

Conservative Surgical Management of Primary Bone Tumour: Report of 22 Cases

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Abstract

Primary bone tumor can be benign, locally aggressive, and malignant. There is also tumor like lesions. There is debate regarding the type of surgical intervention. The current retrospective study examines the outcome of surgery.

Material and Methods: 22 patients with different types of primary bone tumors and sarcoma were treated by surgery. C arm was used during resection of the tumor to ensure identifying and resecting a safety margin. Allograft (2), synthetic bone graft (2), autologous structured bone graft (2), custom made arthroplasty, and in one case bone cement, were used to fill in the bone defect after excision with soft margin. Intramedullary nail, plates and screws were also used when necessary.

Results: Mean follow-up was 1.5 years. Bone grafts were taken, and the function of the limb and the patient was satisfactory, there were no recurrence apart from a case of Adamantinoma of the tibia and mesenchymal sarcoma of the spine. One custom made knee replacement (out of two) failed requiring amputation of the leg.

Conclusion: Using different types of bone graft, and implants after excision of primary tumor with a safety margin; will restore the function and is associated with a good outcome.

Keywords: Primary, Tumor, Bone, Bone Graft, Conservative, Surgery

Introduction

Primary bone tumour is not common compared to secondary skeletal metastasis. There is a spectrum of conditions which mimic bone tumour and some behave in an aggressive way like aneurismal bone cyst. The management of these lesions is often surgical; however there is no consensus in regards to the type of operation.

Recurrence rate is higher following limited excision, curettage with adjuvant when compared with resection of giant cell tumour. The complication rate is higher though following resection, aseptic loosening of prosthesis, allograft failure, and pseudoarthrosis [1].

It is observed that recurrence and soft tissue extension strongly increases the risk of local recurrence, whereas age, sex, location,

and pathological fractures did not [2].

The current paper discusses the outcome following resection of the tumour, filling in the gap with bone graft and its substitutes, and fixation.

Material and methods

Twenty two patients presented with primary bone tumor, treated in Azadi teaching hospital and the private sector between 2008-2012, some of the procedures were carried out outside Iraq (Turkey, India). The sex ratio of M:F was 10:12, with mean 29 (6-57). The main symptoms were pain and swelling. The indication for surgery was, to have a tissue diagnosis, excise the tumor in attempt to stop the spread of the disease. Staging of the disease was done for the malignant and locally aggressive tumors. Oncological consultation and chemotherapy was started for the relevant cases (5). Computerised tomography (helical), MRI scan in addition to plain radiographs and hematological studies, were carried out. The principles of the surgical intervention were to excise the bony lesion with 0.5 cm surgical safety margin, filling in the defect left with bone graft or bone substitute, in order to achieve biological healing. C arm was used to identify the safety margin. Internal fixation was carried out as appropriate to fix the site using different armamentarium in order to stabilize the bone and allow movement. In one occasion, bone graft was not possible to obtain, bone cement was used. One patient has had sciatic nerve palsy incurred during previous attempts to remove the osteosarcoma. Table (1), Fig 1-5

Table 1: Showing the procedures performed and the outcome

Age, sex	Diagnosis	Operation performed	Outcome	Follow-up (years)
12m	Osteoid osteoma of the neck of left femur	Enbloc excision	Good: complete pain relief, no recurrence	2
14f	Osteoid osteoma of the neck of rt femur	Enbloc excision	(Good)	3

12m	Recurrent osteoid osteoma of the neck of lt femur	Enbloc excision	(Good)	2
20m	Osteoid osteoma of lateral femoral condyle	Arthroscopic excision	Good	1.5
12f	Osteoid osteoma of the rt 8th rib	Rib excision	Good	1
26M	Fibrocystic lesion of rt femur	Excision, bone graft, dynamic hip screw (DHS)	Good (Healed, no recurrence)	2
57F	Recurrent fibrocystic lesion of rt femur	Excision, bone graft, dynamic hip screw (DHS)	Good (Healed, no recurrence)	2
28M	Fibrocystic lesion of lt femur	Excision, bone graft, dynamic hip screw (DHS)	Good (Healed, no recurrence)	3
36M	Fibrocystic lesion of rt femur	Excision, bone graft, locked nail	Good (Healed, no recurrence)	3
47F	Giant cell tumor of left lateral condyle of lt humerus	Excision, iliac bone graft, screw fixation	Good(healed, no recurrence, increased range of movement)	1
46F	Recurrent Giant cell tumor of rt distal radius	Excision of distal radius, synthetic bone graft, locking plate, wrist fusion	Fair (stiff wrist, no recurrence, no pain)	1
45F	Giant cell tumor of distal femur (rt)	L-plate, excision, iliac bone graft	Good	1.5
24m	Giant osteochondroma of the lt humerus	Excision and tibial on lay bone graft	Good (no recurrence, regained function of shoulder)	1
28M	Adamantiona, recurrent	Excision of tibia, allograft, tibia nail	Poor, cystic lesion at the proximal end awaiting amputation	2
47F	Chondrosarcoma of the distal end of left femur	Excision, custom made, total knee replacement (TKR)	Good (no recurrence, good range of movement, no pain)	3
29M	Osteosarcoma of the proximal end of tibia	Excision, custom made TKR	Recurrence, Amputation	, 1 y
32m	Recurrent parosteal osteosarcoma of lt femur	Excision of the shaft, allograft, nailing	Good(no recurrence, healing of the graft) Stiff left knee, MUA	3
6F	Recurrent aneurysmal bone cyst of the lt proximal femur	Complete excision, synthetic bone graft, locking plate	Good (healed, no recurrence, no pain)	1
23F	Aneurismal bone cyst of the proximal femur	Excision, nail, plate, bone cement	Fair (no recurrence, but no integration or periosteal bone healing, Awaiting exchanging bone cement with bone graft	3

8F	Mesencymal cell sarcoma of lumbar 5 vertebra, stage 3	Spinal decompression and biopsy	Deceased after 6 months, pelvic obstruction and metastasis	
43f	Chondrosarcoma of the right 8th rib, recurrent	Excision	Fair (Infiltration of visceral pleura without distant metastasis), no recurrence	0.5 y
27m	Desmoid of the sternum	Excision, mesh replacement	Fair (no tumor recurrence, discomfort)	2

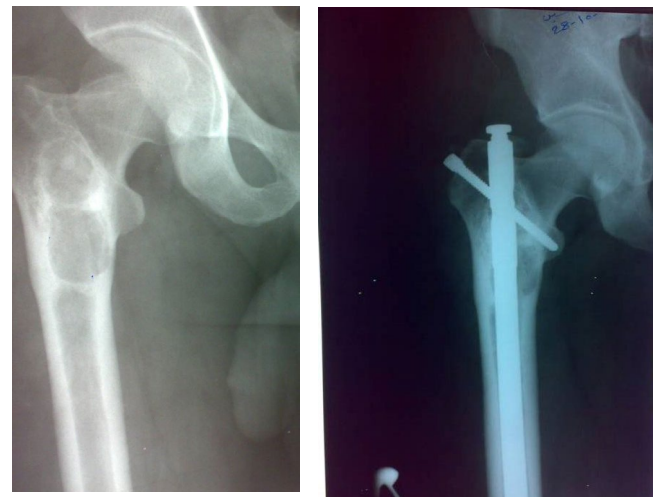


Figure 1: (before and after surgery) cystic and tumor like lesions in the proximal femur, treated with curettage and intramedullary nail fixation. Xray 12 months later



Figure 2: Tumor like lesion in the left proximal femur treated with bone curettage, and dynamic hip fixation

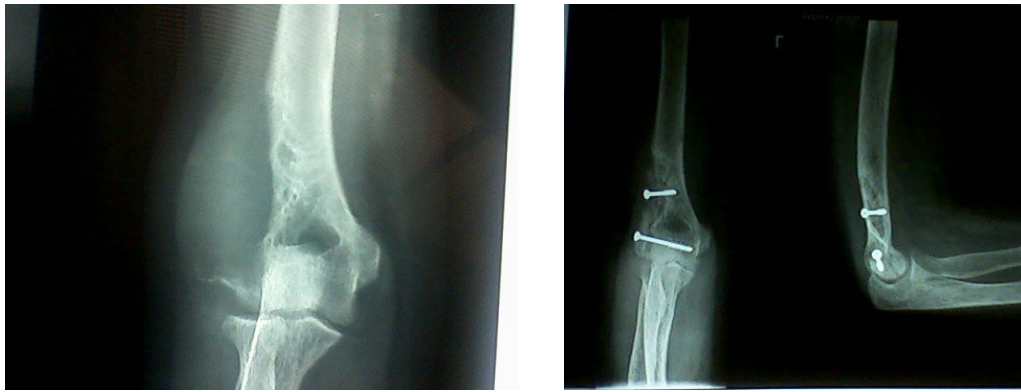


Figure 3: Giant cell tumor of the distal humerus, treated with localised excision and iliac bone bulk graft and fixation

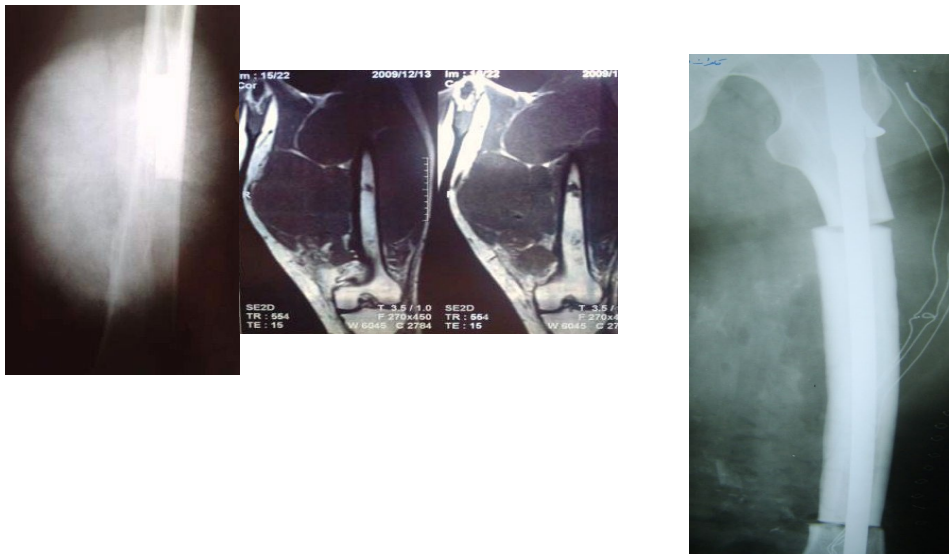


Figure 4: parosteal osteosarcoma of the femur treated by excision and allograft and intramedullary nail of femur

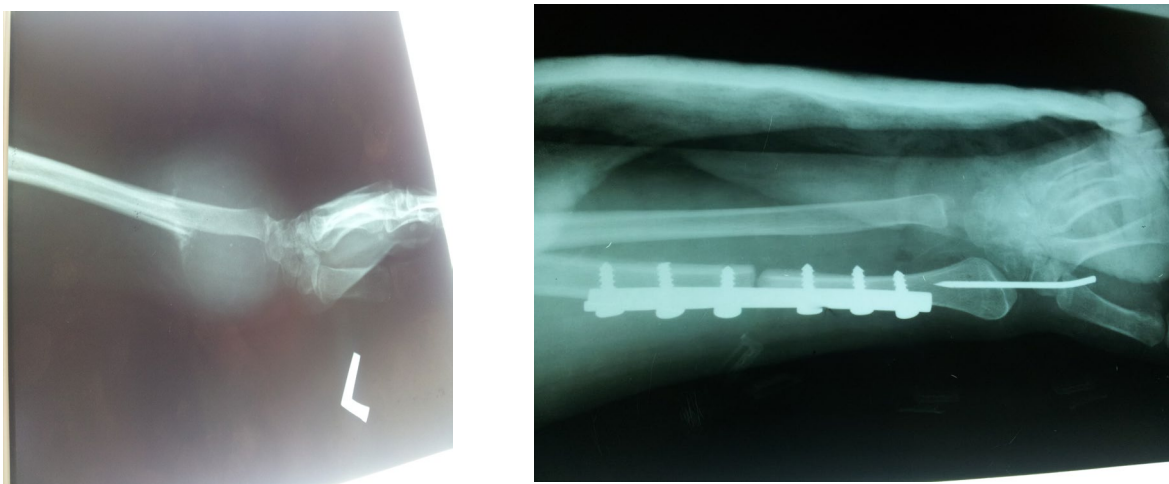


Figure 5: Giant cell tumor of the distal radius treated with excision of distal radius and fibular bone graft and fixation

Results

Medical records, radiological pictures and histological reports were reviewed at a mean follow-up period of 1.5 years (0.5-3). The assessment was carried out by the author and included clinical examination, radiological and hematological investigation aiming at identifying any recurrence (or spread) of the disease. The healing of the bone graft when applicable and the survivorship of the implants used.

The bone cysts healed, the patients were mobile and there were no recurrence. The cases of osteoid osteoma had pain relief, with no recurrence. There were no recurrence of the giant cell tumor, one patient lost the movement of the wrist (fusion), this procedure was undertaken because of the soft tissue extension of the tumor after two previous bone graft operations.

The following complications occurred:

1. Mechanical failure of custom made prosthesis, necessitated above knee amputation

2. Recurrence of Adamantionma, in the proximal part of tibia, there is plan to amputate the leg.
3. Stiff knee (allograft replacement of osteosarcoma), required manipulation under anesthesia.
4. Visceral pleura implantation of chondrosarcoma of the rib, there were no distant metastasis, patient was given chemotherapy.

Discussion

The ideal replacement for large bone defects is one that behaves as the missing bone did; that is, it should be viable, non-immunogenic to the host, and able to provide sound structural support. This is not always feasible. Minimal resection to preserve function and decrease the need for using bone replacement technique, has been combined with adjuvant to reduce the chance of recurrence; this however is not often the case [3].

In the current series, a safety margin of at least 5mm was taken to ensure that recurrence does not occur. Recurrence however occurred in the case of Adamantionma despite resection, allograft replacement and fixation. The nature of the bone tumors and tumour like conditions is unpredictable.

Fibro-osseous lesion, have a broad adult age, albeit may have slowly grown since childhood. In the majority of instances asymptomatic discovery, lack of distortion of bone outline, and sclerotic borders are indications of stability over many years [4]. There are some lesions which looks alarming on radiography, but in reality is not. Atypical fibro-osseous lesions, usually in the proximal femur, are a common consultative diagnostic problem. This is due to the fact that they contain a variety of patterns individually reminiscent of fibrous dysplasia, fibroxanthoma (non-ossifying fibroma), myxofibroma, lipoma, cyst, bone infarct, Paget's disease, and, occasionally, chondroma [5].

We had good outcome for the four cases of bone cyst we treated by curettage and bone graft, and fixation, we had a similar good experience with enblock excision of osteoid osteoma. Preoperative identification of the lesion using CT scan and meticulous exposure was sufficient in our series in getting rid of the lesion without the need for radio-isotope guidance [6].

When the bone is resected, with a safety margin, the use structured synthetic bone graft, cadaveric allograft, however we prefer structured iliac autologous bone graft because the graft contain viable cells. The draw back of autologous bone graft, however is donor site morbidity. There is however concern that these bone grafts are avascular and may fracture, vascularised bone graft surgery is daunting but seem to be successfully [7]. Bone cement is not a substitute for bone graft; we feel that it should not be used in place of bone graft, because of lack of integration and the need to exchange with bone graft in the younger patients.

Tumours of the rib can be excised without replacement, however the tumour of the sternum requires a replacement of a synthetic or allograft. Our case of mesh replacement of the sternum was successful in restoring the thoracic cage, despite the mild discomfort the patient had. Sternal replacement with a cryopreserved allograft sternum is an innovative technique and claimed to overcome the problems related to the prosthetic biocompatibility or to the bone autograft [8].

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