



Case report

A rare case of chest wall reconstruction in a child

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ABSTRACT

Introduction: Ewing sarcoma/primitive neuroectodermal tumour (ES/PNET) is the most common malignant tumour of the chest wall in children and young adults. Chest wall defect left after complete resection of the involved ribs and chest wall defect requiring reconstruction, is surgically challenging for cosmetic as well as for functional purposes especially in growing children.

Importance: A rare but feasible and simple technique for a case of chest wall tumour reconstruction has been described here with its successful outcome with available composite muscular vascularised flap.

1. Introduction

Ewing Sarcoma, most commonly occurring in children and adolescents with a gender ratio of 1.5:1, is a highly malignant and poorly differentiated tumour, consisting of small round blue cells histopathologically. Thoracic localization of these sarcomas most often involves the ribs, and is characterized by indolent progress. Local resection with adequate margins is optimal surgical goal; however the resultant chest wall defect left, is surgically challenging, requiring adequate synthetic grafts or vascularised muscle flaps.

2. Case report

A six years old male child brought to us with complaint of right sided chest swelling with pain since two months (Fig. 1A). Child was evaluated with chest radiography and contrast enhanced computed tomography (CECT); revealed sclerotic lesion of size 7 cm × 3 cm involving the 7th rib and part of 6th rib near their costochondral junctions, having normal underlying lung and pleura. Fine needle aspiration biopsy of the lesion yielded small round blue cells suggestive of small round cell tumorous lesion. Since tumour was well localised, child underwent right thoracotomy via transverse incision over the lesion. Intra operatively the lesion was of size 10 cm × 5 cm involving mainly 7th rib and lower part of the 6th rib near their costo chondral junctions extending laterally (Fig. 1A–F). Underlying pleura, lung as well as medial end of diaphragm and pericardium were essentially normal.

Tumorous part of 7th rib and 6th ribs were excised and the resultant chest wall defect of size 12 cm × 6 cm was closed with a patch of polypropylene mesh and a composite well vascularised pectoralis major

and minor muscular flaps were raised releasing their origin from the respective costochondral junctions keeping the underlying their perforator vessels intact; flaps were advanced to the chest wall defect and sutured with absorbable suture covering the defect over the mesh (Fig. 1A–F). Inter costal drain as well as inter muscular suction drains, were kept which were removed post operatively on day 2nd and child was discharged on 3rd day having normal chest radiography (Fig. 2I). Histopathology of the lesion showed, small round blue cells separated by fibrous septae and inflammatory cells revealing it to be poorly differentiated Ewing's sarcoma (Fig. 2J). Child is receiving chemotherapy and is on regular follow up with us since 3 years.

3. Discussion

Ewing sarcoma, named after James Stephen Ewing, an American pathologist; is a malignant chest wall tumour occurring in children with a frequency of 8% primarily involving the ribs. It is the second most common primary malignant tumour of the bone after osteosarcoma in children and adolescents. Treatment includes a combination of en bloc resection of rib and adjuvant chemotherapy as well as radiotherapy in view of micrometastasis even after complete resection. Ewing's sarcoma also called as blue tumour due to the blue nuclei of cells on staining with hematoxyllin. The five year disease-free survival rate is now approximately 75% [1–3].

Subsets of Ewing's sarcoma which are advanced stage at presentation are called Askin's tumour requiring neoadjuvant chemotherapy.

The resultant chest wall defect reconstruction is really challenging surgically, requiring synthetic grafts with or without vascularised muscle flaps to obliterate the dead space, control infection and to maintain

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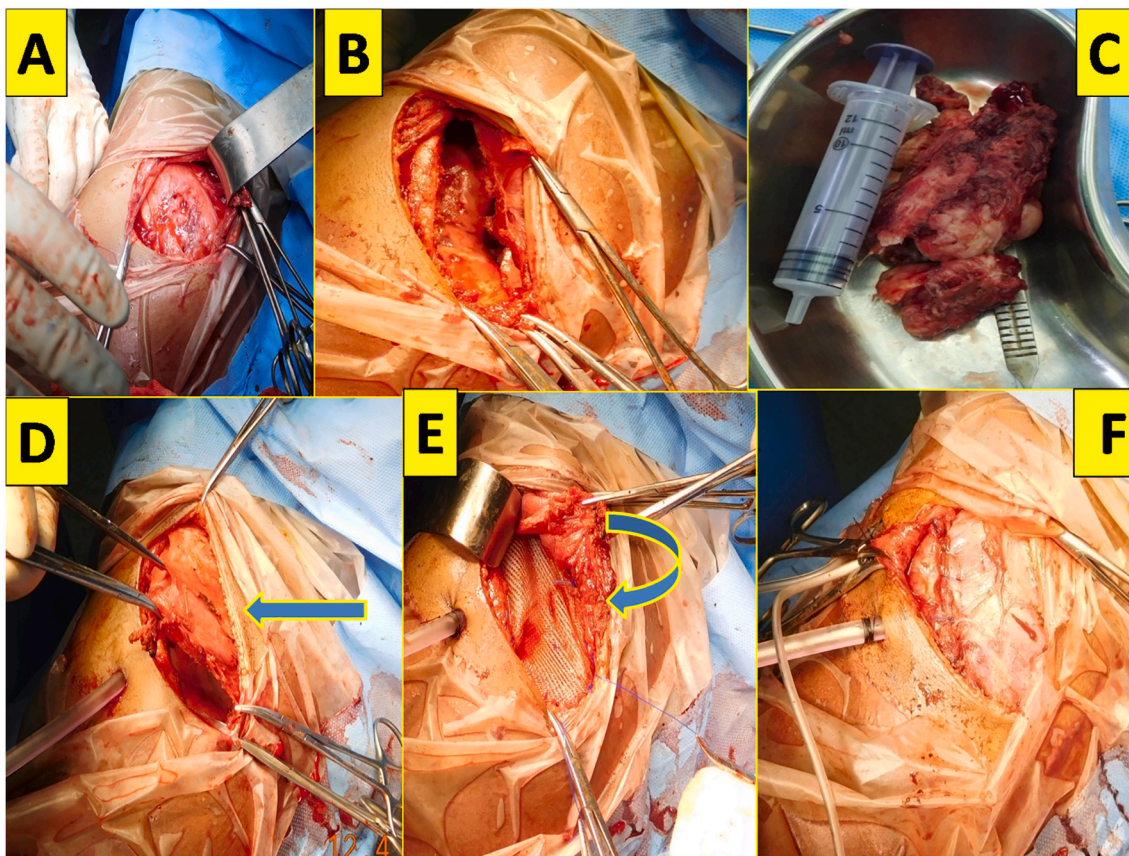


Fig. 1. A: Ewing's sarcoma of 6th and 7th ribs. B: Chest wall defect left after excision of tumorous ribs. C: Excised tumorous ribs. D: Blue arrow-Raised pectoralis major muscle advancement flap. E: Blue arrow-polypropylene mesh sutured to the chest wall defect. F: Closed chest wall defect.

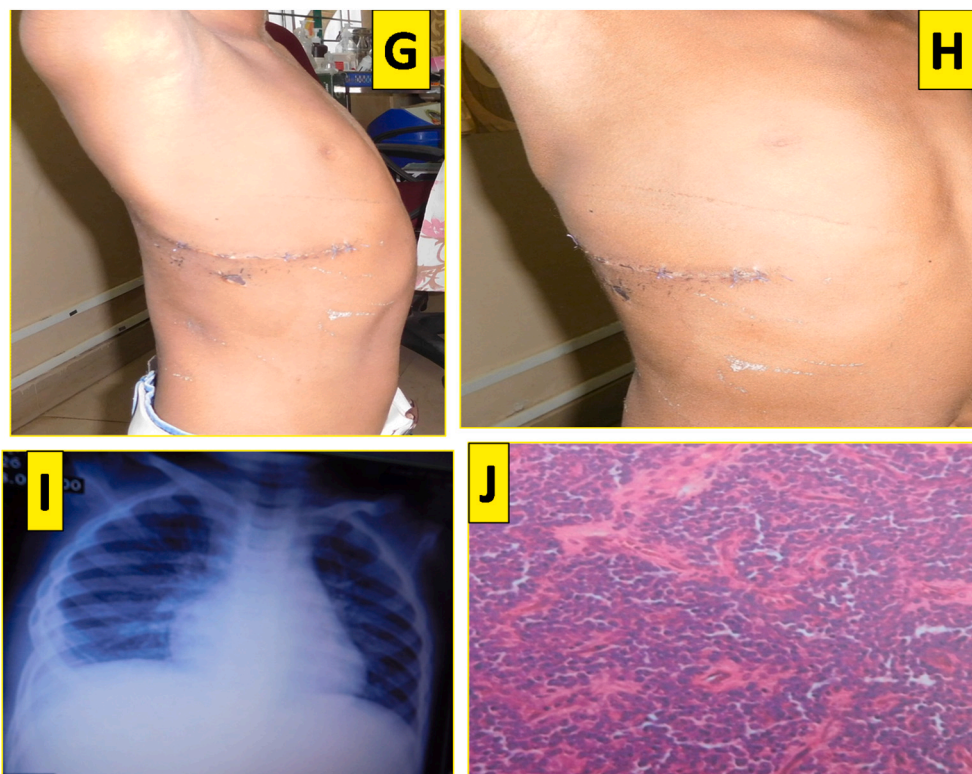


Fig. 2. G and H: Immediate Post operative appearance. I: Post operative chest radiography. J: Histopathological image showing small round cells with fibrous septae and inflammatory cells.

contour of the chest cosmetically as well as functionally especially in growing children [1–3].

The very reliable and versatile pectoralis major muscle (PM) flap based on thoracoacromial vessels and nerve bundles is currently considered the work horse flap for soft tissue reconstruction of chest wall defects. The flap's blood supply is based on the thoracoacromial artery (TAA) and the sternal perforators from the internal mammary artery (IMA) [4,5].

Author, completely dissected pectoralis major muscle free from its origin near the costo chondral junctions of 1st to 6th ribs, leaving the perforators intact, muscle is advanced to chest wall defect without disturbing its clavicular origin, and few digitations of pectoralis minor were released from 3rd to 6th ribs and mobilised, hence both flaps were advanced along with their respective fasciae to cover the chest wall defect after fixing it with a polypropylene mesh to the defect around ribs (Fig. 1C–E) [3–5].

Since the half of the muscle is still intact, the use of Pectoralis flap leaves no much morbidity, since serratus anterior, latissimus dorsi muscles can replace the function working in concert.

Though the literature is abundant with primary Ewing's sarcoma of ribs, chest wall reconstruction after its excision with polypropylene mesh as well as various kinds of muscle flaps in children and in adults, the use of such surgically simple, reliable yet innovative composite vascularised pectoralis major and pectoralis minor muscle flaps in children for chest wall defect has not been described in the English literature so far in children.

Author is sharing her experience of such a simple procedure for complicated chest wall reconstructions without much surgical morbidity and having good outcomes in its unique way.

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Ethical approval

Exempted from IRB of IGICH.

Consent

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Research registration

Not yet.

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CRediT authorship contribution statement

Dr. Jayalaxmi Shripati Aihole. Concept, design, literature review, operating on the child, follow up. writing the article. Submitting the article, correcting article

Declaration of competing interest

Authors declare no conflict of interest.

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