Revision Total Knee Arthroplasty with Concurrent Extensor Mechanism Allograft Reconstruction

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Title:

Revision Total Knee Arthroplasty with Concurrent Extensor Mechanism Allograft Reconstruction: Surgical Technique and Considerations

Introduction:

Revision total knee arthroplasty (TKA) in the setting of extensor mechanism failure presents a significant surgical challenge. Extensor mechanism allograft reconstruction is a suitable option for chronic, irreparable ruptures, especially in patients with a history of prior TKA and failed repairs. This video abstract demonstrates the operative steps, key technical considerations, and postoperative management for a complex case requiring revision TKA with concurrent extensor mechanism allograft reconstruction.

Case Presentation:

A 67-year-old male with a history of atrial fibrillation on apixaban, COPD, and obstructive sleep apnea presented with bilateral knee pain refractory to conservative treatment. Past surgical history included bilateral TKAs performed in 2013 and a left extensor mechanism repair. Following the initial surgeries, the patient sustained multiple injuries including right quadriceps tendon rupture, left patellar tendon rupture, and right patella fracture. Despite extensor mechanism repair, he experienced persistent pain and functional limitations over the subsequent decade. Radiographs and MRI revealed valgus alignment of the left leg, patella alta, sclerotic patella with prior anchor sutures, and lucency around the left femoral component. Infection work-up was negative. The decision was made to proceed with revision left TKA and extensor mechanism allograft reconstruction.

Surgical Technique:

The procedure was performed using a midline incision and arthrotomy medially over the extensor mechanism. Failed implants were explanted, and tissue specimens were sent for frozen section and microbiologic analysis. The extensor mechanism allograft, consisting of tibial tubercle, patellar tendon, patella, and quadriceps tendon, was prepared from a frozen cadaveric specimen. The graft was soaked in a dilute betadine solution prior to implantation. Distal fixation was achieved with 6.5 mm cancellous screws and washers, supplemented with #1 Ethibond and #5 FiberWire sutures. A DePuy SROM Hinge Knee System with a rotating hinge femoral component, femoral sleeve, and tibial baseplate was implanted and cemented in place. Attention was given to preserving native soft tissue flaps during exposure, preventing tibial fracture during osteotomy, and ensuring proper tensioning of the allograft.

Discussion & Literature Review:

Extensor mechanism allograft reconstruction is indicated in chronic, irreparable ruptures, especially after failed repairs or in the setting of multiple prior surgeries. Literature demonstrates that while outcomes are generally favorable, the procedure carries a substantial risk of complications. Retrospective series have reported graft failure rates up to 32.7%, though successful reconstructions can restore active extension and improve Knee Society Scores. Comparative studies show improved function and extensor lag with allograft reconstruction compared to alternative techniques, but highlight risks such as infection, recurrent instability, and mechanical failure. Implant selection, meticulous soft tissue handling, secure fixation, and adherence to postoperative immobilization protocols are critical to optimizing outcomes.

Conclusion:

Revision TKA with concurrent extensor mechanism allograft reconstruction can restore extensor function and improve stability in patients with complex extensor mechanism failure. Success depends on careful patient selection, precise surgical technique, and diligent postoperative management. This video provides a comprehensive demonstration of the operative workflow, graft handling, fixation strategies, and postoperative protocols, serving as an educational reference for orthopedic surgeons managing challenging TKA revisions.