C A S E R E P O R T

UDC: 617.3::616.728.3-001-07/-08
DOI: 10.2298/VSP150318177G

Modified technique of the treatment for proximal tibiofibular joint dislocation

Modifikovana tehnika lečenja iščašenja gornjeg golenjačnolišnjačkog zgloba

Nemanja Gvozdenović*†, Katarina Gvozdenović†‡ , Mirko Obradović*†, Milan Stanković*†

***Department of Orthopedic Surgery and Traumatology, ‡Department of Radiology, Clinical Centre of Vojvodina, Novi Sad, Serbia; †Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia**

Abstract

Introduction. Dislocation of the proximal tibiofibular joint (PTFJ) is a rare injury. The diagnosis requires an accurate history of the mechanism and symptoms of the injury, and adequate clinical and radiographic evaluation of both knees. In the literature there is no larger series, only several cases of PTFJ dislocation treated by different methods have been published so far. The aim of the study was to present a modified technique for the treatment of the unstable PTFJ that results in faster recovery of the patient. **Case report**. A 24-year-old football player was injured at the beginning of training; when tackling the ball he felt a sharp pain in his right knee. He was immediately brought to the Emergency Center of Vojvodina and diagnosed with anterolateral dislocation of the PTFJ. Close reduction in general anesthesia was tried but we failed and then open reduction and internal fixation (ORIF) were performed with a single three cortical screw. We preferred not to immobilise the knee after the procedure and immediately employed passive and active exercises in the knee, without bearing weight to the injured leg. After 6 weeks we removed the screw and gave full weight support to the leg and continued physical treatment. **Conclusion**. In case of acute PTFJ dislocation, the first method of choice is closed reduction in sedation or general anesthesia. If closed reduction fails, ORIF must be performed. ORIF without immobilization and early start of physical therapy lead to the rapid return to sports activities.

Key words:
knee dislocation; joint instability; diagnosis; orthopedic procedures; treatment outcome.

Apstrakt

Uvod. Dislokacija gornjeg golenjačnolišnjačkog zgloba je retka povreda. Postavljanje dijagnoze se zasniva na anamnezi, kliničkom pregledu i RTG dijagnostici oba kolena. U literaturi nisu zabeležene velike serije ovih povreda, te su opisani kao pojedinačni slučajevi koji su lečeni različitim tehnikama. Cilj rada bio je da se predstavi modifikovana tehnika lečenja nestabilnosti gornjeg golenjačnolišnjačkog zgloba koja rezultuje brzim oporavkom bolesnika. **Prikaz bolesnika**. Fudbaler, star 24 godine, povredio se na početku treninga prilikom uklizavanja kada je osetio jak bol u desnom kolenu. Odmah je dovezen na pregled u Urgentni centar Vojvodine gde je dijagnostikovano prednje spoljašnje iščašenje gornjeg golenjačnolišnjačnog zgloba. Pokušana je ortopedska repozija u kratkotrajnoj intravenskoj anesteziji, ali nije bila uspešna te je pacijent bio pripreman za hirurški zahvat – otvorene repozije golenjačnolišnjačnog zgloba i njegovu fiksaciju sa jednim zavrtnjem kroz tri korteksa. Postoperativno nije postavljena imobilizacija i odmah su započete pasivne i aktivne vežbe u kolenu, ali bez oslonca na operisanu nogu. Nakon isteka šest postoperativnih nedelja odstranjen je zavrtanj i dat je pun oslonac na nogu i nastavljeno je fizikalno lečenje. **Zaključak**. U slučaju iščašenja gornjeg golenjačnolišnjačkog zgloba prvi metod izbora lečenja je ortopedska repozicija, a ukoliko ona ne da rezultate, pristupa se otvorenoj repoziciji i unutrašnjoj fiksaciji. Otvorena repozicija i unutrašnja fiksacija bez postoperativno postavljene imobilizacije i odmah započeta rehabilitacija dovode do bržeg oporavka i brzog vraćanja sportskim aktivnostima.

Ključne reči:
koleno, iščašenje; zglob, nestabilnost; dijagnoza; ortopedske procedure; lečenje, ishod.

Introduction

Dislocation of the proximal tibiofibular joint (PTFJ) is a rare injury. The first case was described by Nelaton [1] in 1874. Injuries of the PTFJ account for less than 1% of all injuries of the knee joint. Some authors believe that this condition is more common than previously thought and, as such, is rarely diagnosed immediately [2, 3]. These injuries usually occur in athletes and in sportsmen with twisting often in the flexed knee [4]. In 1974 Ogden [2] collected 43 cases from the literature; his classification describes four types of traumatic PTFJ dislocations (subluxation – type I, anterolateral – type

Correspondence to: Nemanja Gvozdenović, Department of Orthopaedic Surgery and Traumatology, Clinical Centar of Vojvodina, Hajduk Veljkova 1–7, 21 000 Novi Sad, Serbia. E-mail: gvozdenko83@gmail.com

II, posteromedial – type III, upper – type IV) [3]. The role of the PTFJ is to reduce torsional forces in the ankle and transfer the vertical force in standing position [5]. The diagnosis is based on the medical history, clinical examination and X-ray diagnostics. In the literature there is no larger series; only several cases of PTFJ dislocation treated by different methods have been published so far. There are reports on individual cases treated differently: nonoperatively, with closed reduction and immobilization [6–8] or open reposition and transfixation with Kirschner-wires (K-wires) or screws [9, 10].

In case of the late diagnosis, when reduction is not possible, the fibular head resection is made [7, 11] arthrodesis of the upper tibiofibular joint [3, 12], or reconstruction of the tibiofibular joint with femoral biceps muscle tendon [13, 14] or hamstring graft [15].

There is no agreement about the type of transfixation (three cortical or four cortical) and regarding immobilization after open reduction and transfixation of the joint. Recommendation by some authors is to use soft dressing of the leg with modified weight bearing [16, 17], while others advocate leg casting for 1 to 6 weeks [9, 18]. We presented a case of traumatic dislocation of the PTFJ and the modified technique of the treatment.

Case report

A 24-year-old football player was injured at the beginning of training session when he was tackling the ball and then felt a sharp pain and said that something snapped in his right knee. He was immediately brought to the Emergency Center.

Clinical examination revealed palpable pain and swelling in the area of the outer edge of the tibia and diagnosed anterolateral dislocation of the PTFJ which was based on the history, clinical examination and X-ray (Figure 1).

Closed reduction was attempted in general anesthesia, but with no result, then open reduction internal fixation (ORIF) was performed with a single screw. The operations were performed under spinal anesthesia in pale ischemia. A slightly curved skin incision was made on the lateral side of the knee at fibular head, and the fibular nerve was identified. After the fibular head repositioning, the PTFJ was transfixed with one cortical screw with canvas (Figure 2).

Position of the PTFJ was checked by X-ray and the wound was closed in layers.

After these procedures we did not put any immobilization and immediately started with passive and active exercises in the knee (full range of motion) without weight bearing to the injured leg. Six weeks after operation the screw was removed under local anesthesia and full weight support to the leg was allowed and rehabilitation was continued.(Figure 3.)

Twelve weeks after the injury, the patient returned to his sports activities. Follow-up one year later showed the full knee range of motion, the patient did not complain and continued with his active soccer playing. On X-ray examination there were no signs of PTFJ arthrosis.

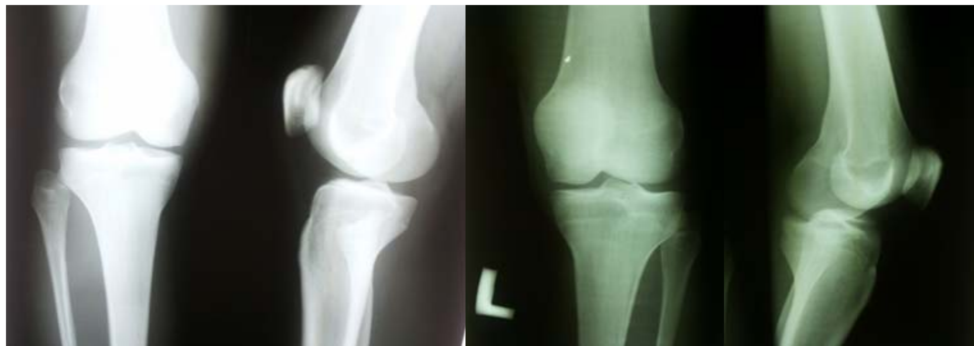

Fig. 1 – Anteroposterior (AP) and profile radiographs of both knees indicates the right anterolateral proximal tibiofibular joint (PTFJ) dislocation – Ogden type II.

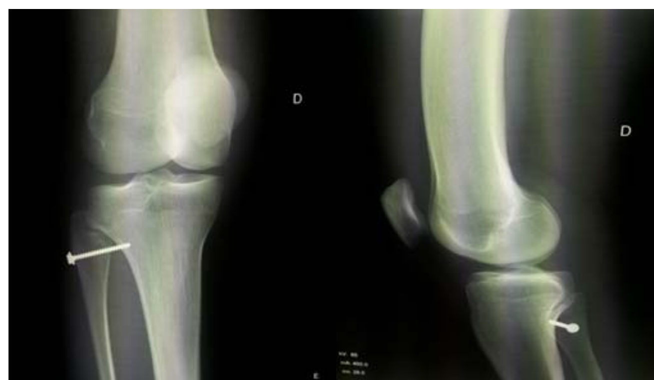

Fig. 2 – Profile and anteroposterior (AP) postoperative radiographs of the right knee after repositioning of the proximal tibiofibular joint (PTFJ) and transfixation with one cancellous screw with canvas.

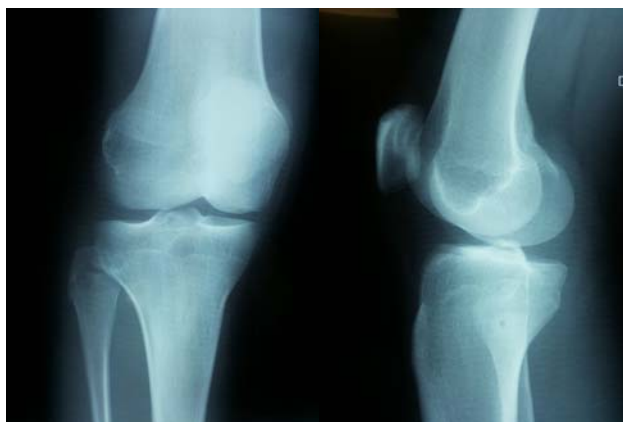

Fig. 3 – Postoperative anteroposterior (AP) and profile X-ray findings of the right knee after removing the screws.

Disscusion

The PTFJ is a synovial joint of lateral tibial condyle and fibular head [19]. In 10–60% of the whole population there is a communication between the knee joint and PTFJ and because of that they are often called PTFJ as the fourth knee department [20]. Generally, the PTFJ is a stable joint. His stability is provided by his joint capsule, ligaments (anterior tibiofibular ligament, a group of ligaments at the postero-laterlal angle, lateral collateral ligament) muscles (biceps femoris tendon) [21, 22]. Traumatic PTFJ dislocation is mostly seen in males of 17–30 years of age, as in the presented case [15]. The elementary function of the PTFJ is the dissipation of torsional loads applied at the ankle, the dissipation of lateral tibial bending moments, and the transmission of axial loads in weight-bearing [5]. Injuries usually occur by force of twisting on the flex knee [23] during the sports activities: soccer [22] (as in the presented case), volleyball [15], skiing [22], basketball [24], trampoline jumping [25], or it results from high-energy trauma as usually seen in polytraumatized patients [26]. Morrison et al. [27] described the case of atraumatic instability of the PTFJ [27]. Ogden [2] divided PTFJ dislocations into four types: subluxation – type I (excessive anterior-posterior motion without dislocation, as usually seen in adolescents with lax joints); anterolateral dislocation – type II (most common and accounts for about 85% of all dislocations of the PTFJ) [7], posteromedial dislocation – type III (occurs in 10% of PTFJ dislocations, and is often seen as a result of direct hit to fibular head) [28], type IV, upper dislocation (represents 2% of all PTFJ dislocations, and is usually seen in high-energy injuries, often associated with fractures of the tibia, fibular head, upper dislocation of lateral malleolus and tear of interosseus membrane) [29]. The presented patient had type II by Ogden classification. A patient with the PTFJ dislocation presents with pain, swelling and asymmetry of lateral side of the knee, while the knee joint is without swelling and the range of motion is not limited [2]. Because this injury can be associated with injury of the fibular nerve, it is very important to examine the fibular nerve function [11].

The differential diagnosis can be: partial rupture of the *ligamentum collaterale laterale* (LCL), meniscal cyst or lateral meniscal tear and distal iliotibial band syndrome [30]. No, or the late diagnosis of the PTFJ dislocation leads to chronic pain in the knee and development of arthrosis PTFJ and because of this it is recommended to compare clinical examination and radiographs with the healthy leg [31].

In case of acute PTFJ dislocation, the first choice method is closed reduction in sedation or general anesthesia, which success depends on the good knowledge of the mechanism of dislocation. The reduction is performed while the knee is flexed, the foot is in eversion and dorsiflexion, and the fibula is in external rotation, with the direct front-to-back pressure on the fibular head, which clicks back into the place. After the successful repositioning, the above-the-knee plaster cast is applied for 3–6 weeks, and then follows functional rehabilitation [20]. Some authors recommend soft dressing (no cast immobilization) of the leg with modified weight bearing [32].

If closed reduction fails, as it was in the presented case, ORIF will be performed with K-wires or screws [9, 10]. In our case the PTFJ was transfixed with one cortical screw with canvas, through three bone cortices. A three bone cortices screw is a stable type of fixation for PTFJ dislocation, and there is no need to transfix the screw through all four bone cortices [10]. If it is not possible to perform reduction of the PTFJ in open surgery, the next step is resection of the origin of the extensor digitorum longus muscle off the fibular head, which makes the reduction easier. After the reduction is done, a joint capsule has to be reconstructed, and then the fibular head is to be transfixed temporarily.

Van den Bekerom et al. [33] recommended that postoperative immobilization is not necessarily required, and they allowed to bear weight immediately after the operation although the knee may not be flexed more than 90° for the first two weeks. We preferred not to immobilize the knee after the procedure also but in the other side we gave no bear weight but preferred immediately a full range of motion in the knee joint. After six weeks we took out the screw although it is recommended after 3–6 months [33], because we wanted to avoid cracking the screws as it was in two cases. Some authors also removed the screw after six weeks [10]. In the presented case full weight bearing was given immediately after removing

the screw, but without the previously placed postoperatively immobilization which resulted in faster patient recovery and his earlier return to sports activities. Full sports recovery after non-surgical treatment of luxation PTFJ with or without immobilization and without bear weight was six months [34, 35]. Robinson et al. [18] said that their patient had full sports recovery after nine months, but when treated operatively with immobilization and without bear weight after eight weeks.

At our Clinic for Orthopaedic Surgery and Traumatology we described a similar case of dislocation of the PTFJ in a football player three years ago (published in 2013), who was injured during football game, when he suddenly changed the direction while his foot was fixed to the ground, unlike this case, where injury was caused by a direct blow on bended knee when he was tackling the ball [10]. The same type of dislocation of the PTFJ was in both cases and it was type II by Ogden's classification. We used a previously described stabilization principles for PTFJ dislocations but in the first case, stabilization was conducted with cancellous screw and in this case we used cortical screw, also we had changes in the postoperative period. The main difference of this modified treatment which proved to be better (in this two extremely rare and similar cases) was based on greater joint stability using cortical screw and immediately starting with physical therapy (full range of motion in the knee joint and strengthening the muscles of the whole leg), without use of postoperative immobilization which was used in the earlier described case by Milankov et al. [10]. This consequent delay of rehabilitation for about two months resulted in longer recovery period. The case reported by Milankov et al. [10] was back to his sports activities four months after the injury, they treated the patient operatively with above-the-knee plaster cast and after six weeks full weight bearing was allowed and physical therapy started. The presented patient was treated without immobilization and weight bear, and we immediately started with physical therapy (immediately full range of motion in the knee joint) and as a result of that the patient returned to football playing without any limitations 12 weeks after the injury.

Conclusion

Prolonged pain in the knee can be induced by not diagnosed dislocation of the PTFJ and it must be taken into consideration in the differential diagnosis of chronic pain in the knee.

Adequate clinical examination and analysis of X-ray of the knee can be relatively easy to establish a diagnosis and further treatment. In case of acute PTFJ dislocation, the first choice method is closed reduction in sedation or general anesthesia, if closed reduction fails, ORIF must be performed. Three cortical fixation of PTFJ with a cortical screw, without immobilization and early start of physical therapy lead to rapid return to sports activities.

R E F E R E N C E S

1. *Nelaton A*. Elements de pathologic chirurgicale. Paris: Librairie Germer Ballière; 1874.
2. *Ogden JA*. Subluxation and dislocation of the proximal tibiofibular joint. J Bone Joint Surg Am 1974; 56(1): 145−54.
3. *Turco VJ, Spinella AJ*. Anterolateral dislocation of the head of the fibula in sports. Am J Sports Med 1985; 13(4): 209−15.
4. *Harvey GP, Woods GW*. Anterolateral dislocation of the proximal tibiofibular joint: Case report and literature review. Today's OR Nurse 1992; 14(3): 23−7.
5. *Ogden JA*. The anatomy and function of the proximal tibiofibular joint. Clin Orthop Relat Res 1974; 101: 192−7.
6. *Laing A, Lenehan B, Ali A, Prasad C*. Isolated dislocation of the proximal tibiofibular joint in a long jumper. Br J Sports Med 2003; 37(4): 366−7.
7. *Falkenberg P, Nygaard H*. Isolated anterior dislocation of the proximal tibiofibular joint. J Bone Joint Surg Br 1983; 65(3): 310−1.
8. *Arziman I, Katırcı Y, Bilgiç S, Tuncer SK*. Isolated dislocation of the head of the fibula. J Clin Anal Med 2011; 2: 99−100.
9. *Parkes JC, Zelko RR*. Isolated acute dislocation of the proximal tibiofibular joint. Case report. J Bone Joint Surg Am 1973; 55(1): 177−83.
10. *Milankov M, Kecojević V, Gvozdenović N, Obradović M*. Dislocation of the proximal tibiofibularjoint. Med Pregl 2013; 66(9−10): 387−91.
11. *Sekiya JK, Kuhn JE*. Instability of the proximal tibiofibular joint. J Am Acad Orthop Surg 2003; 11(2): 120−8.
12. *Lyle HH*. Traumatic luxation of the head of the fibula. Ann Surg 1925; 82(4): 635−9.
13. *Weinert CR, Raczka R*. Recurrent dislocation of the superior tibiofibular joint. Surgical stabilization by ligament reconstruction. J Bone Joint Surg Am 1986; 68(1): 126−8.
14. *Tanner SM, Brinks KF*. Reconstruction of the proximal tibiofibular joint: A case report. Clin J Sport Med 2007; 17(1): 75−7.
15. *Horst PK, Laprade RF*. Anatomic reconstruction of the chronic symptomatic anterolateral proximal tibiofibular joint instability. Knee Surg Sports Traumatol Arthrosc 2010; 18(11): 1452−5.
16. *Crothers OD, Johnson JT*. Isolated acute dislocation of the proximal tibiofibular joint. Case report. J Bone Joint Surg Am 1973; 55(1): 181−3.
17. *Miettinen H, Kettunen J, Väätäinen U*. Dislocation of the proximal tibiofibular joint.A new method for fixation. Arch Orthop Trauma Surg 1999; 119(5−6): 358−9.
18. *Robinson Y, Reinke M, Heyde CE, Ertel W, Oberholzer A*. Traumatic proximal tibiofibular joint dislocation treated by open reduction and temporary fixation: A case report. Knee Surg Sports Traumatol Arthrosc 2007; 15(2): 199−201.
19. *Eichenblat M, Nathan H*. The proximal tibiofibular joint: an anatomical study with clinical and pathological considerations. Int Orthop 1983; 7(1): 31−9.
20. *Bozkurt M, Yilmaz E, Atlihan D, Tekdemir I, Havitcioglu H, Gunal I*. The proximal tibiofibular joint: an anatomic study. Clin Orthop Relat Res 2003; 406: 136−40.
21. *Aladin A, Lam KS, Szypryt EP*. The importance of early diagnosis in the management of proximal tibiofibular dislocation: a 9- and 5-year follow-up of a bilateral case. Knee 2002; 9(3): 233−6.
22. *Ellis C*. A case of isolated proximal tibiofibular joint dislocation while snowboarding. Emerg Med J 2003; 20(6): 563−4.
23. *Ares O, Conesa X, Seijas R, Carrera L*. Proximal tibiofibular dislocation associated with fracture of the tibia: a case report. Cases Journal 2009; 2(1): 196.

24. *Turco VJ, Spinella AJ.* Anterolateral dislocation of the head of the fibula in sports. Am J Sports Med 1985; 13(4): 209−15.
25. *Laprade RF, Terry GC.* Injuries to the Posterolateral Aspect of the Knee: Association of Anatomic Injury Patterns with Clinical Instability. Am J Sports Med 1997; 25(4): 433−8.
26. *Goldstein Y, Gold A, Chechik O, Drexler M.* Dislocation of the proximal tibiofibular joint: A rare sports-related injury. Isr Med Assoc J 2011; 13(1): 62−3.
27. Morrison T, Shaer J, Little J, Bilateral . Atraumatic, Proximal Tibiofibular Joint Instability. Orthopedics 2011; 34(2): 133.
28. *Horan J.* Proximal tibiofibular dislocation. Emerg Med J 2006; 23(5): e33.
29. *Andersen K, Lind T.* Simultaneous fracture of the ankle and disruption of the superior tibiofibular joint: A case report. Acta Orthop Scand 1991; 62(4): 399−400.
30. *Burke NG, Robinson E, Thompson NW.* An isolated proximal tibiofibular joint dislocation in a young male playing soccer: A case report. Cases J 2009; 2(1): 7261.
31. *Capps GW, Hayes CW.* Easily missed injuries around the knee. Radiographics 1994; 14(6): 1191−210.
32. *Ellis C.* A case of isolated proximal tibiofibular joint dislocation while snowboarding. Emerg Med J 2003; 20(6): 563−4.
33. *van den Bekerom MP, Weir A, van der Flier RE.* Surgical stabilization of the proximal tibiofibular joint using temporary fixation: a technical note. Acta Orthop Belg 2004; 70(6): 604−8.
34. *Semonian R, Denlinger P, Duggan R.* Proximal tibiofibular subluxation relationship to lateral knee pain: A review of proximal tibiofibular joint pathologies. J Orthop Sports Physical Ther 1995; 21(5): 248−57.
35. *Laing A, Lenehan B, Ali A, Prasad C.* Isolated dislocation of the proximal tibiofibular joint in along jumper. Br J Sports Med 2003; 37(4): 366−7.

Received on March 13, 2015.
Revised on October 26, 2015.
Accepted on October 27, 2015.
Online First July, 2016.