Surgical perspective of aneurysmal bone cyst of the rib

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Abstract

A retrospective study of aneurysmal bone cyst (ABCs) of the rib was conducted to review their clinical, radiological and pathological features, as well as the early and long-term results of surgical management. From 2000 through 2010, 5 patients (3 male, 2 female, aged 17-40 years) with ABCs of the rib were treated in our department. All patients with aneurysmal bone cyst (ABCs) of the rib diagnosed radiologically and confirmed histologically. Surgical treatment consisted of wide resection in all patients with the use of synthetic mesh in two cases. There was no perioperative mortality. Follow-up at 1-10 years revealed no local recurrence. All aneurysmal bone cysts (ABCs) of the rib should be treated by wide resection with tumor-free margins in order to provide the best chance for cure.

Introduction

Aneurysmal bone cyst (ABCs) was first described as a distinct clinicopathological entity by Jaffe and Lichtenstein in 1942.[1] The term aneurysmal was used to denote the *blowout* radiographic appearance, which resembles the saccular protrusion of the walls of an aneurysm, and also because cystic blood filled spaces are encountered at operation. The name has been generally accepted, though the lesion is neither an aneurysm nor a bone cyst. The cyst is a relatively rare non-neoplastic lesion, accounting for only 26 cases (1.3%) of 2000 primary bone tumours at the Mayo clinic.[2] Most lesions occur in the spine and long bones, with few in the ribs. In a combined series from seven separate reports of 439 cases of aneurysmal bone cyst only 12 (2.7%) were primary rib lesions.[3-9] Primary rib tumours are themselves uncommon. The combination of an aneurysmal bone cyst occurring as a primary rib tumour is unusual.[10] Because of the rarity of this conditionand the small size of any one series, we decided to analyse the clinical features of our five cases.

Materials and Methods

From 2000 through 2010, 5 patients (3 male, 2 female, aged 17-40 years) with ABCs of the rib were treated in our department. There was no history of trauma to the chest wall. Physical examination showed nothing abnormal apart from a hard non-tender mass in three patients while the other two patients had mild tenderness. This mass was located either at anterior chest wall in 3 patients or at the posteriolateral aspect of chest wall in 2 patients. Chest X-ray demonstrated a mass in the right upper zone in one patient, in the left middle zone in 2 patients and right lower zone in 2 patients. Computed tomography (CT) revealed a mass with local expansion and honeycomb lesion of the right 2nd rib in one patient, in right 6th rib in one patient, in right 8th rib in one patient (Figure 1), in left 4th rib in one patient and in left 5th rib in one patient.

Results

All patients with aneurysmal bone cyst (ABCs) of the rib diagnosed radiologically and confirmed histologically. Surgical treatment consisted of en-block resection of the affected ribs and adjacent soft tissues in all patients with the use of synthetic mesh alone in one patient or using methylmethacrylate cement sandwiched between the two layers of vicryl mesh in another patient and securing this composite material with interrupted mattress sutures of vicryl 1-0 suture to the surrounding bony and soft tissue structures. The synthetic mesh or composite graft was tautly stretched at the time of insertion and was covered with overlying muscle, subcutaneous tissue and skin. All the patients made an uneventful recovery and were discharged home in about a week's time. The chest X-ray performed later demonstrated well expanded lungs (Figure 2).

Histopathological examination of all specimens resected revealed multiple, large blood filled spaces surrounded by multinucleate giant cells with foci of haemosiderin deposition and fibrosis. Cartilage was seen in areas with a pattern of maturation, calcification and early osteoid formation. The lesion was surrounded by fibrous capsule and was arising from the rib affected. These findings were consistent with an aneurysmal bone cyst of rib. Follow-up at 1-10 years revealed no local recurrence.

Discussion

Aneurysmal bone cyst is a benign non-neoplastic proliferative tumefaction of bone characterized by presence of channels and spaces of varying sizes surrounded by delicate walls. The walls of the multiple channels and loculi are composed of fibrous tissue, do not contain the elastic tissue and muscle found in the blood vessels. The aetiology of these cysts is unknown, but is believed to be reactive lesions in response to some haemodynamic disturbance in the rich capillary network of the host bone resulting in an expansile destructive process.[11] It can manifest as a primary form in a normal bone or a secondary form, which is

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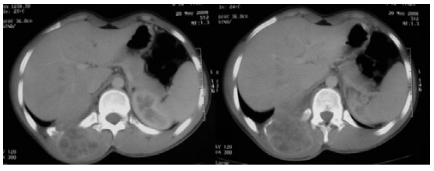

Figure 1. Aneurysmal bone cyst of the right 8th rib.

Figure 2. Resection of right 8th, 9th rib and using synthetic mesh.

associated with various bony neoplasms. These cysts occur in older children, adolescents and young adults and are very rare in children under 4 years of age. Aneurysmal bone cysts can involve any bone, the most common site being ends of long tubular bones of limb followed by the vertebral column. They have not been very commonly reported from the ribs. Local pain is the most common presenting symptom and if the involved bone is superficial, a tender swelling may be palpable. A bruit may be transmitted from a large aneurysmal cyst. The progressive enlargement of cyst in the vertebral column can cause cord and root compression leading to neurological deficit. Although the lesion is benign, it is locally destructive with a high propensity for recurrence. Recurrence occurs in 10-20% of cases and the incidence decreases with increasing age of the patient. The treatment consists of curettage, marginal excision, or rarely, wide excision. In bones deemed expendable, such as ribs or fibula, wide resection is recommended.[12]

Hence it requires excision of mass en-bloc with chest wall involved. At the time of chest wall resection, even though large segments of bony cage are removed, appropriate reconstruction results in reasonable chest wall stability.[13] A variety of techniques has been developed for this purpose and includes autogenous tissues like fascia lata, rib grafts, omentum and lattisimus dorsi muscle flap.[14] Prosthetic materials have been used and include metallic plates, acrylics and synthetic mesh fabrics (Marlex, Prolene, Gortex and Vicryl).[14] These mesh fabrics can be used alone or as a as a composite graft in conjunction with methyl methacrylate or bone cement to provide extra stability to the chest wall.[15] To establish appropriate chest wall stability for adequate independent breathing, the synthetic mesh should be tautly stretched at the time of insertion by securing to the surrounding structures.[16] It is essential to obtain soft tissue coverage of the synthetic material with overlying muscle, subcutaneous tissue and skin. The prosthesis is well tolerated and gets incorporated in the chest wall tissues.[17,18]

Conclusions

The management of the aneurysmal bone cyst arising from ribs which is a rare entity, consists of adequate wide resection and reconstruction of the chest wall. The aim is complete removal of the tumour, restoration of adequate protection to the thoracic viscera, restoration of physiological function, providing for adequate lung and chest wall growth and an acceptable chest wall appearance .

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