

Chondrosarcoma of Sternum-Reconstruction with Polypropylene Mesh, Titanium Plate and Myocutaneous Flap after Subtotal Excision

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Abstract: *Chondrosarcoma of the sternum is an exceedingly rare malignancy. In this case study, we present a 62 - year - old female diagnosed with a low - grade chondrosarcoma involving the left sternoclavicular joint. The patient underwent subtotal excision followed by reconstruction with a titanium plate, polypropylene mesh, and a myocutaneous flap. The postoperative course was uneventful, and the histopathology report confirmed Grade 2 chondrosarcoma with clear margins. We also provide a review of the relevant literature, emphasizing the importance of complete resection and the challenges of chest wall reconstruction.*

Keywords: Chondrosarcoma, sternum reconstruction, titanium plate, polypropylene mesh, myocutaneous flap

1. Introduction

Chondrosarcoma which arises from sternum is very rare. Sternal chondrosarcoma accounts for 2 % of total of 60 cases of chondrosarcoma that occurs in chest wall. ^[1]

Chondrosarcoma is a group of malignant tumors producing cartilaginous matrix. ^[2] The tumors range from benign low - grade tumors to aggressive high - grade tumors. It arises from cartilage producing cells. They are considered second most common sarcoma of bone following osteosarcoma. ^[3]

Sarcomas are heterogenous group of tumors which arise from mesenchyme and can be divided into subtypes based on whether they arise from cartilage, muscle, nerves, blood vessels or fat. Those that arise from cartilage is known as chondrosarcoma. The tumor can be primary or secondary based on etiology.

Secondary osteochondroma can arise from osteochondromas. It can be hereditary associated with gene mutations. ^[4]

Tumor involving sternum is usually malignant and is associated with very poor prognosis and surgical challenges if vital structures are involved. CT or MRI with histopathological correlation is essential to diagnose chondrosarcoma.

However complete resection with tumor free margins is associated with acceptable long - term survival.

This case is significant as it highlights the rare occurrence of sternal chondrosarcoma and the complex nature of chest wall reconstruction using a combination of polypropylene mesh, titanium plates, and myocutaneous flaps. Such cases contribute to the limited literature on optimal surgical approaches and long - term management of these tumours

2. Case Report

A 62 - year - old female presented with complaints of a painless swelling over the left sternoclavicular joint for past 11 months which was gradually increasing in size. The patient had no medical co - morbidities. No history of fever or trauma. There was no relevant family history of tumours.

On local examination, a well - defined swelling measuring approximately 6 x 6 cm was noted in the sternal area more towards left. Skin over the swelling was normal with no evidence of dilated veins. Swelling was hard in consistency and fixed. There was no local rise of temperature or tenderness. No movement with deglutition and protrusion of tongue.

The patient was advised chest X ray which showed a well defines lytic lesion over sternal region with possible diagnosis of tumour of sternal origin was made. She was advised CT scan and guided FNAC.

On CT scan of thorax, a well - defined lobulated hyper enhanced lesion 5.6 x 6.4 x 6.4 cm involving the left Costo sternal joint manubrium sterni and prevascular space. With no invasion of mediastinal great vessels was noticed. **(Fig 1)**

Guided FNAC showed cells consistent with diagnosis of low - grade chondrosarcoma.



Figure 1: CT Thorax showing well defined lesion involving left costosternal joint

The patient underwent surgical excision under general anesthesia

- **Incision:** Elliptical incision encircling the tumor (**Fig 2**)



Figure 2: Elliptical incision

- **Findings:** 6 x 7 x 7 cm solid lesion involving manubrium sterni, left sterno clavicular joint, medial third of left clavicle, medial parts of 1st and 2nd ribs. Mediastinal extent indenting the thymic gland, pericardium with no capsular breach. (**Fig 3**)

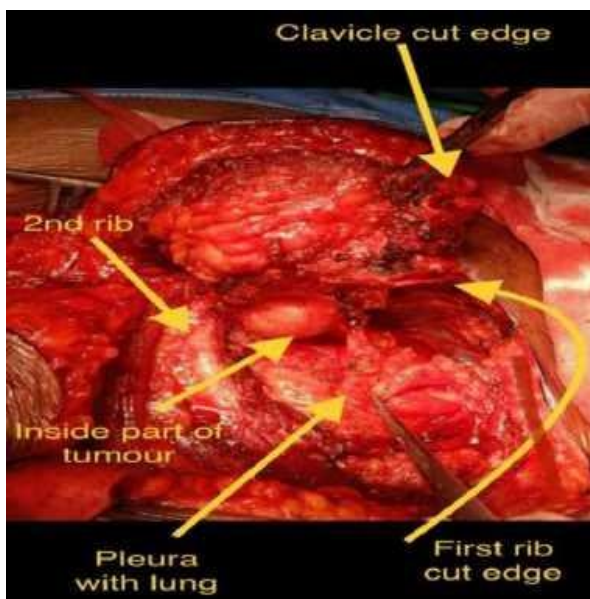


Figure 3: Intraop findings

- **Procedure:** Incision deepened, tumor with manubrium sterni, left sterno clavicular joint, Medial third of left clavicle, medial parts of 1st and 2nd ribs excised with 2 cm margin excised and sent for histopathology; fixation of 2nd rib was done with titanium plate. (**Fig 4**). A 15x15 cm polypropylene mesh placed over mediastinum, 15cm Titanium plate fixed between left and right second rib with 3 screws over the mesh.

Reconstruction by using Left myocutaneous Latissimus dorsi flap tunneled subcutaneously to cover of the anterior chest wall defect.



Figure 4: Reconstruction using titanium plate

There were no complications associated with surgery. (**Fig 5**) The histopathology report confirmed it as Grade 2 Chondrosarcoma with all margins free of neoplasm



Figure 5: Post OP image

3. Discussion

Chondrosarcoma arising from sternum is a very rare tumour of chest wall which is slow growing and usually painless. It usually seen in 6th decade of life with male preponderance. [5]

Surgery is the mainstay of treatment as these tumours are radio and chemo resistant. Tumours should be removed with adequate clearance, with optimum margins 2 - 6cm from the tumour. [6] The remaining chest defect should be reconstructed to maintain respiratory functions and to protect vital structures in mediastinum. Reconstruction can be done with autologous bone grafts, skin grafts, free or pedicled flaps depending on the size of defects and location.

Defects less than 5 cm does not need skeletal reconstruction.

Polypropylene or titanium mesh can be used to cover the defect and prevent paradoxical respiratory movement. Polypropylene although is less rigid is widely used due to cost effectiveness. Titanium mesh helps to make the procedure faster and will provide more rigidity but is more prone for complications like infection and migration.

In the case we discussed residual defect was reconstructed with titanium plate for rib, Polypropylene mesh and myocutaneous pedicled flap. Post Op patient had no paradoxical movement of chest wall and the recovery was uneventful. The histopathology report showed that the tumour margins to be free.

These cases of chondrosarcoma should be followed up 3 monthly for first 2 years, 6 monthly for next 3 years and then annually. [7]

4. Conclusion

Chondrosarcoma of the sternum, though rare, can be effectively treated with complete surgical resection and appropriate reconstruction techniques. In this case, the use of titanium plates, polypropylene mesh, and a myocutaneous flap proved successful in restoring chest wall integrity and preventing complications. Long term follow up is essential to monitor for recurrence.

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