

# Resection of Large Primary Chest Wall Chondrosarcoma with Reconstruction: 2 Case Reports

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## Summary

We report two cases of large chest wall primary chondrosarcoma, one of the sternum and the other of the lateral chest wall. Both were treated by radical resection and reconstruction using marlex mesh and methyl methacrylate "sandwich" prosthesis and pedicled latissimus dorsi flap.

Key Words: Chondrosarcoma, Thorax

## Introduction

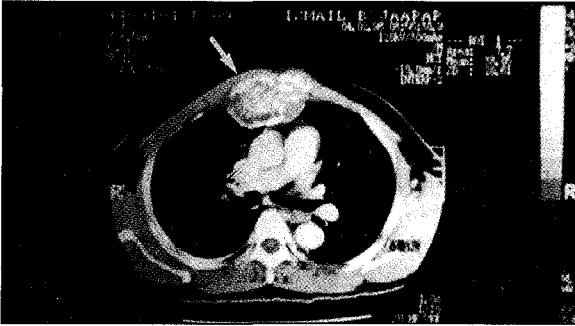
Chest wall neoplasms include a spectrum of soft tissue, bony and cartilaginous tumours whose clinical presentations range from asymptomatic, subcutaneous "lumps" to painful, ulcerating masses. The best option for cure in the treatment of chondrosarcoma is en-bloc radical surgical resection<sup>1,3</sup>. In those cases where the resultant defects are large, reconstruction restores chest wall stability, recreates soft tissue coverage and maintains pulmonary function<sup>1,2</sup>.

In this report, we describe two patients with large primary chest wall chondrosarcoma who underwent successful radical resection and reconstruction.

## Case report 1

A 53 year old Malay man presented with a three-month history of a painless hard swelling over the anterior chest. He did not have any significant past medical history but was noted to have hypertension at initial consultation. Physical examination showed a fit man with a blood pressure of 160/100 and pulse rate 80 beats

per minute. There was a hard non-tender lump over the sternum, measuring 11 cm in length and 6 cm in width. The skin overlying the tumour was mobile. The chest radiograph was unremarkable. Computed tomography (CT) of the thorax showed a mass in the sternum causing destruction of the whole sternaebrae sparing the manubrium showing features consistent with chondrosarcoma (Figure 1). The mediastinal surface was bulging into the anterior mediastinum in direct contact with the pericardium. Histopathological examination of an incisional biopsy showed well-differentiated chondrosarcoma of the sternum. Bone scan showed isolated increased uptake over the sternal tumour with no "hot spots" elsewhere. After stabilization of his blood pressure, the patient underwent wide resection of the tumour including the overlying skin measuring 21 cm by 8 cm. The body of the sternum with the tumour, xiphoid process and the distal manubrium, preserving the proximal 2 cm, was resected. The adjoining second to the sixth costal cartilages and the medial quarter of the pectoralis major were also resected before adequate margins were obtained (4 cm resection margin). Both the lung and the pericardium were not involved with the tumour. The resultant chest wall defect, measuring



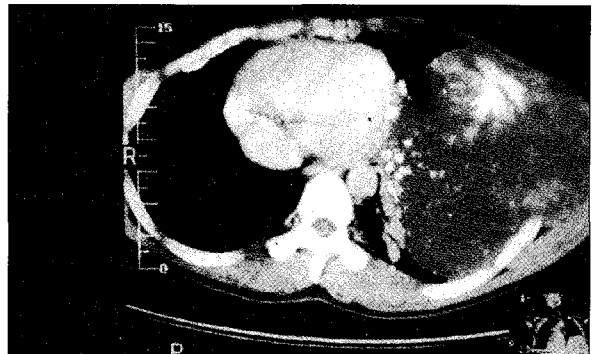
**Figure 1. CT scan of thorax showing the tumour (arrow) destroying the body of the sternum**

16.5 cm by 14 cm, was covered with methyl methacrylate sandwiched between 2 layers of marlex mesh (polypropylene mesh), sutured to the surrounding ribs and manubrium. The mesh was covered by a right latissimus dorsi myocutaneous flap which was tunneled through the subcutaneous tissue of the anterior chest wall. The patient was ventilated for 48 hours post-operatively. His post-operative recovery was uneventful and he was discharged back to the referring hospital on the 17<sup>th</sup> postoperative day. Histopathological examination of the tumour showed well-differentiated chondrosarcoma with the resection margins free of tumour. At follow-up 17 months after surgery, the patient was well with no evidence of recurrence of the tumour.

### Case report 2

A previously fit 40 year old Malay man presented with a three-month history of a hard swelling associated with dull aching pain over the left lateral chest. Physical examination showed a hard non-tender lump over the left lateral chest, measuring 13 cm by 15 cm. The skin overlying the tumour was mobile. The chest radiograph showed the tumour occupying the entire lower half of the left hemithorax. CT thorax showed a mass measuring 15 cm x 15 cm x 16 cm arising from the left lateral chest wall abutting against both the pericardium and left hemidiaphragm (Figure 2). The ribs associated with this mass were destroyed and the tumour has a mottled type of calcification consistent with chondrosarcoma. Histopathological examination of an

incisional biopsy showed well-differentiated chondrosarcoma of the sternum. Bone scan showed isolated increased uptake over the chest wall tumour with no "hot spots" elsewhere. The patient therefore underwent wide resection of the tumour including part of the overlying skin. The left latissimus dorsi muscle was mobilized. A 4 cm clearance margin was obtained and this included removing part of the serratus anterior and pectoralis major muscles. The 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> ribs were transected posteriorly and the corresponding costal cartilages anteriorly were also transected. The tumour was not adherent to the underlying lung, pericardium or hemidiaphragm. The resultant chest wall defect was covered with methyl methacrylate sandwiched between 2 layers of marlex mesh (polypropylene mesh), sutured to the surrounding ribs. The left latissimus dorsi flap was transposed to cover the methyl methacrylate marlex mesh "sandwich". The patient was extubated immediately post-operatively. His post-operative recovery was uneventful and he was discharged home on the 9<sup>th</sup> postoperative day. Histopathological examination of the tumour showed well-differentiated chondrosarcoma with the resection margins free of tumour. At follow-up 4 months after surgery, the patient was well with no evidence of recurrence of the tumour.



**Figure 2. Picture showing the 15 cm x 15 cm x 16 cm tumour arising from the left lateral chest wall abutting against the pericardium, and pushing the mediastinum to the contralateral side. The ribs associated with this mass were destroyed and the tumour has a mottled type of calcification consistent with chondrosarcoma.**

### Discussion

Primary chest wall chondrosarcoma usually presents in the third or fourth decade of life. It is seen radiographically as a tumour mass destroying cortical bone. Tumours involve the anterior costochondral junctions and grow to invade contiguous structures. Pain on presentation can indicate a poorer prognosis, as the periosteal involvement is the hallmark of local invasion. Patient evaluation should consist of a detailed history and physical examination, chest radiograph, computed tomography and bone scan. Pathologic findings from needle aspiration and trucut specimens of bony and cartilaginous neoplasms can be difficult to interpret, as low-grade malignancies are commonly mistaken as benign. In these cases, either incisional or excisional biopsies are appropriate. In tumours, which are resectable, formal wide resection is performed, including en bloc resection of the biopsy site, surrounding skin, subcutaneous tissue and muscle. Adherent structures, such as lung, thymus, pericardium, and chest wall musculature should be resected in continuity. Chest wall reconstruction may warrant myocutaneous flap technique. The goals of chest wall reconstruction (skeletal, followed by soft tissue coverage) include restoration of chest wall stability, recreation of soft tissue coverage and the maintenance of pulmonary function. In the first case report, the ability to preserve the proximal manubrium gives the advantage of maintaining the stability of the shoulder girdle. Skeletal reconstruction prevents paradoxical respiration, but is generally not required for defects that are less than 5 cm in diameter, limited to one or two adjacent ribs, located in the thoracic apex and those that are subscapular in position. The selection of synthetic materials depends largely on the surgeon's preference but the primary disadvantage is their potential for infection. Methyl methacrylate sandwiched between two layers of Marlex mesh is easy to handle, light, easily tailor made to fit the defect, gives firm bonding to bone, allows tissue ingrowth, and is radiolucent, hence allowing future chest radiographic studies of lung field. The other synthetic prosthesis is polytetrafluoroethylene (PTFE) prosthesis. Both are suitable for chest wall

reconstruction and the reported differences in their benefits are marginal. Soft tissue coverage can be attained with local skin advancement, pedicled muscle/myocutaneous flap, or free myocutaneous flap. The most common flaps used are the pectoralis major, latissimus dorsi, and the rectus abdominis flaps.

Because primary chondrosarcoma is a rare tumour, data concerning treatment and results are sparse. Opinions differ as to what constitutes wide resection. In the Mayo Clinic experience, 56% of patients with a 4-cm or greater margin remained recurrence-free at 5 years compared with only 29% for patients with a 2-cm margin<sup>1</sup>. In the Memorial Sloan-Kettering experience<sup>2</sup>, a 2- to 5-cm margin on the skin is used and lateral margins of 4 to 5 cm is advised because many malignant tumours spread preferentially along the bone. Of the 54 patients with malignant tumours of the sternum treated at their institution over a 64-year period, 26 patients had chondrosarcoma. All but one patient had wide resection with skeletal reconstruction of the chest wall defect. Five-year survival of these patients was 80%. Sabanathan et al<sup>3</sup> reported a 10-year survival of 67% in their series of patients with chest wall chondrosarcoma who underwent radical en-bloc resection. None of the reports used adjunct chemotherapy or radiotherapy in those cases with good resection margins.

Radical en-bloc resection remains the treatment of choice in primary chest wall chondrosarcoma. To the authors' knowledge, these are the first reported cases of successful chest wall resection of chondrosarcoma and reconstruction with marlex mesh methyl methacrylate "sandwich" prosthesis and pedicled muscle/myocutaneous flap cover in Malaysia.

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