

Stabilization of chronic proximal tibiofibular joint instability with a semitendinosus graft

Philipp KOBBE, Sascha FLOHE, Mathias WELLMANN, Kai RUSSE

From Sankt Josef Hospital Wuppertal, Germany

Although chronic proximal tibiofibular joint instability is a rare condition, it is associated with marked functional impairment. Various surgical options have been reported in literature, all associated with several problems and limitations. We describe a new technique of reconstruction of the proximal tibiofibular joint using the semitendinosus tendon. The key steps of the procedure are the preparation of a proximally released semitendinosus tendon, and its guidance through two transtibial tunnels and one transfibular tunnel. The semitendinosus tendon acts as a soft tissue sling and does not interfere with mobility at the proximal or distal tibiofibular joints as noted after fibular head resection or arthrodesis of the proximal tibiofibular joint. Further advantages are the easy accessibility of the semitendinosus graft and the small surgical scar with better cosmetic results as compared to ligamentous reconstructive procedures using a split biceps femoris tendon or a strip of the iliotibial band.

Keywords: chronic instability ; proximal tibiofibular joint ; semitendinosus tendon ; reconstruction

INTRODUCTION

Instability of the proximal tibiofibular joint is a rare condition that is most commonly seen in athletes performing sports with twisting motion of the flexed knee ; however instability may also present as idiopathic atraumatic subluxation or following high-energy traumatic dislocations (7).

Patients with chronic proximal tibiofibular instability have not well defined lateral knee pain and instability of the lateral knee and the correct diagnosis is often not recognized (8). Differential diagnosis includes lateral meniscal injury, lateral collateral ligament injury, posterolateral rotational instability, or iliotibial band syndrome (4).

In acute proximal tibiofibular joint dislocations closed reduction with or without immobilization is recommended (7) ; persistent pain and chronic instability in late or recurrent cases require surgical stabilization in up to 57% (6,7). Treatment recommendations for chronic proximal tibiofibular joint

■ Philipp Kobbe, MD, Associate Professor, Orthopaedic Trauma Surgeon.

Department of Trauma Surgery, Universitätsklinikum Aachen, Germany.

■ Sascha Flohe, MD, Professor, Orthopaedic Trauma Surgeon.

Department of Trauma and Hand Surgery, Universitätsklinikum Düsseldorf, Germany.

■ Mathias Wellmann, MD, Orthopaedic Surgeon.

Department of Orthopaedic Surgery, Medizinische Hochschule Hannover, Germany.

■ Kai Russe, MD, Orthopaedic Surgeon.

Department of Arthroscopic Surgery, Sankt Josef Hospital Wuppertal, Germany.

Correspondence : Philipp Kobbe, MD, Associate Professor, Department of Orthopaedic Trauma Surgery, University Hospital Aachen, Pauwelsstrasse 30, 52077 Aachen, Germany.

Email : pkobbe@ukaachen.de

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instability include fibular head resection (6), arthrodesis of the proximal tibiofibular joint (6), ligament reconstruction using the iliotibial band or the biceps femoris tendon (1,5,9,10).

We present a new technique for fixation of the proximal tibiofibular joint using a semitendinosus graft.

ILLUSTRATIVE CASE

A 19-year-old female soccer player presents in our department with persistent pain of the lateral aspect of her right knee radiating in her lateral thigh. She reports that activities requiring knee flexion intensify the pain. She has a history of two torsion injuries of her right knee respectively 18 and 21 months earlier. Upon her first injury she was diagnosed with a sprain of the lateral collateral ligament. She underwent an arthroscopic partial resection of a medial meniscal tear and microfracturing of a grade II cartilage damage of her lateral tibial plateau.

Clinical examination showed no effusion of the femorotibial joint, no meniscal signs, no ligament laxity, and no femoropatellar pain. Upon manual pressure the right fibula head showed a painful anterior-posterior instability increasing with flexion of the knee. Pain increased with dorsiflexion of the foot. She had full range of motion in the right knee. No swelling of the tibiofibular joint or nervous deficit from the peroneal nerve could be observed. The contralateral knee was examined in a similar fashion and the proximal tibiofibular joint was found to be stable.

Plain anteroposterior and lateral radiographs as well as a CT scan of the right knee revealed no permanent dislocation of the proximal tibiofibular joint.

Based on the clinical presentation and considering patient's age and physical activity, we recommended reconstruction of the proximal tibiofibular joint using a semitendinosus graft.

Surgical technique

The procedure is carried out under general anesthesia with the patient in supine position and the knee flexed 30°. A tourniquet is applied to the thigh and the leg is exsanguinated by inflation of the cuff

to 250 mmHg. Harvesting of the semitendinosus grafts follows established protocols. Briefly, a 2.5-cm oblique incision is made 4 cm medial and just distal to the tibial tubercle and the semitendinosus tendon is identified. The tendon is isolated from the gracilis tendon by blunt dissection and division of adhesions and fascial bands. With an open-ended tendon stripper a distally attached 28 cm semitendinosus graft is harvested. The last 2 cm of the proximal end of the graft are reinforced with 2/0 Ethibond and the graft is stretched manually for approximately 10 minutes.

A 5-cm longitudinal incision is centered over the fibular head and the biceps femoris tendon and the common peroneal nerve are identified by blunt dissection.

The placement of the tunnels is illustrated in fig 1. A commercially available ACL drill guide is used to insert a Kirschner wire from the medial tibial condyle to the posterolateral aspect of the tibia behind the fibular head (tunnel 1). The second wire is placed under protection of the peroneal nerve with the surgeon's finger from anterior to posterior on the proximal fibular head (tunnel 2). The entry point for the third wire is the lateral tibia at the level of the anterior proximal fibular head aiming towards the entry point of the first wire at the medial tibial condyle leaving a small bone bridge between both tunnels (tunnel 3). The Kirchner wires are overdrilled with a 4.5-mm cannulated drill and the graft is passed through tunnel 1 followed by tunnel 2 and 3 with an Ethibond fiber loop (fig 2). Finally, two suture anchors fix the tendon to the medial tibial condyle under tension with the fibular head in the reduced position. Graft excess may then be trimmed. The proximal tibiofibular joint reduction should then be tested manually for stability in all directions. The fibular head may be temporarily stabilised with a 2.0-mm Kirschner wire for 6 weeks (fig 3). Finally, the wound is irrigated and closed in routine fashion.

Postsurgical course

The patient is allowed progressive weight bearing with crutches over the course of the next 4 weeks. A brace limiting flexion to 60° is discarded after 4 weeks. In case of additional stabilization of the

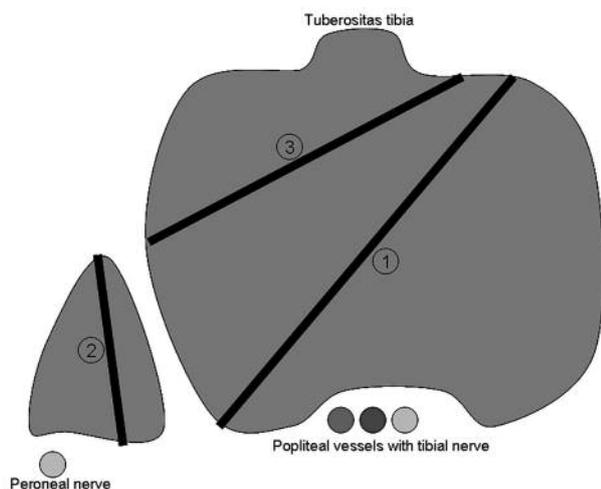


Fig. 1. — Tunnel placement for semitendinosus graft insertion.



Fig. 2. — Intraoperative view showing the insertion of the semitendinosus graft passed through the drill holes using a vessel loop.

proximal tibiofibular joint with a Kirschner wire, this is removed at 6 weeks and progressive closed-chain strengthening of the quadriceps and hamstring muscles of the leg is started. Six months after surgery, the patient is allowed to return to sports.

DISCUSSION

The incidence of chronic proximal tibiofibular joint instability is often underestimated and the diagnosis, as seen in our case, may be confused



Fig. 3. — Postsurgical AP and lateral radiographs showing tunnel placement, fixation of the semitendinosus graft with two suture anchors, and the temporary reduction of the fibular head with a Kirschner wire.

with other, better described and recognized injuries to the lateral knee (7,8).

Various surgical corrections of chronic unstable proximal tibiofibular joints have been described in the literature, such as resection of the proximal end of the fibula, arthrodesis of the proximal tibiofibular joint with or without fibular osteotomy, and different ligament reconstruction (5,6,9,10); however all are associated with several problems and limitations.

Fibular head resection requires excision of the head and neck of the fibula preserving the fibular styloid and the lateral collateral ligament. It is frequently complicated with the development of chronic ankle pain and knee instability (2). Therefore, fibular head resection for chronic proximal tibiofibular joint instability is only indicated in cases of associated peroneal nerve symptoms (7). An alternative to fibular head resection is arthrodesis of the proximal tibiofibular joint. Arthrodesis preserves knee stability, but prevents rotation of the proximal fibula and is associated with increased rotational stress at the ankle which often results in pain as well as instability of the ankle joint (7). Although, this may be alleviated by additional resection of 1.5 cm of the fibula at the junction of the proximal and middle third to avoid overconstraining of the fibula (6,7), both, resection of the

fibular head and arthrodesis of the proximal tibiofibular joint, are not recommended in athletes and children (4). Promising results are reported by surgeons using ligament reconstruction for chronic proximal tibiofibular instability. These include the use of a split biceps femoris tendon or a strip of the iliotibial band (1,4,5,9,10). Although, the authors report encouraging results, both techniques are associated with a non-negligible soft tissue trauma in order to prepare either the split biceps femoris tendon or the strip of the iliotibial band. Further, both techniques weaken stabilizers of the fibular head and the lateral knee (7).

We introduce a technique using an ipsilateral semitendinosus graft for proximal tibiofibular joint instability. The semitendinosus tendon is a mechanically strong graft which has proven strength in ACL and PCL reconstruction. This method allows a functional reconstruction of the tibiofibular joint and can be easily performed with instruments for ACL reconstruction. The advantages of this technique are a minimally invasive approach with negligible soft tissue trauma and a better cosmetic result as compared to above mentioned ligamentous reconstructions. Further, this technique does not jeopardise lateral knee or fibular head stability as with biceps or iliotibial band autografts.

Limitations of this technique are cases with associated cruciate ligament injuries which may require the semitendinosus graft for ACL or PCL reconstruction. Intraoperative complications may include damage to the common peroneal nerve ; however this risk can be minimized by adequate identification and protection of the nerve. Premature graft harvest of the semitendinosus tendon can be avoided by careful division

of all fascial bands to the tendon prior to advancement of the tendon stripper. Postoperative hamstring weakness has been shown to be temporary (3).

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