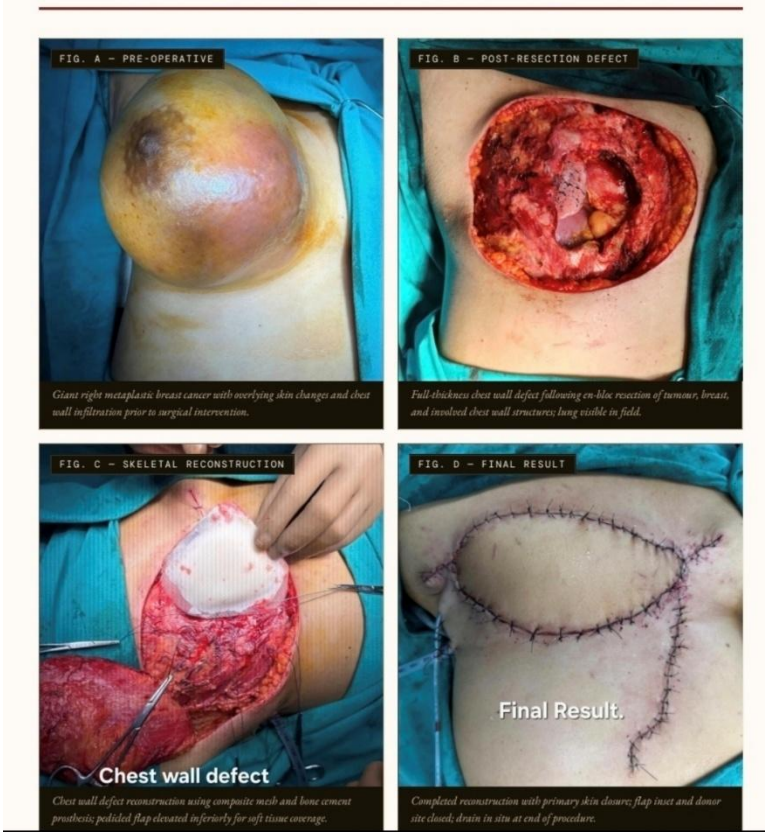
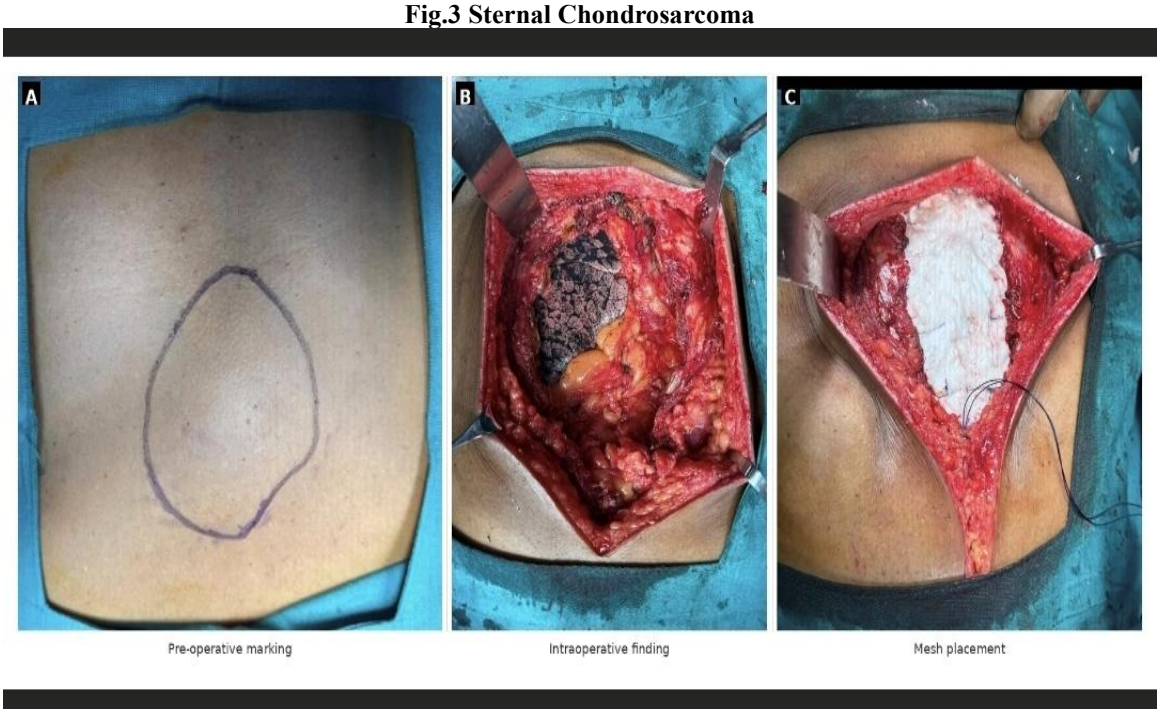


Fig.3 Sternal Chondrosarcoma



DISCUSSION

The first successful chest wall resection was reported in 1878 by Holden , who performed a partial sternectomy for primary sarcoma. This was followed by Parham, who performed chest wall resection for tumor in 1898.(4,5). Tansini first described the use of myocutaneous flap (latissimus dorsi flap) for coverage of anterior chest wall after radical mastectomy. (6) Though partial- and full-thickness thoracic wall resections combined with reconstruction still represent a formidable surgical challenge, but improvements in surgical technique, intensive care, and rehabilitation have led to reduced perioperative morbidity and mortality.(7)

This series demonstrates that aggressive chest wall resection combined with tailored reconstruction can achieve excellent local control with acceptable morbidity. The 100% R0 resection rate underscores the feasibility of complete oncologic clearance even in anatomically complex lesions. Our findings are consistent with recent literature demonstrating high rates of complete resection and acceptable morbidity following chest wall reconstruction. (7).

The choice of reconstruction following chest wall resection depends on the size, location, and complexity of the defect. Rigid reconstruction using materials such as titanium mesh, methyl methacrylate, PEEK implants, or rib grafts is generally recommended for large (>60 cm^2), anterior, lateral, or sternal defects to maintain chest wall stability and reduce respiratory complications. In contrast, non-rigid reconstruction with polypropylene mesh, PTFE, biologic mesh, or acellular dermal matrix is suitable for smaller posterior defects and contaminated fields, offering adequate support with easier handling and lower risk of prosthetic-related complications. Our reconstructive choices reflected the same.The absence of respiratory complications in our series suggests adequate restoration of chest wall mechanics. The latissimus dorsi flap served as the workhorse reconstructive option because of its reliable vascularity, versatility, and ability to cover large defects, as cited in many series.(8,9,10,11)

Complications following chest wall resection and reconstruction can be broadly classified into surgical site-related, respiratory, or other systemic complications. Surgical site and respiratory complications are the most common, with reported incidence rates of approximately 40% across some series.(12) In our series, the single major complication was mesh infection in a patient with advanced recurrent breast cancer, highlighting the importance of patient selection and careful postoperative surveillance. Oncologic outcomes appeared more favorable in primary sarcomas than in recurrent breast cancer, consistent with the biological aggressiveness of recurrent breast malignancy.

Limitations include the small sample size, short follow-up duration, and heterogeneity of tumor histologies

CONCLUSION

Chest wall resection and reconstruction represent safe and effective treatment options for selected patients with primary and secondary thoracic malignancies. Complete resection can be achieved with low morbidity when reconstruction is

individualized according to defect characteristics. Multidisciplinary management remains essential for optimizing both oncologic and functional outcomes.

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