CASE REPORT

Thoracoplasty with Acrylic Plate-Marlex Mesh Combination Following Near Total Resection of Sternum: A Case of Chondrosarcoma of Sternum

N Premnath, FRCSEd, H L Lo, MBBS, Y T Cheong, FRCSI, S Manjit, FRCSED

Department of Surgery, Hospital Pulau Pinang

Summary

Removal of the whole sternum for malignant tumours results in a large defect, causing severe deformity and possible paradoxical movements of the chest wall. The reconstruction of the resultant large defect of the chest wall is often complex and difficult. Commonly used materials include rib autograft, steel strus acrylic plate and various synthetic meshes such as Goretax or Marlex mesh, with a myocutaneous flap for coverage[1]. A case of a 48-year-old man with sternal chondrosarcoma successfully treated with thoracoplasty using acrylic plate-marlex mesh combination[2] following near total resection of sternum is reported.

Key Words: Chondrosarcoma, Latissimus dorsi flap, Chest wall reconstruction

Introduction

Primary malignant sternal tumours are rare. About 15-20% of all skeletal chondrosarcomas occur in the ribs or sternum, more commonly affecting patients between 20-40 years of age. An anterior chest wall mass with occasional pain is the usual clinical presentation. Adequate tissue biopsy coupled with CT or MRI imaging study remain the mainstay of diagnosis. Chondrosarcomas tend to have destructive effects on the surrounding bone and structures and surgical treatment consists of wide radical resection of the chest wall. However local recurrence is common and prognosis is largely dependent upon the adequacy of the initial excision and tumour grade.

Case Report

A 48 year-old man presented with a painless swelling over the mid-sternal region of three months, progressively increasing in size. There was no significant past medical and surgical history. Examination revealed a 4cm hard mass on the body of the sternum. It was mildly tender on palpation. Otherwise, the clinical examination was normal. Chest X-ray was unremarkable. A CT

This article was accepted: 6 February 2002
Corresponding Author: N Premnath, Department of Surgery, Hospital Pulau Pinang

thorax revealed a bony lesion involving the whole body of sternum and xiphoid process. Bone scan indicated pathology involving the whole body and xiphoid. Incision biopsy of the tumour was consistent with chondrosarcoma.

He underwent radical sternectomy with reconstruction. Intraoperatively, there was a grayish white lobulated mass with areas of calcification and necrosis arising from the right lower part of sternum and involving the right 4th - 6th costochondral junctions. The 2nd - 7th ribs were resected 5cm lateral to the sternal edge. The inferior half of the manubrium, the body of sternum, and the xiphoid process were removed. The resultant skeletal defect measured 15x20 cm. The right pleura was breached and was repaired. An acrylic plate was constructed using the removed sternum as template and sandwiched between two layers of polypropelene mesh. It was placed over the defect and sutured to the bony rib edges and manubrium using strong polyester sutures. A latissimus dorsi myocutaneous flap was harvested by the plastic and reconstructive surgeon to close the resultant soft tissue defect.

Patient's recovery was satisfactory. The myocutaneous flap was taken successfully. However he developed fever after the 11th postoperative day. A CT scan of the thorax showed fluid collection behind the acrylic plate. On the 17th post-operative day, about 250cc of turbid fluid was aspirated under ultrasound guidance and a pigtail catheter was inserted. Aspirated fluid culture grew MRSA. Patient was treated with antibiotics and a subsequent CT on the 22nd post operative day revealed minimum residual collection behind the acrylic plate. The catheter was removed on the 30th post-operative day and patient was discharged well on the 31st post-operative day.

Histopathological report confirmed a well-differentiated chondrosarcoma (grade 1-2) of the sternum with lymphovascular involvement. A follow up CT scan of the thorax done 10 months post surgery revealed minimal residual fluid at the sternal reconstruction site behind the acrylic plate and there were no sinuses noted clinically. Adjuvant chemotherapy was not given as it has not been shown to improve the survival rate. A bone scan done 15 months later showed no evidence of metastasis.

Patient is currently 30 months post surgery. There is no tumour recurrence. Although there was a decline in his FVC and FEV_1, he was clinically well with good effort tolerance.

Discussion

Primary malignant tumours of the bony chest wall are uncommon and data concerning treatment and results are sparse. Metastatic lesions from the lung and breast carcinomas easily outnumber primary lesions arising from chest wall. Thus a careful search for primary neoplasm is a must in a patient with a chest wall tumour. The usual manifestations of a chest wall tumour include pain, palpable mass and as an incidental finding on chest X-ray. History of previous trauma and pulmonary infections involving the chest wall such as tuberculosis and actinomycosis should be considered.

Accurate diagnosis requires adequate tissue sampling for histological examination. This is usually accomplished by incisional biopsy with a well-placed incision. Both fine and core needle biopsy should be avoided as the specimen obtained is small and its interpretation is difficult.

The relative difficulty of chest wall reconstruction may result in inadequate resection, thus local recurrence is not uncommon in these slow-growing tumours. Chest wall reconstruction is performed to restore stability of the chest wall. This minimizes the paradoxical movement of the

chest wall and ensures satisfactory ventilatory mechanics. In this patient, Marlex mesh was utilized to strengthen the reconstructed chest wall. It is generally thought to improve chest wall stability, decrease ventilator dependence and reduce the incidence of post-operative thoracic deformity.

Local accumulation of serous fluid post operation is common. In this patient, the fluid collection behind the acrylic plate was infected. It was a potentially disastrous situation, fortunately it responded well to conservative treatment. The use of marlex mesh is often thought to be associated with high risk of wound infection if the overlying tissue are not adequately vascularised.

Chondrosarcomas tend to have destructive effect on surrounding bone and surgical treatment consists of radical excision to attain a clear tumour margin. However chondrosarcomas are prone to local recurrence even after what appeared to be a radical resection. Clinical pathology analysis of chondrosarcoma revealed the 5 and 10 year-survival rate of patients treated were 70 and 60% respectively[9].

The significant prognostic factors are size and histological grading of tumour. On the other hand, age, location of primary tumour and presence of preceding exostosis do not influence the prognosis significantly. Chondrosarcomas of grade 1 and 2 do not generally metastasize. Our patient was diagnosed to have grade 1-2 tumour and thus no adjuvant chemotherapy or radiotherapy was offered. He was disease-free for 26 months post operation. Tumours of grade 3 and 4 are more likely to metastasis to the lung, heart and spine. However, the effectiveness of chemotherapy and radiotherapy as palliative treatment in patient with high grade tumour remains controversial.

References

1. Sabanathean S. Shah. Surgical treatment of primary malignant chest wall tumour. Eur J of Cardiothoracic Surg 1997; 11(6): 1011-16.
2. Yalding S, Basok O. Chondrosarcoma of chest wall. Scandinavian Cardiovascular J. 1998; 32(3): 177-79.
3. Tercan M, Soysal O. One stage coverage of large anterior chest wall defect with multiple flap in anoctogenarian with recurrent sternal chodrosarcoma. Ann of Pl Surg. 1999; 42(6): 705-6.