Orthopedics
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Re-revision extensor mechanism reconstruction due to nonunion and tendon failure after total knee arthroplasty: case report

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Background

- Extensor mechanism (EM) disruption after total knee arthroplasty (TKA) is a morbid complication that occurs in 1-3% of cases with patellar tendon rupture having higher complication rates than quadriceps tendon rupture.[1,2]
- The current gold standard for reconstruction is Achilles tendon allograft with bone block (ATBB) with medial gastrocnemius flap posing as an adequate option of prior failed ATBB, and materials are becoming more widely used as an alternative to allograft and autograft techniques.[1-3]
- There is limited evidence on approaches to re-rupture after reconstruction or repair.

Case Presentation

A 67-year-old male with T2DM underwent primary left TKA in 2015 and revision in August 2019 after dislocation of polyethylene tray at OSH. He presented to UCH on 1/25/21 with ongoing mechanical limitations specifically patellar instability with extensor lag of 15 degrees. Radiographs demonstrated that the patella was laterally and superiorly translated **(Figure 1).** An ultrasound obtained at that time showed thinned and elongated patellar tendon and negative infectious work-up.

3/12/21 Reconstruction #1	I&D with reconstruction using ATBB **Figure 2:** Progressive displacement of the tibial tubercle bone block now with worsening pain, deterioration of motion, and functional impairment.
12/20/21 Reconstruction #2	I&D with reconstruction using ATBB and cerclage through trans-osseous tibial tunnel and around anterior tubercle graft resulted in migration of tibial fixation (**Figure 3**).
7/29/22 Reconstruction #3 ORIF & FiberWire® Augmentation	Intra-operatively, there was extensive scar tissue around the anterior aspect of the knee, capsule and EM. After extensive dissection and scar tissue removal, the nonunion sites and the patellar tendon were exposed. A significant amount of scar tissue (down to bleeding bone) was removed from the nonunion site as well as the ATBB donor graft. Microfracture was introduced to both the nonunion site and the bone block. ORIF was performed using a one-third tubular locking plate that was contoured to buttress and hold the "tibial tubercle" bone block down to its nonunion site. The most proximal screw was lagged by technique across the nonunion site for additional compression. Two #5 FiberWire® sutures were placed in the patellar tendon in a running Krakow locking technique which were then tied down and fixated to a 4.5 mm cortical screw tibial post with a washer.
3.5-month post-op	**Figure 4:** AROM 0-136 degrees without extensor lag back to all activities. He was released from all restrictions at that time.
5-month post-op Telephone call	Continuing to be pain free, near 100% of normal without mechanical symptoms and had active knee ROM of 0-142 degrees without extensor lag.

Figure 1. Initial XRs on 1/25/21

Figure 2. Reconstruction #1

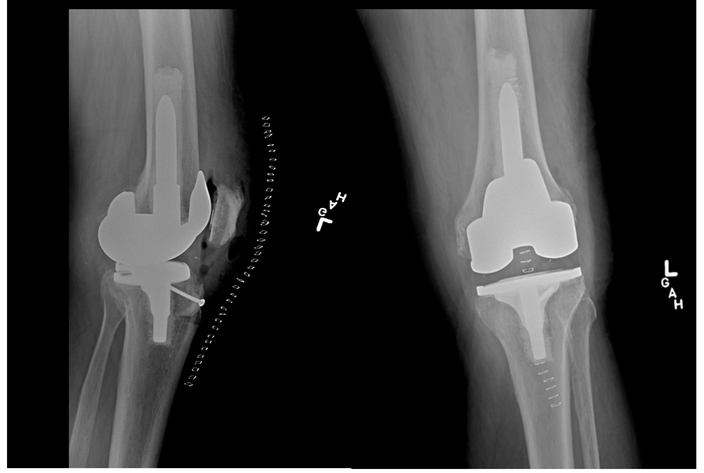
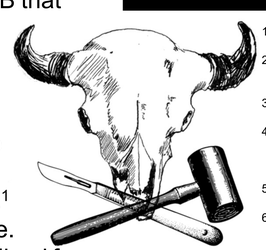


Figure 3. Migration of Tibial Fixation

Figure 4. ORIF and FiberWire® Augment

Discussion

- A comparison of synthetic mesh compared to ATBB showed similar long-term outcomes; however, graft failure remained at 40% and 45% respectively.[6]
- Another recent case report of four patients showed reasonable results following reconstruction with augmentation using Nesplon cable (an ultra-high molecular weight polyethylene cable) at 3.5 years.[7]
- Masouros et al. reported 4 cases of patients who had patellar tendon rupture with failed initial attempts at reconstruction or repair and had no evidence of infection. They performed a staged procedure of patellar advancement followed by reconstruction using hamstrings autograft. At 1 year no patients experienced graft failure and had restored function.[8]
- Poon et al. reported a case of a patient on chronic steroids using a a modified version of ATBB that proved successful in restoring the EM without evidence of bone graft failure at 2 years post-operatively.[9]



- **Patient-specific risk factors contributing to failure**:[1,2,10]
  - Diabetes impacts the structure of collagen and its tensile properties which could potentiate tendonous compromise.[1,11]
  - Multiple surgeries increases scar tissue and microvascular trauma leading to poor healing.[1]
  - Evidence of nonunion at the tibial bone block could reflect too much strain at the boney site.
  - History of methicillin susceptible staphylococcal infection in 2012 for which he was hospitalized for 48 days which could have long-term impact of systemic infection on connective tissue.[12,13]

Conclusion

- Multiple risk factors likely contributed to failure with the more standard approach of the ATBB reconstruction in this case.
- More robust and rigid fixation should be considered in concordance with ATBB when patients have multiple risk factors for repeat failure.
- Successful reconstruction was finally achieved after robust compression, rigid plate fixation, and FiberWire® supplementation tendon repair to address nonunion of the bone block site and the tendinous component, respectively.
- Future studies should investigate how patient risk factors contribute to different types of EM failure and how nonunion plays a role in reconstruction complications.

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