Endoprosthetic replacement for giant cell tumour of the proximal femur

Shah Alam Khan,1 Ashok Kumar,1 Prashanth Inna,1 Sameer Bakhshi,2 Shishir Rastogi1
1 Department of Orthopaedics, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India
2 Department of Medical Oncology, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India

ABSTRACT

Purpose. To evaluate the functional and oncological outcomes of 12 patients with giant cell tumour (GCT) of the proximal femur treated with customised endoprosthesis.

Methods. Nine men and 3 women aged 26 to 52 (mean, 36) years with Campanacci stage-III GCTs of the proximal femur were included. All underwent a wide excision of the tumour with clear margins and replacement using a customised, bipolar, cemented proximal femoral megaprosthesis. Functional outcomes were evaluated using the Musculoskeletal Tumor Society functional scores.

Results. The mean follow-up period was 4.8 (range, 4–6) years. There were no instances of recurrence, dislocation, aseptic loosening, deep infection, or death. At the end of 4 years, 8 patients were walking unassisted, 2 used a cane to support during outdoor activities, one used a walking frame at home and outdoors, and one was lost to follow-up. The mean pain relief score was 5.0, the mean functional score was 4.3, the mean emotional acceptance of the procedure and its outcome was 4.7, the mean lower extremity score for support use was 4.7, for walking ability was 4.5, and for gait was 4.3, and the mean total score was 28.3 (out of the maximum of 30).

Conclusion. Endoprosthetic replacement for Campanacci stage-III GCT of the proximal femur achieves good to excellent functional and oncological outcomes.

Key words: arthroplasty, replacement; femur; giant cell tumor of bone

INTRODUCTION

Giant cell tumors (GCT) of bone are locally aggressive and predominantly affect the ends of long bones (usually the distal femur and proximal tibia) in young adults.1 Oncological and functional results are variable after treatments ranging from extended curettage to wide resection.2,3 Reconstruction options...
for GCT of the proximal femur are limited, owing to proximity of the lesion to the hip joint and its complex biomechanics. The use of endoprosthesis in young adults with good life expectancy is debatable. We evaluated the functional and oncological outcomes in 12 patients having GCTs of the proximal femur treated with customised endoprostheses.

MATERIALS AND METHODS

This prospective observational study was performed between May 2002 and October 2007. Nine men and 3 women aged 26 to 52 (mean, 36) years with primary GCTs of the proximal femur were included (Figs. 1 and 2). Inclusion criteria were: (1) a primary GCT with extensive bone lysis (Campanacci stage III) and soft-tissue spill, (2) multiple recurrent lesions following failed curettage, (3) deformed hip joint unreconstructible with curettage, (4) a malignant GCT necessitating wide excision of the proximal femur, and (5) patients giving informed consent for a proximal femoral prosthetic replacement. Patients with GCTs in Campanacci stages I and II were excluded.

Data were recorded on a pre-fixed proforma. Pain was the most common symptom, followed by swelling. The mean duration of symptoms was 13 (range, 4–20) months. Routine radiology (chest radiography and magnetic resonance imaging) was performed. The diagnosis was based on histopathological features noted on a core biopsy. Patients with a high-grade GCT were subjected to computed tomography of the chest and bone scan for metastatic evaluation.

One patient presented with a pathological fracture of the proximal femur; none had metastatic disease; 2 had high-grade GCTs with atypia and mitosis; 2 had multiple recurrent lesions (one of them had undergone surgery elsewhere); and one had a malignant GCT.

All patients underwent wide excision of the tumour with clear margins. Each patient was put in a supine position, and the proximal femur was dissected through a direct lateral approach. In 7 of the 12 lesions, a sliver was made from the proximal trochanter along with the attached abductors.

Figure 1 The giant cell tumour of the left proximal femur in a 28-year-old man with osseous and soft-tissue involvement.

Figure 2 (a) A Campanacci stage-III giant cell tumour of the right proximal femur in a 26-year-old man, (b) excision of the lesion, and (c) endoprosthetic replacement of the proximal femur at 63-month follow-up.
Following tumour excision, the distal femur was prepared with flexible reaming of the shaft to 1.5 mm more than the selected stem size. The cementing technique involved lavage, use of cement restrictor, and pressurisation. A customised, titanium, bipolar, cemented proximal femoral megaprosthesis was then inserted. After the bipolar cup was reduced, local soft-tissue reconstruction was performed with emphasis on securing the hip abductors onto the prosthesis. The capsular repair of the bipolar hip joint was performed using the ‘wrap around’ technique, which included securing a vicryl mesh tube onto the acetabular margin with Ethibond no.5 sutures (Ethicon, Somerville [NJ], USA) and wrapping it around the neck of the prosthesis. This provided instant stability to the hip joint. The mesh also served as a support for attaching the remaining soft tissues onto the prosthesis.

All patients underwent the same rehabilitation protocol. The sutures were removed on day 13. Non-weight bearing on crutches/walker was allowed at week 6, followed by conversion to a cane for the next 4 to 6 weeks. Weight bearing was allowed after good abduction strength was regained. Functional outcomes were evaluated for at least 4 years using the Musculoskeletal Tumor Society functional score. This scoring system is a 5-point scale assessing pain relief, functional assessment, emotional acceptance, support use, walking ability, and gait. The full score is 30.

RESULTS

The mean follow-up period was 4.8 (range, 4–6) years. There were no instances of recurrence, dislocation, aseptic loosening, deep infection, or death. Two patients had superficial infection that resolved after treatment with oral antibiotics. One patient was lost to follow-up at the end of 2 years. At the end of 4 years, 8 patients were walking unassisted with full weight bearing, 2 used a cane to support during outdoor activities, and one used a walking frame at home and outdoors.

The mean pain relief score was 5.0 (range, 4–5), the mean functional score was 4.3 (range, 3–5), the mean emotional acceptance of the procedure and its outcome was 4.7 (range, 4–5), the mean lower extremity score for support use was 4.7 (range, 4–5), for walking ability was 4.5 (range, 4–5), and for gait was 4.3 (range, 3–5), and the mean total score was 28.3 (range, 25–30).

DISCUSSION

Sporadic cases of GCTs have been described in studies evaluating proximal femoral endoprostheses for different bony lesions. Wide excision and endoprosthetic replacement for GCTs in sites other than the proximal femur achieves lower recurrence rates, compared with conventional treatment. Wide excision seems to be a more important predictor of good outcome than adjuvant therapy following curettage, although curettage has been the preferred treatment for most cases of GCT. Ideally treatment should ensure local control and maintain function. As recurrence rates of 25% to 50% have been reported, it is appropriate to treat Campanacci stage-III GCT of the proximal femur with wide excision and endoprosthetic replacement. Nonetheless, case selection should be undertaken with care, as many of these patients can be treated with extended curettage and bone grafting. Our indications for endoprosthetic replacement were recurrent GCT, Campanacci stage-III tumours with extensive bone lysis and soft-tissue spill, and high-grade/malignant lesions with metastatic potential. There is a dilemma regarding eradication of the tumour and saving the extremity’s function using intralesional or wide excision, and the longevity of the prosthesis is the main concern. In malignant lesions of the proximal femur, the longevity of megaprostheses has been reported as fair to poor. There is even more debate with regard to patients with a benign tumour like GCT, as their life expectancy is long and revision of the prosthesis may be necessary during their lifespan.

In our patients, the short- and mid-term oncological and functional outcomes were satisfactory. Randomised, controlled studies with long-term follow-up are needed to confirm whether endoprosthetic replacement for GCT of the proximal femur should become the treatment of choice in selected patients.

REFERENCES