

Case Report

Giant cell tumour of the femoral neck: Failure of curettage–cavity filling cementation with screw fixation, a case report

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ABSTRACT

Background: Giant cell tumours are common primary long bone tumours with femoral neck locations infrequent and notorious for pathological fractures. Treatment with simple curettage often results in local recurrence. Aggressive treatment that combines tumour resection with cement filling and internal fixation aims at preserving native joint function.

Case report: The authors intend to illustrate the short falls of such conservative approach through a case report of a femoral neck giant cell tumour in a 37 year old patient. Patient had undergone curettage-cavity filling with screw fixation for a pathological femoral neck fracture. Total hip arthroplasty was undertaken following implant failure and severe hip impairment 3 years after initial surgery.

Conclusion: Intralesional curettage and cavity cementation with internal fixation of giant cell tumour of the proximal femur allows joint preservation. Mechanical failure, local recurrence and degenerative changes hinder long term outcomes especially in the setting of pathological fractures. Further studies are required to delineate the benefits of joint sparing techniques vis-a-vis total hip replacement for giant cell bone tumours of the femoral neck.

Introduction

Giant cell tumours (GCTs) are benign tumours accounting for approximately 5% of primary bone tumours in adults [1]. They arise in the metaphyseal–epiphyseal area with a predilection for the distal radius, proximal tibia and distal femur [2]. Proximal femur localisations are poorly documented in literature.

Surgery remains the mainstay treatment for potentially resectable tumours [3,4]. Despite continuing debate on the relatively lower risk of local recurrence, treatment combining aggressive curettage and joint sparing techniques still remains popular among orthopaedic surgeons [5].

Proximal femur GCTs are notorious for pathological fractures. Conservative approach that seeks to preserve native joint while insuring limb function through tumour curettage, cavity-filling cementation and internal fixation could prove a daunting challenge.

The authors intend to demonstrate the main challenges faced by such conservative approach through a case report with reference to pertinent literature.

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Fig. 1. Scar of previous anterior approach for aggressive curettage.

Case report

Patient M.S., a 37 year old manual labourer was referred to our department for persistent pain in his right hip following hip surgery. Patient had a history of right femoral neck pathological fracture on GCT for which he underwent curettage, cavity cementation and screw fixation three years prior to his admission. He recalled almost painless right limb function in the first year following initial surgery. Pain had worsened in the last year and has been walking on clutches for the past 6 months.

Physical examination found a conscious patient, good general conditions with right limb discrepancy and slight quadriceps and gluteal muscle atrophy. Scars of previous anterior approach for aggressive curettage-cavity filling cementation and a small lateral scar for internal fixation were noted with no prominent screws (Figs. 1 and 2). Range of motion was greatly impaired especially on hip flexion and external rotation. X-ray showed femoral neck shortening with implant failure (Fig. 3). Lab tests including C reactive protein (CRP) and Erythrocyte sedimentation rate (ESR) were unremarkable.

Patient underwent a hybrid total hip replacement using a cemented dual mobility acetabular cup and cement-less stem (FH orthopaedics® France hip'n go) (Fig. 4) after written informed consent was obtained. A Southern approach to the hip was performed to remove previous fixation and allow for possible tumour residue resection. Immediate postoperative recovery was uneventful. Pathology came back for a local recurrence of Giant cell bone tumour. Patient was discharged on the 2nd postoperative day with no signs of recurrence and improved limb function after 20 months follow-up.

Discussion

The World Health Organization (WHO) classifies bone GCT as a benign yet locally aggressive tumour with a predilection for the metaphyseal epiphyseal area [6]. It most frequently affects young adults aged between 20 and 40 years with a slight female predominance [5,7]. Its histogenesis remains unclear and recommended therapy has evolved since the turn of the century [8–11]. Natural history is often variable. Unlike static forms, locally aggressive lesions are associated with extensive bone destruction and potential for massive soft tissue extension (4).

Surgery remains the mainstay for resectable GCTs and optimal treatment should guarantee local tumour control while preserving joint function. Intralesional excision is advocated combined with various adjuvants in attempt to reduce the risk of local recurrence [12,13]. The impact of bone grafting or cavity cementation and the management of recurrent lesions are key issues for eternal debate.

Surgical approach largely depends on the location of the GCT. As a rule of thumb, careful soft tissue dissection preserving muscle insertion is encouraged and a bone window set up as distant as possible from the lesion to reduce contamination. This is also key to ensuring aggressive curettage with complete removal of tumour. Perhaps that might explain the need for combined anterior and lateral approaches to the hip during previous surgery in our patient. Modern concept of aggressive curettage implies grinding the affected bone with a high-speed burr, washing under pulse pressure and treating with chemical agents (including phenol, alcohol and bone cement) in an attempt to extend marginal excision [14,15].



Fig. 2. Lateral hip scar for screw fixation.

Despite the low level of evidence and lack of uniform surgical recommendation, extended curettage of lesions with osteotomy-fenestration and cavity-filling with a bone graft or bone cement coupled with internal fixation is highly recommended. Chen et al. [16] demonstrated the clinical efficacy of such techniques in reducing local recurrence while restoring joint function in patients with locally aggressive Enneking stage II proximal bone tumours of the limbs.

Giant cell tumour of the femoral neck presents a therapeutic dilemma. They have one of the highest rates of pathological fracture of any site according to Wijsbek [17]. Aggressive curettage may be performed in cases without pathological fracture, with limited tumour extension though it is not necessarily a contraindication to use intralesional curettage for patients with Campanacci grade III tumours [18]. Pathological fractures are major risk factors for local recurrence. Traditionally, large defects after aggressive curettage have been reconstructed using cavity-filling cementation and internal fixation as bone grafting is both limited and comes with considerable donor site morbidity.

In addition cementing is very advantageous as methyl methacrylate monomer is cytotoxic and its thermal effect is believed to extend the boundary of tumour kill [19]. Mechanically it affords structural support and allows early weight-bearing. The main drawback of cavity cementation is its lack of resistance to shear and torsional forces. Its use in femoral neck pathological fractures is almost doomed for mechanical failure. Furthermore subchondral damage in weight bearing areas could precipitate articular degeneration.

Thus occasionally, even in benign tumours like GCT, wide resection may be a viable option in instances where intralesional methods would result in severe mechanical compromise and ultimately hinder limb function as is evidenced in our case [20]. Reconstruction after wide resection should entail either total arthroplasty, hemiarthroplasty or endoprosthesis replacement. Though the latter is prone to breakage, loosening and may require conversion [21,22]. Pathological fractures of femoral head and neck are best treated by hemiarthroplasty [23,24]. Selekt et al. [25] advocate that endoprosthesis reconstruction may be the optimal choice for metastatic lesion as the implant generally outlives patients with advanced stage disease.

The principles of management remain the same in recurrent lesions. Vult von Steyern et al. [26] in a retrospective study of 137 cases of local recurrence of GCT concluded that local recurrence after curettage and cementing could be successfully treated with further curettage and cementing albeit with a minor risk of increased morbidity. However this extensive surgery is not the method of choice as it leaves the patient with higher morbidity with no significant functional gain. The need for successful local tumour control

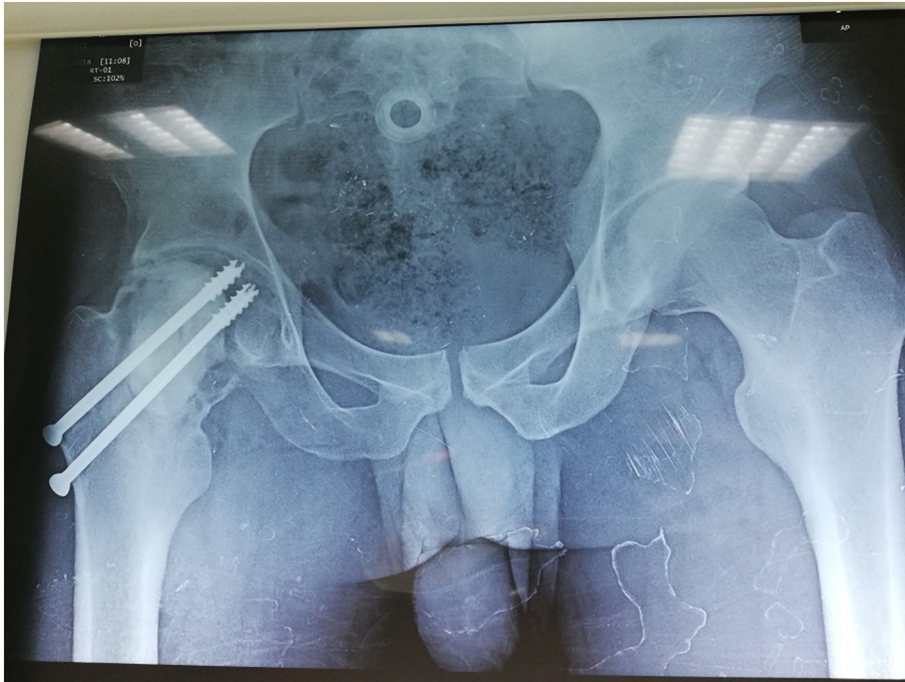


Fig. 3. Pre-operative X-ray showing femoral neck shortening with implant failure and degenerative changes in the hip joint.

and its impact on adjacent joint function should be carefully considered when choosing reconstruction technique for femoral neck GCT.

Conclusion

Femoral neck GCTs are notorious for pathological fracture and their surgical management constitutes a therapeutic dilemma. The above case report illustrates the challenges of joint sparing techniques in the management of locally aggressive bone tumours. Further studies are needed to clearly delineate the benefits of such techniques vis-a-vis wide excision and total hip replacement.

Ethics approval and consent to participate

Local ethics committee approval was sought before the publication of this article.

Consent to publish

Written informed consent was obtained from the patient for publication of this article and associated images.

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Authors' contributions

All authors contributed either directly or indirectly in the writing and general format of the manuscript.

Declaration of Competing Interest

The authors declare no potential conflicts of interest with respect to the authorship, and/or publication of this article.

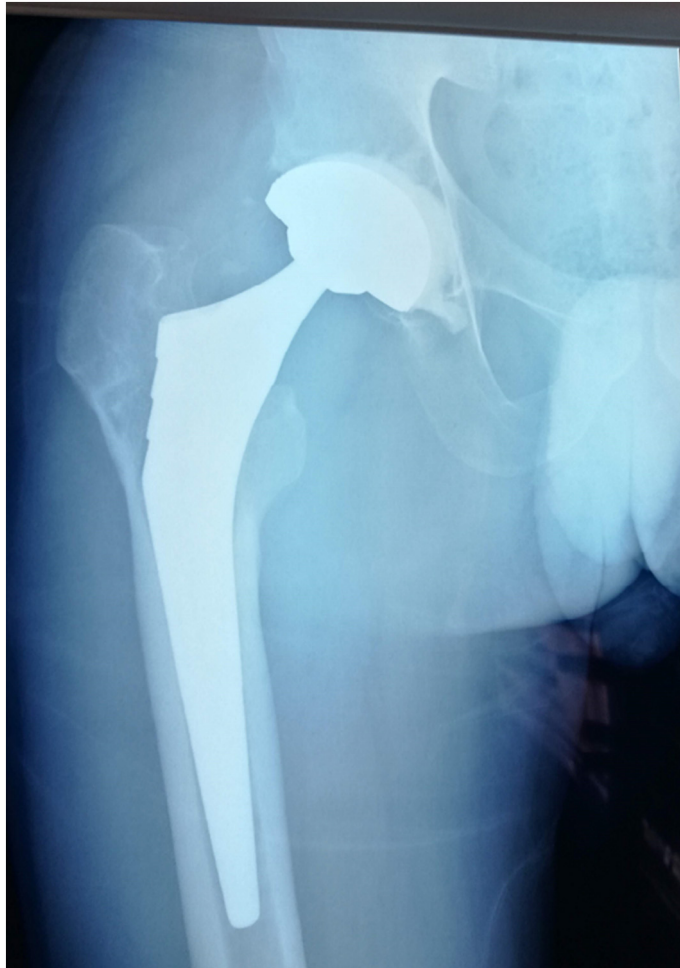


Fig. 4. Post-operative X-ray after wide excision and cemented total hip arthroplasty.

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Abbreviations

CRP: C-reactive protein
 ESR: erythrocyte sedimentation rate
 GCT: giant cell tumour
 THA: total hip arthroplasty
 WHO: World Health Organization