

# Anatomic reconstruction of chronic symptomatic anterolateral proximal tibiofibular joint instability

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**Abstract** Symptomatic chronic proximal tibiofibular joint subluxation is a pathology which is difficult to diagnose and treat. Surgical treatment has not been well defined. A report of two patients successfully treated with an anatomic reconstruction of the posterior aspect of the proximal tibiofibular joint is presented.

**Keywords** Proximal tibiofibular joint instability · Knee injury

## Introduction

Proximal tibiofibular subluxation is a rare condition. In 1974, Odgen described four forms of proximal tibiofibular instability, the most common of which was anterolateral dislocation caused by disruption of the proximal capsular ligaments [7, 8]. Conservative treatment with immobilization is recommended in most cases [7, 8, 11]. However, if symptoms persist despite conservative management, surgical intervention is recommended [16]. The optimal surgical treatment for patients with chronic proximal tibiofibular subluxation has not been well defined [4, 8, 9, 11, 13, 15]. Two cases of chronic anterolateral proximal tibiofibular subluxation which were successfully treated with an anatomic reconstruction of the posterior aspect of the proximal tibiofibular joint are presented.

## Case presentations

### Patient 1

A 16-year-old female presented with a 6-month history of progressive right lateral knee instability associated with significant discomfort during squatting and bending activity after a volleyball injury where she fell on a flexed knee. A 3-month trial of physical therapy did not improve her symptoms.

Physical examination of her right knee revealed that during maximal knee squatting, she had a painful and visible clunk due to anterolateral translation of her fibula on the tibia. Posteriorly directed manual pressure over the fibular head prevented this anterolateral subluxation. She was stable to varus and valgus stress testing in full extension and at 30° of knee flexion and had a negative Dial test.

Radiographs of her right knee were normal. An MRI of her knee showed the proximal tibiofibular ligaments were not well visualized. Her pre-operative IKDC subjective knee and Modified Cincinnati Knee Survey scores were both 49.

### Patient 2

A 45-year-old female horse trainer presented 3 months following an injury after being thrown from a horse and landing in a kneeling position with her left foot under her buttocks and her ankle inverted. Three months of physical therapy with an emphasis on knee strengthening was ineffective.

On examination, gross anterior instability of the left proximal tibiofibular joint was produced at 90° of flexion with an anterior translation force applied to the fibular head and styloid. Tinel's test of the common peroneal nerve,

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where it crossed the fibular head, was positive. She was stable to varus and valgus stress testing and had a negative Dial test.

Knee (AP, lateral, and 45° axial patellar views) radiographs were normal. An MRI of her knee demonstrated no intra-articular pathology. Her pre-operative IKDC subjective knee score was 66.

### Surgical technique

In both patients, a lateral hockey stick incision was made over the posterolateral aspect of the knee [14]. The superficial layer of iliotibial band was visualized and a posteriorly based tissue flap was developed down to the long head of the biceps femoris. A neurolysis of the common peroneal nerve was performed to gain access to the posterior aspect of the fibular head. As suspected, anterolateral subluxation of the fibular head was reproduced manually while the knee was flexed to 90° (Fig. 1). The posterior proximal tibiofibular ligament was torn and incompetent, while the anterior portion of the proximal tibiofibular ligament was intact. The popliteofibular ligament was intact.

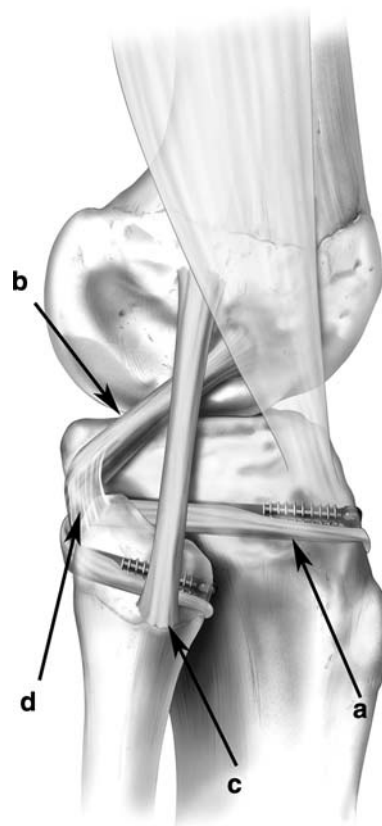
Dissection to expose the anterior aspect of the proximal fibular head was performed. A guidepin was drilled from anterior to posterior along the fibular head between these two points and a 6-mm tunnel was created with the posterior neurovascular structures protected with a retractor. The flat spot distal and medial to Gerdy's tubercle anteriorly [5] was identified, and posteriorly, blunt dissection under the lateral aspect of the popliteus musculature, medial and distal to the popliteofibular ligament, was performed. A guidepin was then drilled through the tibia



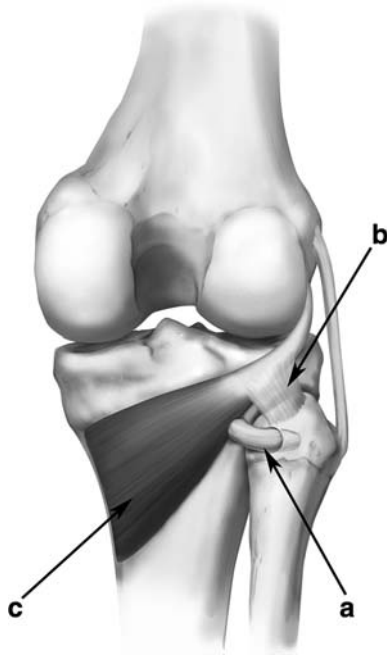
**Fig. 1** Shows anterolateral subluxation of fibular head (*arrow*) on manual displacement intra-operatively for Patient 2 (lateral view, left knee)

from anterior to posterior between these two spots, which exited the posterolateral tibia approximately 1 cm medial to the exit point of the fibular head tunnel. A 6-mm tunnel was then reamed. An autogenous hamstring tendon graft was first passed through the fibular tunnel and fixed in place anteriorly with a 7-mm bioabsorbable screw. After fixation, the graft was passed from posterior to anterior through the tibial tunnel. Tibial graft fixation was performed with the knee at 70° of knee flexion because this was the angle at which the proximal tibiofibular joint was noted to subluxe both clinically and intra-operatively. While joint reduction was verified, anterior traction was placed on the graft and fixed in the tibial tunnel with a 7-mm bioabsorbable screw, which reduced the anterior subluxation without over-constraining the proximal tibiofibular joint. Figs. 2 and 3 show lateral and posterior views of the knee highlighting tunnel placement and the location of graft fixation with respect to surrounding, intact structures.

At 2-year follow-up, patient 1 had returned to full activities and her tibiofibular joint was stable on examination. AP and lateral radiographs of her knee at 2 years



**Fig. 2** Illustration of lateral right knee showing tunnel placement with proximal posterior tibiofibular joint graft (**a**) coursing through the fibula posteriorly and anteriorly through the tibia with respect to intact posterolateral structures including the popliteus tendon (**b**), fibular collateral ligament(**c**), and popliteofibular ligament (**d**)



**Fig. 3** Illustration of posterior right knee showing proximal posterior tibiofibular joint reconstruction graft (a) connecting the fibula to tibia with respect to an intact popliteofibular ligament (b) and popliteus muscle (c)

post-operatively demonstrated tunnels in good position without evidence of osteolysis around bioabsorbable screws. Her 2-year follow-up IKDC subjective knee score had improved to 60 from her pre-operative value of 49. Her Modified Cincinnati Knee Survey score at 2 years post-operatively had improved to 64.

Patient 2 had no complications during her recovery and had returned to horseback riding within 6 months. At 2 years post-operatively, her IKDC subjective knee score had improved to 88 from her pre-operative score of 66.

## Discussion

The most important finding of the present study was that an anatomic reconstruction of the proximal tibiofibular joint restored stability for patients with chronic, symptomatic proximal tibiofibular joint anterolateral subluxation. The proximal tibiofibular joint is stabilized by both its anterior and posterior ligamentous attachments [7, 10]. The anterior aspect of the proximal tibiofibular joint consists of two to three flat ligamentous bands and is reinforced by the biceps femoris tendon, which makes it stronger and less likely to tear than the posterior ligament, which exists as only a single band [1, 16]. Subluxation of this joint is rare and primarily reported in case studies. When reported, the most common dislocation is anterolateral with disruption of the posterior capsular ligaments commonly caused by a fall

onto a hyperflexed knee with a plantar flexed foot [3, 4, 7, 8, 10]. Patients with this pathology commonly present with lateral knee pain during deep flexion, common peroneal nerve symptoms, and anterior translation of the fibula on physical exam [7, 8, 11, 12]. This was the mechanism of injury, presenting symptoms, and disrupted ligament for both patients presented in this report.

Acute injuries may be treated conservatively with activity modification, physical therapy, supportive straps, and immobilization. However, patients with chronic pain and instability may require surgical intervention. Previously reported surgical interventions include arthrodesis, fibular head resection, reconstruction of the proximal tibiofibular joint with a portion of the biceps femoris tendon, iliotibial band, and temporary fixation of the fibular head [2, 3, 6, 17]. To this point, the ideal treatment for patients requiring surgical intervention has not been well defined. In fact, some of these interventions have been reported to cause pain and instability of the lateral knee and ankle joint and are not recommended in children and athletes [4, 8, 9, 11].

A new anatomic reconstruction technique for chronic anterolateral proximal tibiofibular instability utilizing an autogenous semitendinosus tendon was presented. These patients had posterior proximal tibiofibular ligament disruption leading to anterolateral fibular subluxation that was eliminated by an anatomic reconstruction. Both patients returned to normal activity, with satisfactory knee function and improved IKDC subjective knee and Cincinnati Knee Survey scores. Moreover, there were no post-operative or long-term complications related to this procedure.

## Conclusion

An anatomic reconstruction of the proximal posterior tibiofibular joint may be considered for patients with chronic, symptomatic proximal tibiofibular joint anterolateral subluxation.

**Conflict of interest statement** No potential conflict of interest declared.

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