Subtotal Reconstruction of the Calcaneus with combined Pedicled Fibular Flap and Structural Allograft

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Background:

Giant cell tumor of bone (GCTB) is a benign but locally aggressive tumor that typically affects the epiphyses of long bones, though it can also occur in other locations, such as the calcaneus. Surgical management of GCTB, especially in the context of a complex medical history, poses significant challenges. Reconstruction after tumor resection requires careful consideration of the patient's overall health, the potential for future joint degeneration, and the need for durable structural support. In cases with preexisting conditions like avascular necrosis (AVN), the approach to treatment may require a more nuanced strategy to ensure optimal functional outcomes.

Case Presentation:

A 39-year-old woman presented with a six-month history of right hindfoot pain and tenderness along the lateral aspect of the calcaneus. Her medical history was significant for diffuse large B-cell lymphoma, treated with multi-drug chemotherapy and CAR T-cell therapy, including intrathecal chemotherapy for central nervous system involvement. Despite being disease-free, she suffered from widespread AVN, leading to multifocal joint pain and balance issues. Imaging revealed a lytic lesion within the right calcaneus, superimposed on an area of AVN, consistent with a giant cell tumor of bone, confirmed by core needle biopsy.

Surgical Technique:

The decision was made to perform a subtotal resection of the calcaneus and reconstruct the defect using a combined pedicled vascularized fibula flap and structural allograft. Intraoperative fluoroscopy and K-wires guided the osteotomy, allowing for precise geometric resection of the tumor. The plastic surgery team then dissected and mobilized the pedicled fibula graft, which was flipped distally to cover the defect. A proximal femur allograft was shaped to fit the calcaneal defect and accommodate the vascularized fibula graft. The fibula was inserted into the calcaneal space, prepared with curettes and bone tamps, and secured using interfragmentary screws, achieving solid fixation.

Outcome:

Postoperative imaging confirmed stable graft fixation and ongoing bone integration. By four months, the patient achieved full weight-bearing status, with improved range of motion and resolution of hindfoot pain. At 18 months, radiographs demonstrated advanced bone healing and graft incorporation, with significant improvement in soft tissue healing, cosmesis, and overall gait function. Despite mild to moderate mechanical pain due to bilateral AVN of the ankle joints, the patient showed substantial recovery in foot function and quality of life.