INTRODUCTION

A variety of tumours and tumour like conditions occur in hand, which are usually benign. Malignant neoplasms in hand are rare, but may be the site of distant metastasis from lung, breast or kidney. Giant cell tumours (GCT) in the bones of the hand comprise only 3% of all Giant cell tumours.1 The metaphyseal region of the metacarpals is the site of origin for most of these tumours. The phalanges and first metacarpal is a very rare site of tumours in hand. 2 Hand has a restricted free space, expansion of bone may give pain, loss of function or significant swelling.3

Most tumours exceed 3-6 cm in length and usually bulges beyond the confines of the cortex, and gives an expanded contour without periosteal reactions. Analysis of the radiograph and interpretation of these features lead to a specific and correct histopathological prediction most of the time.4 Conventional radiography also contributes to initial staging of bone tumours.5 Giant cell tumour produce increase uptake of technetium-99 and is useful in ruling out multi-centricity. CT scan and MRI has limited role in GCT of hand. MRI may be useful in determining joint involvement.4 Biopsy alone can give definitive diagnosis.6

The goals in treating Giant cell tumour of the hand are to obtain local tumour control, restore hand function and maintain good cosmeses.7 Factors to be accounted in the treatment of GCT of bone include the anatomical site, potential for local aggressiveness and its extent based upon the clinical and radiographic assessment. Giant cell tumour in bones of hand has limited options of treatment. Depalma et al. found 100% success rate when tumour was completely excised and either the joint was fused or replaced by a bone graft.8 Fibular graft is commonly used to replace resected bone, which restore the integrity of the bone and stability of defect.9,10 Graft is augmented by intramedullary Kirschner wire fixation.11 Union is best promoted by good supplementary cancellous grafts at bone ends.5 Amputation as primary procedure is indicated where GCT have perforated the cortex and invaded the surrounding tissue and where resection is not possible.8

Although Giant cell tumour of bone is common in Asia and sub-continent, hand is a rare site. This study was carried out to determine clinical, radiological behaviour and operative outcome of Giant cell tumours in hand.

METHODOLOGY

This is a hospital based study carried out at the Department of Orthopaedic Surgery, Jinnah Postgraduate Medical Centre, Karachi. A total of 7 patients
of Giant cell tumour of hand presented and included in this study out of 210 cases of Giant cell tumours of skeleton over a period of 19 years from January 1990 to January 2009. Only those patients of Giant cell tumour of hand bones were included who were clinically, radiologically and histopathologically diagnosed. Exclusion criteria were past history of infection or surgery in hand or lost to follow-up. Frequency of GCT in relation to age and gender was studied, clinical findings and radiological stage at the time of presentation were noted, all were screened for any skip lesion by performing Tc99 bone scan and X-ray chest.

Necessary pre-operative investigations including, X-rays of hand with wrist, X-ray of chest and Technetium-99 bone scan was performed in all cases. Parathyroid hormone level was done in one case of GCT initially in January 2009. Only those patients of Giant cell tumour of hand presented and included in this study out of 210 cases of Giant cell tumours of skeleton.

Seven cases of Giant cell tumour of bones of hand were operated; 4 were males and 3 were females. The youngest patient was 18 years and the eldest was 32 years of age with mean age of 24.28 ± 5.7 years. In 4 cases lesion was in metacarpal, (2 in first metacarpal) and in 3 cases, it was in a phalanx. Duration of symptom ranged from 3 to 10 months with average of 5.78 ± 3.26 months.

All patients received 5-7 days prophylactic antibiotics. Dressing was changed on 3rd postoperative day. Stitches were removed after 7 days and cast was applied in functional position. Kirschner wire was removed in 4-6 weeks time. Active and passive range of motion exercises of wrist and fingers was started. Patients were instructed to refrain from contact sports and lifting heavy objects for 5 months.

The patients were monitored with serial physical examination, plain radiography of the digit and X-ray chest every 3 months for first 2 years after surgery and after every 6 months after 2 years of surgery. Post-operatively all the patients were assessed for motion, pain, stability, deformity, strength, emotional acceptance and functional ability. The development of local recurrence was also evaluated at the latest follow-up examination.

RESULTS

Seven cases of Giant cell tumour of bones of hand were operated; 4 were males and 3 were females. The youngest patient was 18 years and the eldest was 32 years of age with mean age of 24.28 ± 5.7 years. In 4 cases lesion was in metacarpal, (2 in first metacarpal) and in 3 cases, it was in a phalanx. Duration of symptom ranged from 3 to 10 months with average of 5.78 ± 3.26 months.

All tumours presented as an expansile lesion, destroying the cortex in 6 cases. In all cases lesion was more than half of the diameter of bone and thickness of sub-chondral bone at the adjacent articular surface was less than 5 mm to zero mm (Figure 1). All of them had

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (years)</th>
<th>Occupation</th>
<th>Stage</th>
<th>Sex</th>
<th>Site</th>
<th>Duration of symptoms (months)</th>
<th>Treatment</th>
<th>Follow-up</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>Student</td>
<td>III</td>
<td>F</td>
<td>1st MC</td>
<td>6</td>
<td>Wide resection + 4th metatarsal reconstruction</td>
<td>3 years</td>
<td>Union no recurrence good function</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>House wife</td>
<td>III</td>
<td>F</td>
<td>4th MC</td>
<td>8</td>
<td>WR + FR</td>
<td>7 years</td>
<td>Union no recurrence</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>House wife</td>
<td>III</td>
<td>F</td>
<td>5th MC</td>
<td>10</td>
<td>Ray resection</td>
<td>8 years</td>
<td>No recurrence</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
<td>Shop keeper</td>
<td>III</td>
<td>M</td>
<td>4th Pr. Ph</td>
<td>6</td>
<td>WR + FR</td>
<td>4 years</td>
<td>Union no recurrence</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>Student</td>
<td>III</td>
<td>M</td>
<td>1st MC</td>
<td>8</td>
<td>WR + FR</td>
<td>2 years</td>
<td>Union no recurrence</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>Laborer</td>
<td>III</td>
<td>M</td>
<td>2nd Pr. Ph</td>
<td>5</td>
<td>WR + FR</td>
<td>3 years</td>
<td>Union no recurrence</td>
</tr>
<tr>
<td>7</td>
<td>32</td>
<td>Office clerk</td>
<td>III</td>
<td>M</td>
<td>Pr. Ph+ Distal radius</td>
<td>3</td>
<td>WR + FR</td>
<td>1.5 months</td>
<td>Union no recurrence Satisfactory</td>
</tr>
</tbody>
</table>

FR = Fibular Reconstruction; WR = Wide Resection; MC = Metacarpal; Pr = Proximal; Ph = Phalanx.
extension of tumour in soft tissue. Open biopsy was performed in case number 5 of first metacarpal only. In 5 cases fine needle aspiration cytology (FNAC) was diagnostic, showing giant cell lesions. In case one (Table I) en-block excision of the tumour and reconstruction with metatarsal auto-graft was done splinted by intra medullary Kirschner wire (Figure 2) which was removed after 4 weeks (Figure 3). In cases numbered 2, 4, 5 and 6 (Table I) en-block excision of the tumour and reconstruction was done by fibular graft and splinting with intra medullary Kirschner wire was done. In case number 3 extensive tumour of 5th metacarpal, ray resection was performed. Postoperative histopathology confirmed diagnosis of Giant cell tumour. Case no. 7 (Table I) was initially diagnosed and treated as GCT of distal radius and resection and reconstruction with proximal fibular graft. At the time of initial diagnosis it was isolated lesion clinically, radiologically and on Technetium-99 scan. He was presented after 4 months of initial surgery with pain, swelling of proximal phalanx of same side thumb, initial biopsy reviewed which shows malignant Giant cell tumour. Parathyroid hormone levels were normal and FNAC of the lesion showed giant cell tumour. Resection and reconstruction was done by fibular graft and splinted by intramedullary Kirschner wire. Follow-up of the cases ranged from 1.5 years to 8 years (average 4.5 years). All patients were pain free with good union and incorporation of graft at both ends. All the patients showed good stability and strength in 6 months time and 5 patients showed good emotional acceptance. Patient no. 1 was not satisfied with functional ability and limited movements at first metacarpophalangeal joint. Purpose of putting osteo-articular graft from metatarsal was to retain movements at the joints, which was partially achieved. Overall all the patients had a fairly functional and also cosmetically acceptable hand. Wound infection, stress fracture of the graft, non-union and recurrence was not noted in any case.

**DISCUSSION**

Giant cell tumour predominantly occurs in long bones in 75-90% of cases and only a fraction are found in hand bones. This lesion represents 5% of all primary bone tumours in the West. In East, the reported incidence is about 20%. Among the 210 cases of GCT of bones encountered in 19 years, only 7 cases of Giant cell tumours of hand bones were reported, showing incidence of 3.3%. Incidence of Giant cell tumour of bones of hand reported from West is 2% and high rate of incidence is reported from China as 4% and the highest incidence of metacarpal involvement is 5.5% in a series from South India. Sanjay et al. reported 2% involvement of Giant cell tumours of metacarpal. Another feature is a young age of the patient with GCT of hand bones, Averill et al. reported 25 years as the average age. In this series, the mean age was of 24 years. It is rare under the age of 15 years. Reported clinical behaviour and presentation of Giant cell tumour has varied in different studies. Most authors feel that there is a correlation between the radiological behaviour of the tumour and the clinical presentation. The radiological atypicality as found in this series, was also observed by other authors. Primary Giant cell tumour involving the bones of the hand were occupying central location, expansile with paper-thin cortex, which differs from the usual eccentric location seen in Giant cell tumour of bones at other sites. GCT of bone hands is considered more aggressive, with higher rate of recurrence than other skeletal sites. Aggressiveness was observed in all cases and had presented as stage 3 lesion, therefore, it required wide local excision/resection reconstruction or ray amputation. None of the patients in this series developed later metastasis or recurrence. Shaw and Mosher reported recurrence rate of 83% in Giant cell tumours of hand treated by curettage. Curettage was not selected as method of treatment in this series. Multicentricity in GCT of hand was reported by Averill, which may appear simultaneously or over interval as short as 4 months or as long as 16 years. One of the presently reported patients (case 7), recurrence occurred after 4 months of initial surgery of Giant cell tumour of radius with a tumour of proximal phalanx of ipsilateral thumb (Table I).
Reconstruction with fibular or iliac graft or metatarsal transfer or amputation is recommended for Giant cell tumour in the hand which are expanding and perforating the thinned cortices. Total removal by resection of the tumour with a surrounding margin of normal un-involved tissue was performed in all these cases which provided the best chance for cure and recurrences. Further operative intervention was avoided in all cases in this series.

Hand is a rare site for Giant cell tumours of bone and numbers of cases were limited in this series and no local comparative data was available. Surgical choices were also limited due to late presentation of cases and aggressiveness of tumour.

CONCLUSION

This study of Giant cell tumours of hand showed that primary Giant cell tumours involving bones of the hand are rare lesions which are generally diagnosed at an advanced stage. Accurate diagnosis requires clinical evaluation, imaging studies and histopathological assessment. No recurrence after surgery in this small series of cases supports a policy of aggressive primary surgery, including amputation or en bloc resection and reconstruction.

Disclosure: Case No. 3 and 4 (Table I) presented in this article were part of dissertation written by the first author as “Giant cell tumour an analysis of 24 cases “and was submitted to College of Physicians and Surgeons Pakistan in 1992.12

REFERENCES