



Tips & Tricks: Concurrent Unicompartmental Knee Arthroplasty and Anterior Cruciate Ligament Reconstruction

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Background

Anterior cruciate ligament (ACL) deficiency has classically been considered a contraindication to unicompartmental knee arthroplasty (UKA).¹ In cadaveric studies of UKA, ACL-deficient knees exhibited increased femoral rollback at 0, 30, 90, and 120 degrees of flexion.² This may increase polyethylene wear on the posterior aspects of the tibial insert, which may contribute to tibial component aseptic loosening and UKA failures.^{3,4} Other surgeons, however, delineate between ACL-deficient knees with instability and those without instability. Partial knee replacement is offered to the latter group; this group is often older and has less functional demands. This group may also exhibit ACL deficiency that is more likely related to large osteophytes that provide stability and will continue to do so as long as they are preserved during the UKA.^{5,6}

In contrast, young and active patients who develop post-traumatic unicompartmental knee osteoarthritis from discrete ACL injuries have limited surgical options with regards to maintaining an active lifestyle.^{7,8} In the population that is looking for pain-relief, increased stability, eventual return to high level of function, and a faster recovery from surgery, UKA with a concurrent ACL reconstruction is a viable surgical option. While uncommonly performed, studies show high short and medium-term survival rates, encouraging patient-reported outcomes, and biomechanics similar to UKAs in ACL-competent patients.⁹⁻¹⁴ This article aims to describe the particulars associated with a single stage UKA and ACL replacement and the salient points of pre-operative evaluation and intra-operative technique.

Preoperative Assessment

Preoperative assessment includes a thorough history of past knee trauma, injuries, diagnosis of inflammatory arthropathy, non-operative therapies undertaken, and any previous surgeries. Prior (failed) ACL reconstructions are of particular importance. It is also essential to fully understand the location of pain and symptoms of instability, and to determine if the patient's primary complaint is instability or pain. A primarily unstable patient with a lesser degree of unicompartmental pain may benefit from ACL reconstruction alone, whereas a chief complaint

of pain with instability may indicate UKA plus ACL reconstruction. On physical exam, overall alignment, a correctable coronal plane deformity, cruciate ligament integrity, and range-of-motion should all be assessed. As with isolated ACL reconstruction, pre-operative range-of-motion should be optimized with physical therapy prior to surgery. Three-view knee and standing radiographs should be obtained to assess all three compartments and overall mechanical axis alignment. All other indications for a UKA should be met.

Surgical Considerations

Pre-operative Collaboration

Collaboration between arthroplasty and sports medicine surgeons is essential for coordinating a surgical plan. Our protocol involves both surgeons being present at the beginning of the procedure to draw out their surgical incisions and ensuring that each surgeon's approach does not conflict with the other. We typically utilize standard incisions for the UKA, drawn prior to arthroscopy and confirm our arthroscopic portals accordingly.

First stage: Diagnostic Arthroscopy, Tunnel placement

The initial part of the procedure involves a diagnostic scope to evaluate the knee, assess the competency of the ACL, and to confirm there is no significant degeneration of the contralateral or patellofemoral compartments. This is done after the arthroplasty surgeon has delineated his or her planned surgical incisions. If there is significant degeneration of the contralateral compartment, the decision to convert to a TKA may be made.

After confirmation of appropriateness to proceed with a combined UKA and ACL reconstruction, the femoral and tibial tunnels are made. For medial UKA, both tibial and femoral tunnels are placed in standard locations. For lateral UKA, the tibial tunnel is placed in the standard location, but the femoral tunnel is modified due to removal of bone on the lateral condyle during lateral UKA. Given the insertion of the ACL on the lateral femoral condyle and the corresponding bony cuts, femoral tunnel placement would be slightly shallower and

anterior to ensure the tunnel is not violated by the femoral cuts for the UKA (Figure 1). Once the tibial and femoral tunnels are drilled, a 9.5cm graft passer is threaded through the tunnels.

Stage 2: Unicompartmental Knee Arthroplasty

Once the temporary ACL graft passer is in place, the unicompartmental arthroplasty is performed through the usual approach. Care is taken to protect the temporary graft during the procedure. UKA components are placed and trialed. The final components can be cemented in standard fashion at this time, or after the final ACL graft placement depending on surgeon preference.

After completion of the arthroplasty portion, the knee is evaluated through a full range of motion to determine if the graft passer is impinging on implants or the intercondylar notch.

Stage 3: Completion of ACL reconstruction

Once the UKA components have been cemented in place, a bone-patellar tendon-bone (BPTB) autograft is harvested. The graft passer is used to shuttle the BPTB autograft through the tibial and femoral tunnels. Of note, the graft selection is due to surgeon preference and may be autograft or allograft, BPTB, hamstring, or quadriceps tendon. The typical advantages and disadvantages of each graft apply per surgeon experience and preference.

Post-Operative Care

Post-operative care is guided by the Multicenter Orthopaedic Outcomes Network (MOON) ACL Protocol.¹⁵ Patients are made weight bearing as tolerated with crutches immediately after surgery (no knee immobilizer if a femoral nerve block is not administered).

Unique Complications and other concerns

In theory, the tibial tunnel for the ACL reconstruction could serve as a stress riser, resulting in a higher risk of proximal tibia fracture. The risk may be mitigated if the tibial tunnel is

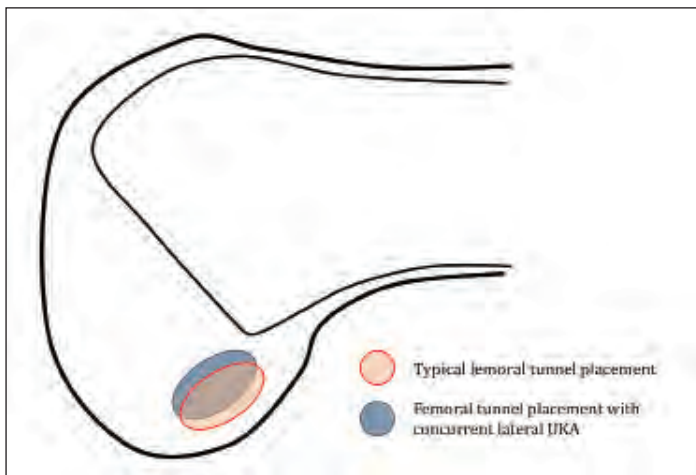


Figure 1. Location of femoral tunnel placement in the setting of concurrent lateral UKA..



Figure 2. Post-operative radiographs of a 43-year-old female patient who underwent concurrent lateral UKA and ACL reconstruction. (A) AP radiographs. (B) Lateral radiographs. (C) Sunrise radiographs

aligned more vertically.¹⁶ However, an actual case has yet to be reported in the literature. The risk of deep infection is not demonstrated in the literature, and the longer surgical episode and relation to deep infection remains theoretical.

Conclusion

Concurrent UKA and ACL reconstruction may be an appropriate option for unicompartmental osteoarthritis and ACL deficiency in the younger, more active patient whose goals are to return to a higher level of activity with less pain, more stability, and preservation of future surgical options. Communication and appropriate pre-operative planning between surgeons is essential for an optimal result.

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