Conversion Distal Femur Replacement with Telescoping Tibial Allograft

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Background

Distal femur replacements have been utilized for major distal femoral bone loss such as in the case of osteosarcoma, allowing for the preservation of knee range of motion. Both cemented and uncemented fixation can be utilized but fixation strategy can be influenced by certain patient characteristics such as age, proximity of resection, and bone quality. With significant bone loss, fixation may be compromised leading to failure and higher rates of implant loosening.

Purpose

This video provides an overview and reviews a case presentation of a patient with significant distal femoral bone loss who underwent a distal femoral replacement with a telescoping tibial allograft.

Methods

The patient history and indications for a distal femoral replacement with a telescoping tibial allograft are presented. The patient is a 25-year-old male with a history of left distal femur osteosarcoma. His index procedure included a distal femoral resection and arthrodesis in 2016 performed outside of the United States. He underwent a revision arthrodesis with the use of compressive osseointegration fixation in 2023. However, he began to have worsening pain and difficulty ambulating. Imaging demonstrated loosening of the implant proximally and deficiency of proximal femoral bone stock.

Results

An incision was made through the previous anteromedial incision. Scar tissue surrounding the implant were peeled away and flaps were developed. Once the implant was exposed, the fusion component at the knee joint level was disengaged. The femoral component and tibial components were removed using a burr. A proximal tibial allograft was measured and cut to size to fit the femoral canal. The femoral canal was enlarged using a burr and a braided cable was prophylactically placed proximally around the femur. The tibial allograft was then telescoped into the femur. The femur with the tibial allograft were reamed to accommodate the distal femoral stem. Next, the metaphysis was reamed to accommodate a cone and a trial cone was placed.
Trial components are placed and traction was placed on the extremity to assess overall length of the construct. Once satisfied, the tibial and femoral components was assembled and cemented into placed. The hinge component was then linked and range of motion was assessed. A limited contact compression plate was then cut to the appropriate length and placed along the telescoping portion of the construct and secured with unicortical and bicortical screws. The wound was thoroughly irrigated with a betadine solution, and the wound was closed in a layered fashion.

He was made non-weight bearing with full range of motion of the knee. At 3 months postoperatively, the patient had 0-35° of flexion. His incision was well healed, and radiographs demonstrated stable implants without evidence of loosening.

Conclusion

Limited proximal femoral bone stock can risk implant failure due to inadequate fixation after distal femoral replacement. In the setting of previous osteosarcoma, distal femoral replacements had an overall survivorship of 88% at 10 years. Telescoping tibial allografts can provide additional bone stock proximally for fixation with an 80% survivorship at 7 years. Operative planning including implant selection, availability of fluoroscopy, and prophylactic fixation are essential to successfully performing a distal femoral replacement in a patient with limited proximal femoral bone.