CASE REPORT

Proximal tibiofibular joint dislocation treated using flexible and permanent syndesmosis fixation

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SUMMARY

We present the case of a 40-year-old man who suffered an isolated proximal tibiofibular dislocation of the left knee after a trauma during a soccer game. Physical examination and radiographic imaging revealed an anterolateral dislocation of the proximal fibula. The diagnosis was confirmed by MRI. The treatment choice was open reduction and internal fixation under direct visualisation using flexible and permanent internal fixation. Postoperative treatment includes knee immobilisation during the first week, and partial weight was allowed for 2 weeks progressing to full weight bearing over 4 weeks. The patient started a gradual and progressive physical therapy programme with range of motion exercises, muscle strengthening and gait training. Full knee range of motion was achieved after 4 weeks. No complaint of pain or hardware discomfort was reported, and the patient is back to daily life and sports activities after 6 months of surgical treatment.

BACKGROUND

Dislocation of the proximal tibiofibular joint is an uncommon knee injury that represents only 1% of all knee injuries. The cause of the lesion frequently involves a direct, high-energy trauma, including different sports injuries and traffic accidents. As the diagnosis is often neglected in initial care, it may lead to chronic pain, degenerative changes and dysfunction of the peroneal nerve (5% of cases).¹⁻⁵ We report the case of a patient who presented with proximal tibiofibular dislocation and was treated with a flexible and permanent fixation.

CASE PRESENTATION

A 40-year-old male patient presented with pain and deformity along the lateral side of his left knee after a knee trauma during a soccer game. He noticed a dislocation and deformity in his knee after a knee sprain in the varus and internal rotation of the tibia. The patient looked for emergency care and was diagnosed with a knee sprain without ligament injury, suggested after an initial radiograph and physical examination. The patient was immobilised in extension for 7 days and encouraged to walk after that. Then, he came to our clinic with knee pain with walking and a lateral deformity of the knee.

INVESTIGATIONS

On physical examination, a varus-like deformity was noticed due to swelling on the anterolateral aspect of the knee and lateral prominence of the fibular head (figure 1). The patient complained of pain on palpation over the fibular head and after full range of motion, particularly during extreme knee flexion. Neurovascular examination of the lower limb was normal. The knee was stable in anterior and posterior drawer tests, the Lachman test and varus and valgus stress tests. Radiographic imaging (anteroposterior and lateral views) revealed an anterolateral dislocation of the proximal fibula (figure 2). If the unilateral study is doubtful, the comparative bilateral image makes the finding more reliable, since it is clear in the anteroposterior study that the asymmetric overlap is between the fibulae and the tibial lateral margins. The magnetic resonance image provided more details on the proximal tibiofibular dislocation and ligament disruption. A classification system described by Ogden⁶ divided the proximal tibiofibular dislocation in injury patterns, considering the direction of displacement of the proximal fibula: anterolateral dislocation (85% of dislocations), posteromedial dislocation, superior dislocation and atraumatic subluxation. The diagnosis was confirmed by MRI, which showed a bone bruise oedema with trabecular microfracture at the end of the fibular head (without malalignment), signs of arcuate ligament injury at the posterolateral corner of the knee and popliteal-fibular and anterolateral ligament injury (figure 3).

DIFFERENTIAL DIAGNOSIS

Other osseous or ligamentous injuries may present similar clinical characteristics to dislocation of

Figure 1 Visual inspection: varus deformity of the proximal leg due to a swelling on the anterolateral aspect of the knee.

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Figure 2 Anteroposterior radiograph with correct positioning, without rotations, which is confirmed by the symmetry of the patella. Even so, the expected overlap between the fibula and the lateral margin of the left tibia was lost (arrow). The tibial joint facet (continuous line) of the proximal tibiofibular joint is inferior to the fibular facet (dotted line) indicating proximal tibiofibular luxation. Note the normal congruence between the facets in the right knee (arrowheads).

the proximal fibula, which include lateral meniscal tear, tibial fracture or injury to posterolateral knee structures. For these reasons, patients should be assessed with careful physical and radiographic examination. The majority of the cases present a full range of motion with absence of pain after joint reduction.

TREATMENT

We reproduced the surgical technique in our cadaver laboratory to better illustrate the surgical technique. We used the Knotless Syndesmosis TightRope/Arthrex/Naples/USA, which provides a fixation of syndesmosis disruptions. This device is frequently used for distal syndesmosis with ankle fracture. The Knotless Syndesmosis TightRope is composed of two metallic buttons connected with an unobservable wire, which when tensioned and secured in place against the tibia and fibula, provides physiological stabilisation of the ankle mortise. When compared with the commonly used cortical screws for syndesmosis fixation, this device does not require hardware removal. We adapted its use for proximal syndesmosis in this case report.

Figure 3 The anterior margin of the articular facet of the fibula (arrows) should be aligned with the anterior margin of the tibial articular facet (arrowhead). Note the capsular oedema and subchondral bone oedema (short arrows). Proximal tibiofibular ligament rupture (asterisks).

Figure 4 (A) Fibula limits are demarked. (B) Surgical approach with iliotibial band incision, biceps retraction and peroneal nerve identification.

Surgical technique

Under spinal anaesthesia, closed reduction was attempted with the knee in 90° of flexion and with direct pressure to the fibula head. The reduction was satisfactory but was unstable after the removal of fibular head pressure.

We performed an anterolateral incision and dissected and isolated the common peroneal nerve to avoid nerve entrapment or iatrogenic injury (figure 4A,B).

After debridement of the haematoma and under direct visualisation of the tibiofibular joint, we applied direct pressure to the joint and performed reduction (figure 5).

We used a lateral collateral ligament guide angled 30° from posterolateral to anteromedial to avoid disruption of the posterior cortex of the tibia. Care should be taken not to emerge close to the tibial tuberosity anteriorly as well (figure 6). A perforation was made with a 4.5 mm drill through all four cortices (figure 7).

The needle and pull-through sutures were passed along the drill hole, and the Knotless Syndesmosis TightRope was inserted (figure 8) and tension adjusted accordingly. Care should be taken not to overtension the system due to the decreased density of the bone of the proximal fibula and to avoid the bottom to prevent violation of the lateral fibula cortex.

We tested the stability by rocking the fibula and during full range of motion.

Additional fixation was not needed, and a final radiograph showed reduced syndesmosis (figure 9).

OUTCOME AND FOLLOW-UP

Postoperative treatment included knee immobilisation during the first week. Partial weight was allowed for 2 weeks, progressing to full weight bearing over 4 weeks. The patient started a gradual and progressive physical therapy programme with range of motion exercises, muscle strengthening and gait training. Knee range of motion was limited to 0°–90° for 2 weeks, progressing to full movement after 4 weeks. No complaint of hardware discomfort was reported, and the patient is back to daily life and sport activities after 6 months of surgical treatment.

DISCUSSION

Proximal tibiofibular dislocation is a rare traumatic lesion that represents only 1% of all knee injuries. This condition is typically seen in athletes of contact sports that involve aggressive twisting of the knee, particularly soccer, rugby and football. Since this mechanism of trauma can result in another knee injuries, including meniscal tears or injury to posterolateral structures, isolated proximal tibiofibular dislocation is often misdiagnosed.^{3 4 7} For this reason, it should be considered during the differential diagnosis when the patient presents with a history of trauma, lateral knee pain and an inability

Figure 5 Posterior cortex of the tibia is palpated for reduction confirmation and drilling orientation.

to bear weight. Early detection and immediate treatment are essential to prevent further complications, such as chronic pain, abnormal gait and reduced sports performance.^{5,7} Several treatment choices are published in the literature, and although there is still no defined consensus, closed reduction has been considered as the first treatment attempt; when this procedure is unsuccessful, open reduction should be performed.^{2,8}

Considering the lack of studies published in the literature about this condition, we conducted a sensitive search using the MEDLINE (via PubMed) database, with the term 'Proximal Tibiofibular Dislocation' that resulted in 111 references. No language or date restrictions were applied. Two authors independently selected the studies related to proximal tibiofibular dislocation, as shown in the present case, and only 21 were found. The majority of the studies were case reports, published between 1973 and 2015. The patients were predominantly men, aged between 20 and 45 years old. Soccer, football, rugby and basketball games were reported as the most common trauma sources.

Chiu and Sheele⁵ reported a case of a 21-year-old man with proximal tibiofibular joint dislocation that occurred after

Figure 6 A femoral guide is inserted to oriented 30° anteriorly.

Figure 7 1 cm below the apices of the fibula, we marked and drilled the tunnel.

a twisting knee motion during a soccer game. The patient was treated with closed reduction accomplished by direct manipulation. van Wulfften Palthe *et al*² presented a case of a 45-year-old woman with a diagnosis of isolated proximal tibiofibular dislocation during a roller skating fall. The dislocation was also treated by closed reduction with direct manipulation after an intra-articular anaesthesia infiltration. The patient was immobilised postoperatively, with no weight bearing during the first week postoperatively. The results showed that after 4 weeks there were no pain and normal knee range of motion. These authors recommend that closed reduction by direct manipulation should be the first choice in acute cases, before considering surgery.²

On the other hand, Burke *et al*⁹ analysed different regimens of treatment and showed that there was no consensus about definitive management. These authors successfully treated a 23-year-old male patient by open reduction and temporary Kirschner-wire fixation. Most dislocations can be treated through closed reduction; however, open reduction may be required in some cases due to an anterior muscle tension and/or interposition of disrupted capsular ligaments that may resist reduction.⁹ MacGiobain *et al*⁸ and Robinson *et al*¹⁰ also reported a case of open reduction and internal fixation after an initial attempt with closed reduction failed. MacGiobain *et al*⁸ reported the removal of the K wire 6 weeks after the surgery.

In our case, open reduction and a definitive flexible fixation were chosen. To date, there are no previous reports in

Figure 8 (A) A Knotless Syndesmosis TightRope is inserted. (B) Traction is applied while tightening the bottom. (C) Three knots are made to lock the bottom system.

Figure 9 The expected proximal tibiofibular joint alignment was re-established (continuous and dotted lines).

the literature that presents this treatment option for proximal tibiofemoral dislocation. Analogous to the treatment of distal tibiofibular syndesmosis lesion, the flexible fixation may allow the joint to better accommodate in the tibiofibular fovea and avoids a second surgical procedure for hardware removal.^{11 12} Despite the satisfactory results shown by the presented case, we believe that a larger sample of patients is needed to demonstrate the effectiveness and safety of this surgical technique for the treatment of proximal tibiofibular dislocation.

In summary, proximal tibiofibular dislocation is an uncommon and underdiagnosed injury that should be carefully detected and appropriately treated with the aim of preventing further complications such as chronic pain, abnormal gait and reduced sports performance.^{5 7 9} In suspect cases, a well-documented clinical history, an adequate physical examination

and a comparative radiograph of the knees are the keys to the diagnosis in an appropriate time, facilitating the treatment and improving prognosis. The definitive flexible fixation may be a suitable treatment option for unstable proximal tibiofibular dislocation.

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Learning points

- ▶ Proximal tibiofibular dislocation is a rare traumatic lesion and often neglected in initial care.
- ▶ When neglected, proximal tibiofibular instability is a source of pain and disability in the long term.
- ▶ Closed reduction is a first treatment choice, but when unreduced or residual instability is noted during normal range of motion, open reduction should be performed.
- ▶ Definitive flexible fixation is a suitable treatment option for unstable proximal tibiofibular dislocation, and there is no need for hardware removal.

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