

Post-Traumatic Patellofemoral Joint Ankylosis

¹Nicole S. Belkin, MD
¹Nicole Zelenski, MD
¹Samir Mehta, MD
¹John D. Kelly IV, MD

¹University of Pennsylvania,
 Department of Orthopaedic Surgery,
 Philadelphia, PA

Introduction

Post-traumatic knee stiffness following peri-articular fractures is not a rare occurrence. Limitations in range of motion can be attributed to flexion contracture, extension contracture, or a combination of both. The etiology of the contracture must be considered prior to treatment. Intra-articular scar tissue and/or bony impingement can contribute to contracture, but extra-articular muscular adhesion to bone, or adhesion between soft tissue layers must be considered as well.¹ In this case report, we found arthrofibrosis of the patellofemoral joint to be the unexpected and, to our knowledge, previously un-reported etiology of post-traumatic knee stiffness.

Case Information

A 56 year-old female sustained a tibial plateau fracture due to a motor vehicle collision in May 2013 and was initially cared for at an outside facility. She presented to our trauma clinic for continued care. Her fracture had been definitively treated in an external fixator, which was removed in July 2013. Upon presentation, her complaints included an inability to actively straighten the leg, and the inability to adequately flex the knee. She was ambulatory with a walker. Upon physical exam, her external fixation sites were well healed without any signs concerning for infection. She had an extensor lag of 40 degrees,

which was passively correctable to 0 degrees. Her active flexion was limited to approximately 80 degrees, this was not passively improved. She did not demonstrate any signs of ligamentous laxity. Radiographs (Figure 1A & B) revealed a proximal tibial mal-union demonstrating a 20-degree procurvatum deformity. An MRI was also obtained for review, which confirmed continuity of the extensor mechanism, without major abnormality. A metabolic and infection work-up was unremarkable, aside from Vitamin D deficiency, for which supplementation was initiated.

The patient underwent corrective osteotomy in April 2014. Post-operative radiographs (Figure 1C & D) demonstrate corrected alignment. Of note, intra-operatively, it was noted that the tibial tubercle had healed in a position that had effectively shortened the patellar tendon. The appropriate limb length, alignment, rotation, and tubercle position were achieved upon conclusion of the corrective procedure. Her post-operative course was complicated by difficulty obtaining full range of motion. At four months post-operatively, range of motion from 0 degrees to 60 degrees was attainable passively. There was a firm block to further flexion. Additionally, a 40-degree extensor lag was re-demonstrated. Radiographs at this time point (Figure 2A & B) demonstrate maintenance of correction, healing of the osteotomy, and a normal appearing patellar tendon length.



Figure 1. (A & B) Pre-operative radiographs demonstrating the proximal tibial malunion.

Corresponding author:
 Nicole S. Belkin, MD
 Penn Medicine University City
 3737 Market Street, 6th Floor
 Philadelphia, PA 19107
 Phone: 215-662-3340
 Nicole.Belkin@uphs.upenn.edu



Figure 2. (A & B) Follow up AP and lateral radiographs demonstrating healing of the osteotomy with maintenance of correction.

The patient underwent surgical arthroscopy of the knee for lysis of adhesions and manipulation under anesthesia in September 2014. Intra-operatively extensive adhesion and scar tissue formation was encountered in the supra-patellar pouch, as well as in the medial and lateral gutters, enveloping the tibio-femoral joint. After extensive debridement, the patellofemoral joint was visualized (Figure 3A). It was noted that a calcified scar tissue had developed within the patellofemoral articulation. This was osteotomized with a Cobb elevator (Figure 3B). Accessory posteromedial and posterolateral portals were utilized to provide the complete debridement of the adhesions circumferentially (Figures 3C & D). After the debridement, the knee was manipulated. Range of motion for 0 degrees to 115 degrees was obtained.

With aggressive post-operative physical therapy, the patient was able to maintain a range of motion of 0 to 80 degrees, with only a 5 degree extensor lag. She is now able to ambulate with a single cane. She will be undergoing a second arthroscopic lysis of adhesions and manipulation in an attempt to further improve her flexion.

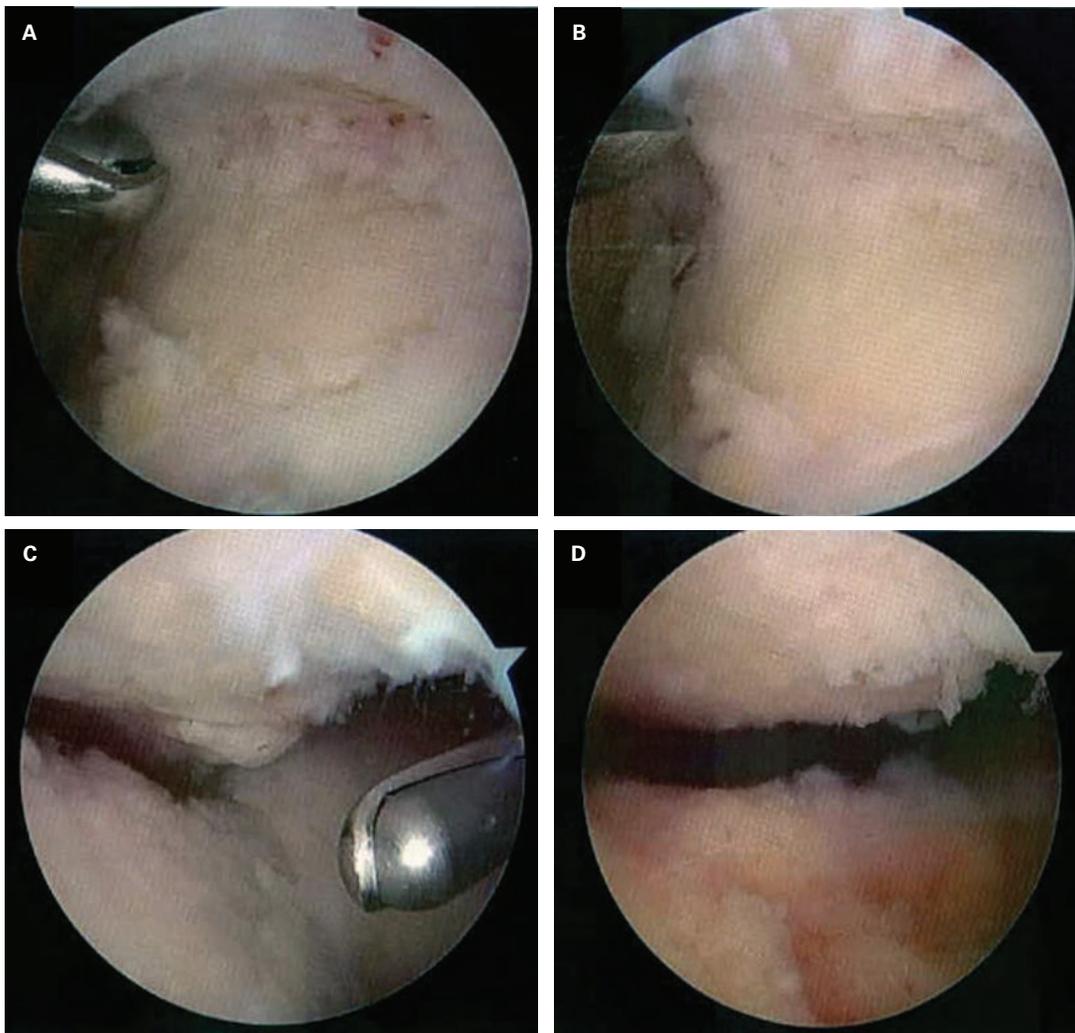


Figure 3. (A) Obliteration of the patellofemoral joint. Removal of soft tissue. (B) Osteotomy of ankylosis of patellofemoral joint with Cobb elevator. (C) Mobilization of patella. (D) Completed debridement of patellofemoral articulation.

Prior Reports & Relevant Literature

To our knowledge, arthrofibrosis of the patellofemoral joint has not been discussed in the literature as an etiology contributing to post-traumatic contracture. However, there are reports reviewing the myriad of other factors to consider, and recommendations for a systematic approach to caring for these patients.

Hulet *et al*, Jouffroy *et al*, and Alici *et al* have reported upon the treatment of post-traumatic flexion contracture. Excellent results are reported for arthroscopic anterior arthrolysis, with average post-operative flexion of 117 degrees, compared with 66 degrees pre-operatively.² Additionally, for contractures with quadriceps adhesion involvement, similarly promising results have been reported for arthroscopic quadriceps release, with average post-operative flexion of 120 degrees, compared with 60 degrees pre-operatively.³ When severe quadriceps contraction and adhesion contribute to flexion contractures, open modified Judet's quadricepsplasty has been shown to be effective, with average post-operative flexion of 95 degrees, compared with 30 degrees pre-operatively.⁴

Mariani *et al* and Lobenhoffer *et al* have reported on the treatment of post-traumatic extension contracture. Excellent results are reported for arthroscopic posterior arthrolysis, with average post-operative extension to 3 degrees, compared with only extension to 26 degrees.⁵ Open posterior release has been shown to have similar results, with average improvement in extension to 2 degrees from 17 degrees pre-operatively.⁶

Acquired patella baja can develop if scar tissue causes contracture of the infrapatellar fat pad. This can severely restrict knee motion. Lengthening of the patellar tendon,⁷ allograft reconstruction^{8,9} and proximalization of the tibial tubercle¹⁰ have all been described methods for addressing this pathology.

Discussion

Post-traumatic knee stiffness is a common condition, and can pose many challenges with regards to treatment because of the many factors that can contribute to the clinical presentation. Successful treatment is dependent on thoughtful and thorough consideration of the etiologies contributing to the loss of motion, and the execution of a treatment strategy that addresses each of those pathologies. Additionally,

meticulous post-operative care is essential to minimize pain and swelling, thereby allowing for the necessary aggressive physical therapy.

Conclusions

This patient presented with flexion contracture and extensor lag of the knee following traumatic proximal tibial mal-union, despite corrective osteotomy and restoration of appropriate patellar tendon length. The unexpected etiology of patellofemoral ankylosis was discovered during arthroscopic treatment. We have demonstrated that osteotomy of the patellofemoral fusion, in addition to anterior and posterior arthroscopic arthrolysis, significantly improved knee flexion and nearly eliminated extensor lag.

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