# Proximal Tibiofibular Joint Stabilization Using an Adjustable-Length Suspensory Fixation Device

Ajay C. Kanakamedala,* MD, Maximilian Hinz,† MD, YuChia Wang,* MA, and Armando F. Vidal,*‡ MD
*Investigation performed at Steadman-Philippon Research Institute, Vail, Colorado, USA*

**Background:** Proximal tibiofibular joint (PTFJ) injuries are rare injuries, and the optimal treatment is poorly understood. Surgical treatment options for PTFJ instability include reconstruction with allograft, stabilization with an adjustable-length suspensory fixation device, open reduction and internal fixation with a screw, arthrodesis, and proximal fibular resection.

**Indications:** In acute first-time PTFJ dislocations, nonoperative treatment may be trialed after closed reduction. Operative treatment is indicated for first-time dislocation with concomitant operative injury, an irreducible dislocation, and chronic symptomatic PTFJ instability. Taping or PTFJ injections can be helpful for diagnostic and therapeutic purposes and should be trialed before moving forward with surgical treatment.

**Technique Description:** Multiple PTFJ stabilization and reconstruction techniques have been described for PTFJ instability. This technique describes a stabilization technique utilizing an adjustable-length suspensory fixation device that is placed through a posterolateral approach to the knee.

**Results:** A prior systematic review of PTFJ injuries found that approximately 59% of patients with a PTFJ dislocation were successfully treated nonoperatively with no symptoms at a mean final follow-up of 15.9 months. While multiple case reports and techniques have been reported for PTFJ stabilization using an adjustable-length suspensory fixation device, there are limited data on outcomes of this procedure.

**Discussion/Conclusions:** PTFJ stabilization using an adjustable-length suspensory fixation device is a safe and technically feasible option for the treatment of PTFJ instability. It is critical to confirm the diagnosis of symptomatic PTFJ instability with either a taping trial or a diagnostic injection before proceeding with surgical treatment.

**Patient Consent Disclosure Statement:** The author(s) attests that consent has been obtained from any patient(s) appearing in this publication. If the individual may be identifiable, the author(s) has included a statement of release or other written form of approval from the patient(s) with this submission for publication.

**Keywords:** proximal; tibiofibular; joint; reconstruction; button; suspensory; cortical

‡Address correspondence to Armando F. Vidal, MD, Steadman-Philippon Research Institute, 181 West Meadow Drive, Suite 1000, Vail, CO 81657, USA (email: avidal@thesteadmanclinic.com).
*Steadman-Philippon Research Institute, Vail, Colorado, USA.
†Department of Sports Orthopaedics, Technical University of Munich, Munich, Germany.

Submitted January 10, 2024; accepted March 24, 2024.

One or more of the authors has declared the following potential conflict of interest or source of funding: A.C.K. is a board or committee member for *Arthroscopy*. A.F.V. has received consulting fees from Arthrex and Stryker, honoraria from Vericel, speaking fees from Smith & Nephew, research support for Arthrex, intellectual property royalties from Stryker, hospitality payments from Bodycad USA, and support for education from Gemini Mountain Medical and is a board or committee member for American Academy of Orthopaedic Surgeons and the AOSSM. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Video Journal of Sports Medicine (VJSM®), 4(6), 26350254241272113
DOI: 10.1177/26350254241272113


## VIDEO TRANSCRIPT

This is Ajay Kanakamedala from the Steadman Clinic and Steadman Philippon Research Institute reporting on our technique for proximal tibiofibular joint (PTFJ) stabilization with an adjustable-length suspensory fixation device.

## BACKGROUND

PTFJ injuries are rare injuries. Rajan et al[3] performed a retrospective review and found only 17 cases across a 10-year period at a level 1 trauma center. Due to their relative infrequency, the optimal treatment is poorly understood.

Stabilizers of the PTFJ include the anterior and posterior tibiofibular ligament complexes as well as the fibular collateral ligament and biceps femoris.

Instability is most common in the anterolateral direction.

Moving on to our case presentation, the patient is a 25-year-old woman who sustained a left knee injury while back-country skiing approximately 9 months prior. She initially presented to another physician with medial and lateral knee pain, and she underwent magnetic resonance imaging (MRI), which was mainly notable for patellofemoral chondral wear. After exhausting nonoperative treatment, she ultimately underwent a left knee arthroscopy, but she continued to have lateral knee pain localizing to her PTFJ and was subsequently referred to our clinic.

Examination was notable for mild tenderness to palpation over the fibular head as well as mildly increased proximal tibiofibular laxity compared to her contralateral side.

Preoperative imaging is shown here. Anteroposterior (AP), lateral, and sunrise radiographs were unremarkable.

T2-weighted axial MRI showed patellar cartilage thinning, as noted by the solid blue arrow, as well as possible attenuation of the posterior proximal tibiofibular ligamentous complex, as shown by the white solid arrow, but there was no obvious evidence of PTFJ subluxation or dislocation.

She underwent a diagnostic injection into her left PTFJ, which gave her 100% pain relief lasting for a few hours.

Treatment options for PTFJ instability include nonoperative treatment, which is reasonable for acute first-time reducible dislocations in the absence of any other injuries necessitating operative intervention. In a systematic review performed at our institution, Kruckeberg et al[2] reported on 35 patients with PTFJ injuries across 18 studies who were treated with varying periods of immobilization ranging from 1 to 6 weeks. At a mean final follow-up of 15.9 months, they found that 59% of patients had significant improvement with no symptoms at final follow-up.

## INDICATIONS

Indications for operative treatment include dislocations that are irreducible by closed means, chronic symptomatic dislocation/instability, and first-time dislocations with concomitant operative injuries such as a tibial shaft fracture.

During the workup of these injuries, taping can be helpful, and in chronic cases, a taping trial should be considered before surgical treatment. Diagnostic injections of the PTFJ under ultrasound guidance can also be helpful, and we routinely perform these prior to indicating a patient for surgical treatment, especially in cases of PTFJ pain without obvious ligamentous injury or dislocation.

Surgical options include proximal fibula resection, proximal tibiofibular arthrodesis, open reduction with or without internal fixation, and reconstruction with allograft.

While there is limited literature on the topic, the senior author prefers stabilization with a suspensory fixation device in isolated cases of PTFJ instability or in acute cases where there is greater potential for ligament healing and scar formation. In chronic cases, revision cases, or the setting of multiligament knee injuries, proximal tibiofibular ligament reconstruction with allograft is typically performed. Proximal fibula resection or arthrodesis is reserved as salvage options.

In this case, the patient was indicated for stabilization with an adjustable-length suspensory fixation device given that this was an isolated case of PTFJ instability.

## TECHNIQUE DESCRIPTION

The patient is positioned supine with the knee at 90° of flexion. A posterolateral curvilinear incision is made centered between the fibular head and Gerdy's tubercle distally and posterior to the lateral femoral epicondyle proximally. The peroneal nerve is identified and protected. Examination of fibular mobility shows approximately 1 cm of translation.

Once the PTFJ is confirmed to be reduced and held there, a guidewire is first placed through the planned tunnel location. The entry point for the guidewire is at the apex or widest part of the fibular head at its posterolateral aspect. This is aimed just distal to the condylar flare of the tibia. This helps minimize hardware prominence by allowing the button to sit flush on the medial tibial cortex under the condylar flare.

The guidewire is passed bicortically through the fibula and tibia and out through the skin on the anteromedial aspect of the knee. A 1-cm accessory incision can be made over the tibial end of the guidewire to later ensure that the button is resting on the cortex with no interposed periosteum or soft tissue.

The location of the guidewire is confirmed on AP and lateral fluoroscopic images. We also routinely obtain an image in line with the guidewire to confirm that the guidewire is not eccentrically placed, particularly in the fibula.

We also recommend palpating the pes anserinus tendons to ensure the guidewire does not cross the pes anserinus insertion, which can lead to increased hardware-related symptoms.

The guidewire is then overdrilled through all 4 cortices with a cannulated 3.7-mm drill. The drill bit is removed while leaving the guidewire in place to guide future TightRope (Arthrex) passage.

The TightRope adjustable-length suspensory fixation device is then passed through the previously drilled tunnel using an inserter.

It is important to ensure that the button is directly on the tibial cortex with no interposed soft tissue or periosteum. Proper seating of the button flush on the cortex can be can confirmed both by direct visual confirmation through the accessory anteromedial incision and with sequential fluoroscopic images as the button is being passed through the tunnel.

Once it is just past the anteromedial tibial cortex, the far cortical button is deployed using the inserter and then flipped on the anteromedial tibial cortex by pulling the inserter back to pull tension on the button.

The TightRope, including the near cortical button, is then removed from the inserter, and the inserter is removed from the tunnel. A curved clamp or needle driver

can be used to hold the far cortical button so that it does not inadvertently come off of the tibial cortex.

The central tensioning sutures in the near cortical button are then tensioned by pulling straight back on each suture one at a time. Intermittent examination of PTFJ mobility can be performed to achieve the desired tension. Final tensioning is obtained with the tensioning handle. The PTFJ mobility is reexamined and found to have significantly reduced laxity to anterior and posterior force while still maintaining physiologic motion.

Final fluoroscopic images are obtained to confirm the desired implant position.

The excess suture tails are cut as this is a knotless device, and the wound is copiously irrigated and closed in a standard layered fashion.

AP and lateral radiographs obtained 2 weeks postoperatively are shown here.

## RESULTS AND DISCUSSION

Postoperatively, patients are kept nonweightbearing for 2 weeks, followed by partial weightbearing with 2 crutches during weeks 3 and 4 and 1 crutch during weeks 5 and 6. Patients are advanced to weightbearing as tolerated after 6 weeks. Physical therapy, including full unrestricted range of motion exercises, is begun on postoperative day 1. Patients are advanced to nonimpact exercises and strength training at 6 weeks and impact exercises at 3 months postoperatively.

There is limited literature on outcomes of the treatment of PTFJ instability. With regard to nonoperative treatment, Kruckeberg et al[2] performed a systematic review of these injuries and reported 35 patients across 18 studies with a mean age of 23 years who were treated nonoperatively with varying periods of immobilization ranging from 1 to 6 weeks. At a mean final follow-up of 15.9 months, they found that 59% of patients had significant improvement with no symptoms at final follow-up.

With regard to operative treatment, in the same systematic review, Kruckeberg et al. reported on 11 cases of operative treatment with a cortical suspensory button, but 8 of these patients were treated in the setting of a transtibial amputation, and no patient-reported outcomes were obtained. Thus, there is a paucity of literature on outcomes of the technique described here for the treatment of isolated PTFJ instability.

Dr. Laprade's group[1] published a case series of 13 patients with a mean follow-up of 3.5 years, all of whom underwent autograft or allograft reconstruction for chronic instability. All patients had a taping trial prior to being indicated. Eighty-five percent had full return to sport, and there was a mean statistically and clinically important improvement in Western Ontario and McMaster Universities Osteoarthritis Index and Lysholm scores. There were no reoperations.

## CONCLUSION

In conclusion, taping trials and diagnostic injections are very helpful during the workup of PTFJ instability prior to indicating patients for surgery, especially in chronic cases. Surgical options include stabilization with an adjustable-length suspensory fixation device for isolated or acute cases and ligament reconstruction for chronic or revision cases or those involving multiple ligaments. Technical pearls include confirming the central position of the guidewire in the fibula on AP and lateral imaging to avoid eccentric placement, and surgeons should place the guidewire just distal/posterior to the pes anserinus on the tibia to minimize hardware-related symptoms. Last, nonoperative treatment is successful in 50% to 60% of cases, and there are limited data on the outcomes of surgical treatment.

## ORCID iDs

Maximilian Hinz https://orcid.org/0000-0002-2649-8420
YuChia Wang https://orcid.org/0000-0001-9138-7463

## REFERENCES

1. Dekker TJ, DePhillipo NN, Kennedy MI, Aman ZS, Schairer WW, LaPrade RF. Clinical characteristics and outcomes after anatomic reconstruction of the proximal tibiofibular joint. *Arthroscopy*. 2020;36(6):1649-1654. doi:10.1016/j.arthro.2020.01.056
2. Kruckeberg BM, Cinque ME, Moatshe G, et al. Proximal tibiofibular joint instability and treatment approaches: a systematic review of the literature. *Arthroscopy*. 2017;33(9):1743-1751. doi:10.1016/j.arthro.2017.03.027
3. Rajan PV, Ramski DE, Romeo NM. Traumatic dislocation of the proximal tibiofibular joint: a systematic review and 10-year experience from a level 1 Trauma Center. *J Am Acad Orthop Surg Glob Res Rev*. 2022;6(5):e21.00105. doi:10.5435/JAAOSGlobal-D-21-00105