

# Giant Cell Tumor of the Femoral Head: A Case Report and Review of the Literature

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## Learning Point of the Article:

The treatment of choice for GCT of the proximal femur is a hip arthroplasty with either a standard THA for small confined tumours or endoprosthesis insertion for more extensive tumours.

## Abstract

**Introduction:** Giant cell tumors (GCTs) of the bone are uncommon primary bone neoplasms that occur mainly in the epiphysis of long bones. GCT of the femoral head is rarely encountered.

**Case Report:** We report a rare case of GCT of the femoral head in a 20-year-old female. The patient presented with pathological fracture. The patient underwent total hip arthroplasty (THA). The aim of this paper is to present a case study with pathological fracture of the femoral head and to report the results of a literature review.

**Conclusion:** The treatment of choice for GCT of the proximal femur is a hip arthroplasty with either a standard THA for small confined tumors or endoprosthesis insertion for more extensive tumors. Joint preserving procedures have a high revision rate (47.06%). Denosumab has been tried as a neoadjuvant treatment with some success in certain cases.

**Keywords:** Giant cell tumor, pathological fracture, arthroplasty.

## Introduction

Giant cell tumor (GCT) of bone represents 5% of all skeletal tumors. They are more common in young adults and females [1, 2]. Common sites of origin include the metaphyseal-epiphyseal region of the distal radius, proximal tibia, and distal femur [2]. Proximal femoral tumors have been infrequently reported in the literature [3]. GCT is a benign tumor that may become locally invasive leading to extensive bony destruction [4, 5]. Surgical management is the first line of treatment for relieving symptoms, preventing local recurrence, and improving overall patient survivorship [1]. The proximal femur is the location with the highest risk of pathological fracture, which, in turn, may increase the risk of local recurrence [6]. The best treatment option for a pathological fracture of the femoral neck due to GCT is total hip arthroplasty (THA) [7, 8].

## Case Report

A 20-year-old lady presented to the emergency department with progressive atraumatic right hip pain and an inability to weight bear for 3 months. Plain films showed a pathological fracture of the right femoral neck with an eccentric epiphyseal-metaphyseal lytic lesion (Fig. 1).

The patient was admitted for further biochemical investigations including a bone profile, inflammatory markers, and full blood count. Radiological investigations included a bone scan (Fig. 2) and magnetic resonance imaging (MRI) of the right femur (Fig. 3).

The MRI showed a solitary lesion in the proximal right femoral metaphysis extending into the femoral epiphysis superiorly and inferiorly to the subtrochanteric level. There was a homogenous appearance on T1-weighted images with a hyperintense signal on T2-weighted images. The main differential diagnoses were

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## Author's Photo Gallery



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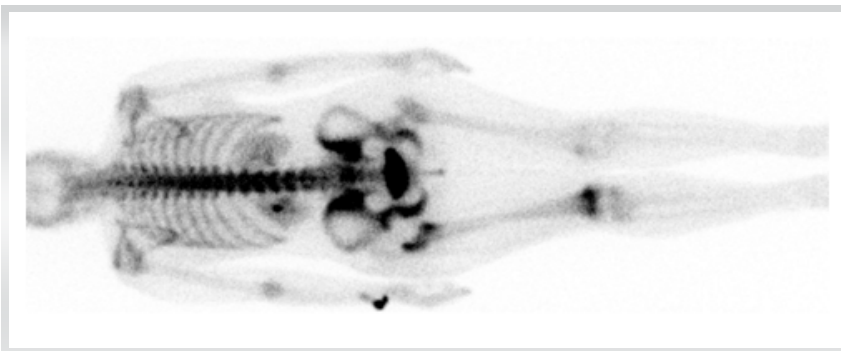
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**Figure 1:** Plain radiograph demonstrating a lytic proximal femoral lesion.



**Figure 2:** Bone scan.

GCT, chondroblastoma, and a primary malignant lesion.

The patient's hip was reconstructed with a hybrid THA (Fig. 4) as the local cauterizing effect of the femoral bone cement has been known to reduce the incidence of local recurrence [7, 8]. Bone samples were sent for the histopathology.

The histopathological report confirmed the diagnosis of GCT due to the appearance of cellular tumor sheets of multinucleate osteoclast giant cells, admixed with a mononuclear round cell population with rare mitotic activity. There was no evidence of a high-grade sarcomatous component.

After 1 year from the initial injury, the patient was fully weight-bearing with no limping. We assessed her quality of life and mobility by SF-12, SF-32, and modified Harris hip score (mHHS) [9, 10]. Her SF-12 was 42, SF-32 was 97, and her mHHS was 87. We could not identify any recurrence after 1 year of follow-up.

### Discussion

A literature search was conducted on March 27, 2020, using PubMed and EMBASE databases. Search terms included "GCT," "femoral head," and "proximal femur" in various combinations to identify articles published in any language. After screening, all articles that met the search criteria were read entirely, and the reference lists were checked for missing relevant publications. No additional studies were found. Our inclusion criteria involved any study describing a GCT of the proximal femur.

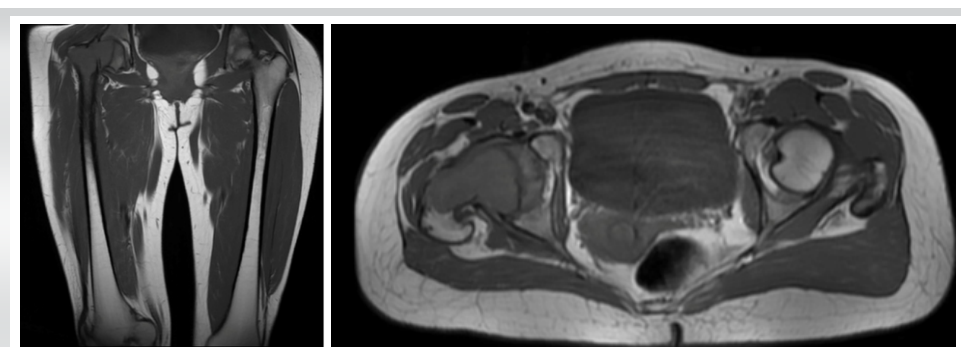
We identified 10 articles (Table 1), four of which were case studies [4, 5, 7, 8]. The other six were case series. The total number of patients included overall was 69 patients with a proximal femoral GCT. Fifty-three patients (76.8%) had presented with hip pain exclusively without any pathological fracture. Sixteen patients (23.2%) presented with a pathological fracture. Of the 16 patients with a pathological fracture, 14 were treated with THA and the remaining two were treated with joint preservation surgery. These two cases involved curettage and fibular strut bone graft in one and a pediatric dynamic hip screw in another.

The total number of patients that been treated with THA was 35. Five patients (11.3%) underwent revision surgery due to disease recurrence. Thirty-four patients (49.3%) underwent joint preservation procedures including curettage with bone cement or bone grafting and internal fixation. Sixteen patients (47%) underwent revision to either a repeat joint preservation procedure (n = 3) or THA (n = 13).

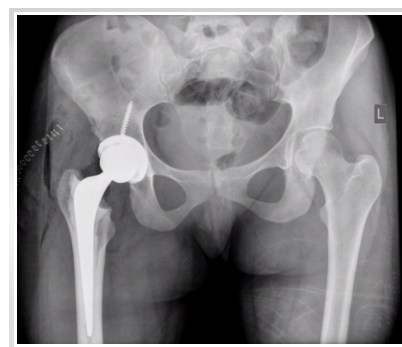
GCT of the femoral head may be managed in a number of ways. Due to limited bone stock and high rates of local recurrence, primary excision and reconstruction with THA or end prosthetic replacement has been advocated [7].

Joint preserving procedures in the form of curettage and bone cementing have a high rate of recurrence ranging from 50% to 60% [7, 11].

Rüdiger *et al.* [5] advocated the use of a transfoveal approach. Medical management includes the use of denosumab as a



**Figure 3:** T1-weighted magnetic resonance imaging demonstrating lesion in the right proximal femur.



**Figure 4:** The right hybrid total hip arthroplasty in situ.

Table 1: Table of the included studies

Study name		Number of Patients	Age in years	Gender (F/M)	Initial Treatment	Further treatment	Follow up In Months
Wijsbek et al 2014[6]	Patient with pathological fracture	11	32(17-53)	44411	JR (11)	3	105.4 (15-300)
	Patients without pathological fracture	13	31(20-72)	44383	JS (10)JR (3)	<b>41</b>	<b>87(48-228)</b>
Abdulrazak et al 2019[4]	Patient without pathological fracture	1	36	0/1	JS	JR	36
Hannes et al 2016[5]	Patients without pathological fracture	1	20	1/0	JS	0	24
Gaston et al 2014[7]	Patients without pathological fracture	1	15	1/0	JS	0	NA
Cho et al 2009[11]	Patients without pathological fracture	12	28.2 (18–41 )	44412	JS	3 (JS)3(JR)	<b>58.3 (30–93 )</b>
	Patient with pathological fracture	2	NA	NA	JR	0	
Khan et al 2009[12]	Patients without pathological fracture	11	36 (26-52)	44442	JR	0	57.6 (48-72)
	Patient with pathological fracture	1					
Sakayama et al 2007[13]	Patients without pathological fracture	7	27.5(19-36)	44410	2(JS) 5(JR)	3 JR	89.9(20–178)
Tibrewal et al 1986[14]	Patients without pathological fracture	4	22.5(16-33)	44199	3(JS) 1(JR)	3 JR	57(36-108)
Mkandawire et al 2005[8]	Patient without pathological fracture	1	49	0/1	JR	0	1
Panchwagh et al 2018[15]	Patient without pathological fracture	2	24.75(18-35)	NA	JS	0	82.6(36-116)
	Patient with pathological fracture	2			JS	0	
	Patient with pathological fracture	1	20	1/0	JR	0	4

neoadjuvant treatment to down size the tumor and decrease the recurrence rate after joint preserving procedures [12]. The current best evidence does seem to support THA as only 4 patients (11.43%) underwent revision. Two patients managed with THA had lesions were extending distal to the proximal femur and so an endoprosthesis might have been a preferable option here from the outset. The remaining 88.5% of patients undergoing THA experienced very good outcomes.

### Conclusion

GCTs of the hip are commonly associated with pathological fracture and there is a debate surrounds its surgical management.

### Clinical Message

The treatment of choice for GCT of the proximal femur is a hip arthroplasty with either a standard THA for small confined tumors or endoprosthesis insertion for more extensive tumors. Joint preserving procedures have a high revision rate (47.06%). Denosumab has been tried as a neoadjuvant treatment with some success in certain cases.

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**Consent:** The authors confirm that informed consent was obtained from the patient for publication of this case report

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