

Giant cell tumor and impending fracture of the proximal tibia treated with internal fixation and nanocrystalline hydroxyapatite bone grafting (NanoBone® Bone Graft)

Judd E. Cummings, MD, FACS Orthopedic Surgical Oncology of Arizona
Clinical Assistant Professor of Orthopedic Surgery, University of Arizona

Preoperative

The patient was a 30-year-old female who presented with right knee pain for one year. Initial radiographs revealed a lesion of the lateral proximal tibia extending into the epiphysis with cortical expansion. Subsequent MRI showed a lesion consistent with a giant cell tumor. There was no apparent collapse of the knee joint space and no obvious fracture although cortices were very thin laterally and proximally. Recommended treatment was extended curettage, margin expansion, bone grafting, and prophylactic stabilization due to impending pathologic fracture of the tibia.

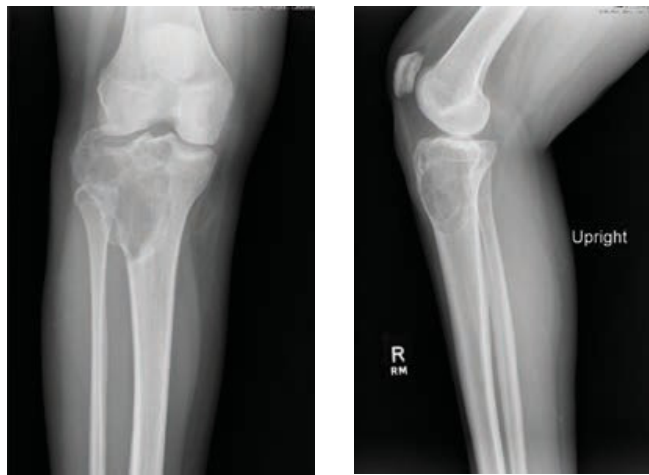


Fig. 1. Preoperative X-rays demonstrating lesion of the proximal lateral tibia requiring intervention

Surgical Procedure

A biopsy was performed pre-op that confirmed the pre-operative diagnosis of giant cell tumor of the bone. The patient was taken to surgery and a tourniquet inflated on the right upper thigh. A curvilinear incision was made over the anterolateral lower leg and extending to the distal femur and mid-tibia. The lateral tibia was exposed in subperiosteal fashion, elevating the anterior muscle compartment off the bone. Fluoroscopy was used to identify the extent of the tumor. A corticotomy was made over the lateral and proximal tibia to expose the medullary contents. Extended curettage of the large tumor cavity was completed extending all the way to the subchondral bone proximally and laterally and then distally to the proximal metadiaphysis. A combination of a curette and a powered bur were used to perform extended curettage of the lesion. Care was taken not to penetrate the articular surface. The tumor cavity was copiously irrigated then treated with hydrogen peroxide as was the surrounding soft tissue. Finally, the tumor cavity and surrounding tissues were treated with an argon beam laser.

At this point, instruments and gloves were changed and stabilization was undertaken. An 8-hole locking proximal tibia plate was secured provisionally to the bone. Position was checked on x-ray. The bone was secured distally with non-locking bicortical fixation and proximally with locking screw unicortical fixation under fluoroscopic guidance. The tumor cavity was filled with 90ml of NanoBone SBX Putty. NanoBone was selected in the hope of establishing good bone stock so that if further surgical intervention was needed, particularly if arthroplasty was indicated, a standard implant might be used rather than resorting to a proximal tibia replacement with a hinged construct. After the bone graft was placed, final x-rays confirmed appropriate grafting and complete filling of the void. The tourniquet was deflated and hemostasis ensured. The incision was closed in layers and a sterile dressing was applied.

Postoperative Course

Two weeks after surgery, the patient was recovering well with minimum pain. Radiographs showed resection of the tumor with bone graft in place and the lateral plate with screws in the proper position. The patient was instructed to continue toe-touch weightbearing. She was able to ambulate using both walker and crutches. She had a nearly full range of motion and will continue physical therapy.

Bone Graft Substitute Clinical Case Series



Fig. 2. 2-week postoperative X-rays showing tumor resection and proper hardware placement

At two-months post-surgery, the surgical site was well-healed and the patient reported no pain. She had been limited to toe-touch weightbearing but reported difficulty adhering to this limitation and had walked several times unsupported. She was advanced to 50% weightbearing and encouraged to follow this recommendation to provide for good fixation.

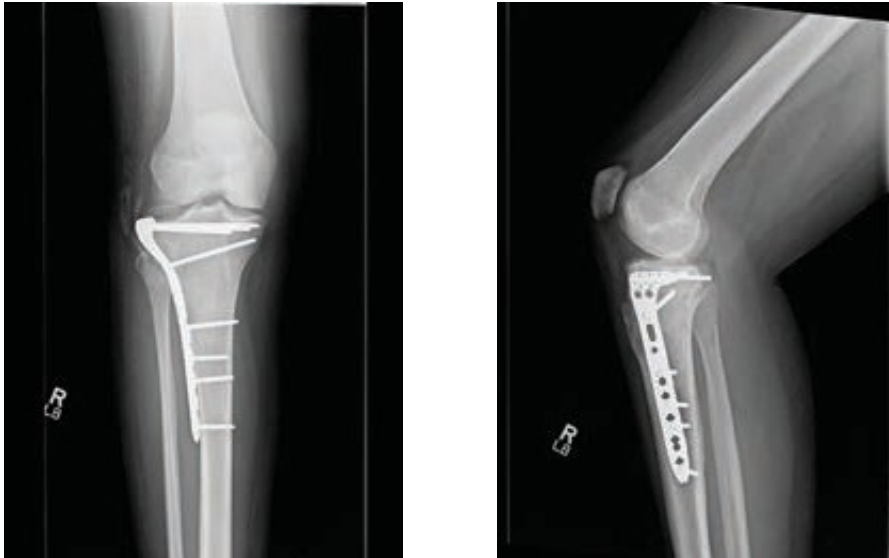


Fig. 3. 3-month postoperative X-rays demonstrating progressive incorporation of NanoBone

At three-months post-surgery, the patient continues to improve. The bone graft shows progressive incorporation. There is no evidence of tumor recurrence. The lateral joint line remains unchanged and intact compared to previous imaging studies.