

# **Reconstruction following Giant Cell Tumor of the Extremity: Subchondral Bone Grafting Decreases Risk for Arthritis and Fracture Compared with Polymethylmethacrylate Alone**

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## **INTRODUCTION:**

Giant cell tumors (GCTs) are locally aggressive benign bone tumors that typically affect the metaphyseal region of long bones. Surgical treatment of GCT sparing the articular surface typically includes curettage, adjuvant therapy, polymethylmethacrylate (PMMA) cementation, and metal fixation with or without subchondral bone grafting. Given the difference in elastic modulus between stiff PMMA and less stiff bone, there may exist a potential increased risk for fracture or increased rates of osteoarthritis in patients treated with PMMA juxtaposed to the subchondral/articular surface.

## **METHODS:**

We asked the following questions: 1) Will the use of subchondral bone grafting affect rates of local recurrence? 2) Will the use of subchondral bone grafting affect the rates of patients who go on to develop arthritis? 3) Will the use of subchondral bone grafting affect the rates of fracture?

Medical records of patients treated for GCT from 1996-2022 at a single institution were retrospectively reviewed. Differences between the two cohorts was analyzed with chi-squared and fisher exact tests. Forty-three patients were analyzed. Twenty (47%) patients were treated with subchondral bone grafting.

**RESULTS:** The median age was 34 years. Mean follow up was 80.5 months and was comparable between groups. Sixteen (37%) patients had non-oncological complications: 5 fractures, 11 with osteoarthritis and 1 infection. All occurred in the group treated with PMMA alone except for one patient in the bone graft group who developed arthritis. Patients treated with PMMA alone had a 9x greater risk of arthritis and a 6x greater risk of fracture (P= 0.002,0.009 respectively). There were 13 instances of local recurrence. Six (46.2%) recurrences were in the bone graft cohort. The risk of recurrence following intervention was not statistically different between the cohorts (RR = 0.98, 95% CI 0.266 – 3.61). Mean time from intervention to recurrence was 32 months and was not statistically comparable. To date no patient from the PMMA and bone graft group had required revision surgery. Conversely, four (14%) patients treated with PMMA alone have gone on to have revision surgery for construct failure. Two of these patients went on to receive a distal femoral replacement and one patient underwent arthrodesis.

## **DISCUSSION AND CONCLUSION:**

In this series, use of bone graft at the subchondral region in conjunction with PMMA was associated with reduced risk of later fracture or development of osteoarthritis at a mean 80.5 months follow up. This technique may delay or decreased the need for later revision surgery due to non-oncologic complications. No difference was seen in risk of local recurrence between groups.