Soft Tissue Reconstruction of the Proximal Tibiofibular Joint by Using Split Biceps Femoris Graft with 5-Year Clinical Follow-up

Publish date: May 22, 2018

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Authors’ Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

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Take-Home Points

- We present the case of an active 26-year-old woman with a 4-year history of recurrent PTFJ subluxations.
- We chose to treat this patient surgically using split biceps femoris tendon graft for PTFJ reconstruction after failed nonoperative management.
- Surgical correction should be considered for those who fail several courses of nonoperative management.
- In our practice, we prefer reconstruction over arthrodesis as it preserves normal anatomy and avoids secondary stresses to the ankle.
- The soft tissue stabilization of a chronically unstable PTFJ is a viable treatment modality that provides good results.

The instability of the proximal tibiofibular joint (PTFJ) is a rare clinical condition that commonly occurs secondary to an initial pivoting or twisting event of a flexed knee. Although acute PTFJ dislocations respond well to closed reduction and casting, the treatment of chronic PTFJ instability presents a unique challenge. Surgical fixation methods include tibiofibular joint recreation using either a split semitendinosus or biceps femoris graft, as well as a Tightrope device. Older surgical options for chronic PTFJ instability include fibular head resection or PTFJ arthrodesis. However, these older techniques have fallen out of favor, and the optimal surgical technique for the treatment of this injury remains a point of contention.

We present the case of an active 26-year-old woman with a 4-year history of recurrent PTFJ subluxations. The
The patient was surgically treated at our institution by using a split biceps femoris tendon graft for PTFJ reconstruction. This article specifically details the surgical technique used, provides data obtained at the 5-year clinical follow-up, and reviews prior publications on this injury. The patient provided written informed consent for print and electronic publication of this case report.

Case

A 26-year-old woman presented with a 4-year history of lateral right knee pain with any physical activity. She stated that her pain began immediately following a fall, which was initially treated with casting and immobilization for approximately 6 weeks. After treatment, she began to develop symptoms of “popping on the outside of the knee.” In the 8 months prior to her presentation to our practice, these symptoms had intensified in pain severity and frequency. She reported that the popping events occurred most often with deep squatting.

No gross deformity was observed upon physical examination, and both knees were visibly symmetric. Evidence of effusion was absent. The patient felt no pain with the passive motion of her knee, and she presented the full range of motion (ROM) from 0° to 120°. Anterior drawer, McMurray, Lachman, and pivot shift tests were all negative. Upon the application of manual pressure, the fibular head could be dislocated anteriorly (Video 1). This dislocation recreated the patient’s symptoms. The fibular head could not be subluxed or dislocated posteriorly. Flexing the knee to 90° facilitated reproducing manual anterior dislocation. The contralateral knee was examined and demonstrated no appreciable PTFJ instability. The patient exhibited no other signs of generalized ligamentous laxity. Her sensation in the lower leg was intact, and she reported no tingling or numbness in the peroneal nerve distribution. Tinel’s test of the peroneal nerve was negative.

X-ray imaging revealed symmetrically aligned knees with the fibular head in place within the PTFJ. Magnetic resonance imaging (MRI) and computed tomography demonstrated no evidence of soft tissue posterolateral corner injury, meniscal damage, bony fracture, or PTFJ arthrosis.

When the patient presented to our office, she reported having undergone several failed efforts of nonoperative treatment, including bracing and activity modification. On the basis of the chronicity of the reported symptoms, level of pain, and the desire of the patient to return to full activity, we recommended the surgical reconstruction of the PTFJ by using a split biceps femoris tendon graft.

Operative Technique

The patient was positioned supine on a Jackson table. General anesthesia was utilized. Biplanar fluoroscopic imaging of the fibula was obtained with the fibular head manually dislocated and reduced. A bump was placed beneath the right thigh to create resting knee flexion. The patient was prepped and draped in sterile fashion, and a tourniquet was applied.

A 10-cm curvilinear surgical incision was made centered over the fibular neck and extending proximally within the interval between the iliobial band and the biceps femoris tendon. Dissection was performed. The peroneal nerve was identified, carefully dissected out, and then isolated with a vessel loop. The biceps femoris tendon insertion on the fibular head was dissected while ensuring that the nerve was isolated, and the anterior half of the tendon was marked approximately 14 cm proximally using a surgical marker. A 15-blade was then used to split the tendon proximally along the marked path while taking care to preserve the tendinous insertion on the fibular head. The split portion of the tendon was freed from all underlying tissue, and the most distal 2 cm was tubularized using a running baseball stitch and No. 2 Ethibond.
The anterior and posterior aspects of the fibular head were then débrided of tissue, and a guidewire was placed anteriorly-to-posterior. After the position of the guidewire was confirmed with fluoroscopy, a 5-0 cannulated reamer was used to drill through the fibular head. Next, the interval between the biceps femoris and iliotibial band was found, and the lateral head of the gastrocnemius was retracted posteriorly within this interval. A portion of the soleus muscle was also elevated off of the posterior capsule and posterior tibia. The iliotibial band insertion at Gerdy’s tubercle was then identified, and a guidewire was placed from anterior-to-posterior within the tibia, with the starting point just posterior to Gerdy’s tubercle. The wire was advanced under direct visualization with an ACL tibial guide and confirmed fluoroscopically. A 5-mm cannulated reamer was then used to drill over the guidewire through the anterior and posterior cortex of the tibia. A suture passer was passed anterior-to-posterior through this tunnel to retrieve the tubularized portion of the biceps femoris graft, which was then shuttled through the tibial tunnel. This same tubularized graft segment was then shuttled anteriorly-to-posteriorly through the fibular tunnel. At this point, approximately 3 cm of the graft protruded from the posterior aspect of the fibular tunnel.

The remaining graft was held taut, and the knee was cycled through flexion and extension. The knee was then placed in approximately 30° of flexion, and the fibular head was noted to be well reduced within the tibiofibular joint. This was confirmed visually and fluoroscopically. A 4.75-mm biotenodesis interference screw was then placed from anterior-to-posterior in the fibular tunnel. The remaining tendon exiting posteriorly from the tunnel was then over-sewn onto the remaining native biceps femoris tendon attached to the fibular head. The knee was stable through flexion and extension, and gentle pressure on the fibular head demonstrated no subluxation motion (Video 2). The wound was copiously irrigated with normal saline. The tourniquet was then taken down, and following the reapproximation of the deep fascia, the wound was closed in standard subcutaneous fashion.

**Postoperative Course**

The patient was initially kept in a knee immobilizer following surgery and instructed to use touch-down weight-bearing for 3 weeks. She was switched to a hinged brace at 1 week postoperatively. Physical therapy began with range of motion exercises, and an active flexion was withheld until 6 weeks postoperatively. After 6 weeks, the patient was allowed to progress to an active ROM and increase to weight-bearing as tolerated. Strengthening was started at 12 weeks.

MRI was performed at 4 months postoperatively because the patient reported pain with running. The MRI demonstrated no evidence of stress reaction or fracture in the area of reconstruction. She was advised to continue with physical therapy and stop running. At 5-month post-reconstruction, the patient reported that her pain had resolved and that she had no complaints of any peroneal nerve neuropraxia. At 6 months she had returned to normal activity without complaints. At this point, she was instructed to follow-up as needed.

The patient was seen in office 5.5 years after the initial surgery for an unrelated orthopedic issue. At this time, follow-up data were obtained for her PTFJ reconstruction. She stated that she was very satisfied with the results of her surgery. She claimed to be pain free and had been performing normal activities without any difficulty. Upon physical examination, she achieved full range of motion. She had no extension lag or flexion contracture. She achieved functional and clinical Knee Society Scores of 94 and 90 points, respectively.

**Discussion**

This article details a soft tissue PTFJ reconstruction using a split biceps femoris graft with over 5 years of clinical follow-up. Chronic PTFJ instability is a rare clinical entity, and unless gross instability is evident upon physical
examination, its diagnosis may be confused with the diagnosis of more common complaints, such as meniscal tears or iliotibial band syndrome.

Ogden\textsuperscript{8} first described the classification system for PTFJ dislocations. The classification system is based on dislocation direction and whether the joint is partially subluxed or dislocated. The classification system is as follows: type 1, atraumatic subluxation; type 2, anterolateral dislocation; type 3, posteromedial dislocation; and type 4, superior dislocation. Anterolateral PTFJ dislocation is the most commonly reported PTFJ dislocation in published literature. This case was classified as a type 2 dislocation given that the patient’s fibular head can be dislocated with manual pressure following an initial traumatic event.

Past instances of PTFJ instability have been managed with closed reduction and protected weight-bearing, as well as with various open reduction techniques.\textsuperscript{2-7} Surgical reconstruction is commonly considered in chronic cases or if nonoperative modalities have failed. Although PTFJ arthrodesis or fibular head resection has been used as a prior treatment option, the postoperative complications associated with each of these techniques have since caused them to fall out of favor.

The split biceps femoris graft has been successfully used in the soft tissue reconstruction of PTFJ.\textsuperscript{3,5-7} The soft tissue reconstruction of the PTFJ provides advantages over arthrodesis or fibular head resection because it preserves normal anatomy and avoids secondary stresses to the ankle encountered in the latter procedure. Fibular head resection also presents secondary complications, such as the loss of the biceps femoris and posterolateral corner ligament insertion points.\textsuperscript{9} Similar to this study, prior works have reported returns to functionality. However, this study represents the longest clinical postoperative follow-up of PTFJ ligament reconstruction. By using a split biceps graft, the insertion point of the biceps on the fibular head is preserved, thus maintaining normal function while still allowing for an easily tubularized graft for anatomic PTFJ ligament reconstruction.

**Conclusion**

We present data for over 5 years of follow-up for our surgical approach to this rare pathology. To the best of our knowledge, this is the first case report of PTFJ instability that was treated surgically and with a long-term follow-up. The patient did not demonstrate loss of knee motion, pain, or peroneal nerve symptoms. Moreover, she was very satisfied with the procedure at the most recent follow-up and had returned to unrestricted activity. The soft tissue stabilization of a chronically unstable PTFJ is a viable treatment modality that provides good results, and future studies should confirm these satisfactory outcomes in the long-term.

*This paper will be judged for the Resident Writer’s Award.*

**Key Info**

**Figures/Tables**
References


Multimedia

Product Guide

- **STRATAFIX™ Symmetric PDS™ Plus Knotless Tissue Control Device**
- **STRATAFIX™ Spiral Knotless Tissue Control Device**
BioComposite SwiveLock Anchor
BioComposite SwiveLock C, with White/Black TigerTape™ Loop

Citation

Peter Goljan, MD Todd P. Pierce, MD Anthony J. Scillia, MD Anthony Festa, MD. Soft Tissue Reconstruction of the Proximal Tibiofibular Joint by Using Split Biceps Femoris Graft with 5-Year Clinical Follow-up. Am J Orthop. Publish date: May 22, 2018

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