

Unexplained proximal tibiofibular joint pain after high tibial osteotomy

Enrique Adrian Testa, David L Haeni, Gerrit Behrens, Michael T Hirschmann

ABSTRACT

Problems of the proximal tibiofibular joint (pTFj) after high tibial osteotomy (HTO) are rare. A 44 year old male patient presented with diffuse pain on his left knee 3 years after medial opening wedge HTO. Patient described persistent anterior tibial and lateral knee pain. 2 years after HTO, patient underwent implant removal but the knee pain persisted. As the reason for the persistent pain was not identified, further radiological evaluation was done. Single photon emission computerized tomography/computerized tomography (SPECT/CT) revealed that there was no increased uptake within the tibiofemoral joint, indicating a biologically well performed correction of the varus deformity. However, markedly increased tracer uptake was found at the pTFj. On the inherent axial CT scans, it was seen that the proximal screws were too long and placed within the pTFj. Along with this a severe osteoarthritis of the pTFj was identified. The cause of the patient's pain was then confirmed by a CT guided infiltration of local anesthetic. An arthrodesis of the pTFj was performed and at 12 months followup after the arthrodesis the patient was pain free. This case highlights how important it is to evaluate the pTFj in patients with unexplained pain after HTO. SPECT/CT was helpful in identifying the patient's problem in this challenging case.

Key words: Arthrodesis, high tibial osteotomy, proximal tibiofibular joint, medial compartment arthrosis

INTRODUCTION

Importance of the proximal tibiofibular joint (pTFj) is generally underestimated, when compared to the tibiofemoral and patellofemoral joint. The pTFj is a sliding joint connecting the proximal tibia and the fibular head. It belongs to the complex lateral region of the knee joint. It's major function is the dissipation of torsional and lateral stress as well as axial load transmission of the lower leg.^{1,2} The pTFj communicates with the tibiofemoral joint in 10-63% and is referred as the 4th compartment of the knee joint.^{1,2} In standard clinical and radiological examinations the pTFj is often under acknowledged, which is due to the rarity of related problems. Moreover,

the patients are often not able to clearly localize the origin of their pain.¹⁻³

When the patient's history as well as clinical and standard radiological examination do not equivocally lead to the diagnosis, further imaging may be helpful. Hybrid imaging modalities such as single photon emission computerized tomography/computerized tomography (SPECT/CT), which is SPECT in combination with conventional CT, has gained increasing interest in patients with unexplained pain after knee surgery.⁴⁻⁶ With this case report, we strive to highlight the importance of investigating the pTFj in patients with unexplained knee pain after high tibial osteotomy (HTO).

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CASE REPORT

A 44 year old male patient presented to us with diffuse pain of his left knee 3 years after a medial opening wedge HTO which was fixed by a tomofix plate (Depuy Synthes, Oberdorf, Switzerland) due to medial compartment overloading in a varus knee [Figure 1]. Despite an uneventful followup, patient continued to have pain throughout the rehabilitation period. The patient described persistent anterior tibial and lateral knee pain. The preoperatively reported medial joint pain was not present anymore. 2 years after HTO the patient underwent implant removal, but knee pain persisted. At initial presentation

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to our clinic, there were no signs of infection. The medial wound had healed. There was tenderness on the anterior and medial tibia and over the lateral-posterior knee joint line. In addition, a mild hypesthesia surrounding the scar site was identified. The vascular status was unremarkable. During varus stress and rotating meniscal tests, the pain became intolerable and testing had to be stopped. Active range of motion (flexion/extension) was 120°/0°.

Standard conventional anterior-posterior and lateral radiographs of the knee showed that the osteotomy site and the plate was placed considerably distally on the tibia. In addition, osteoarthritis of the different knee compartments (Grade II-IV according to Kellgren-Lawrence), in particular of the patello femoral joint was noted [Figure 2]. The osteotomy site appeared to be well healed. On long leg radiographs, the Mikulicz line was running through the lateral tibiofemoral compartment. As the reason for the persistent pain was not identified, further radiological evaluation was indicated.

The differential diagnosis was under-correction by the osteotomy, a nonunion or an increasing osteoarthritis. SPECT/CT using 99mTc-hydroxymethylene diphosphate (HDP) as a bone tracer, was performed and it revealed that there was no increased uptake within the tibiofemoral joint, indicating a biologically well performed correction of the varus deformity. However, markedly increased tracer uptake was found at the pTFj. On the inherent axial CT scans, it was also seen that the proximal screws were too long and placed within the pTFj. SPECT/CT draws attention to the site of the problem. Along with this a severe osteoarthritis (Grade III-IV of Kellgren-Lawrence) was identified [Figure 3].

The cause of the patient's pain was due to an iatrogenic lesion of the pTFj and consequent degenerative osteoarthritis was then confirmed by a CT-guided infiltration with local anesthesia [Figure 4]. After the injection, the patient's pain disappeared for half a day.

Decision was made to perform an arthrodesis of the pTFj using a compression screw. At the followup of 6 and 12 months after the arthrodesis, the patient was pain free except for slight anterior knee pain, which was related to the patellofemoral osteoarthritis [Figure 5].

DISCUSSION

This is an exceptional case dealing with the difficulty of diagnosing and treating an iatrogenic lesion of the pTFj in a patient with medial opening wedge HTO. Esenkaya *et al.*⁸ showed that in 6.5% of patients in a series of 46 medial opening wedge osteotomies, there was an intraarticular saw

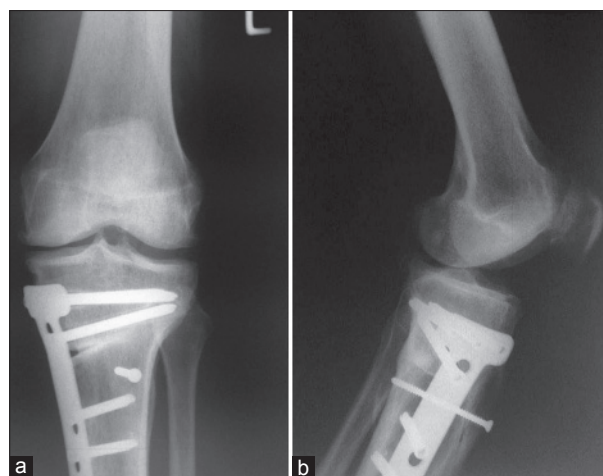


Figure 1: Anteroposterior (a) and lateral (b) nonweight bearing radiograph of the left knee after proximal high tibial osteotomy



Figure 2: Anteroposterior (a) and lateral (b) knee radiographs at the first presentation showing osteoarthritis in the different knee compartments. The osteotomy site appears to be healed



Figure 3: 99mTc-hydroxymethylene diphosphate-single photon emission computerized tomography/computerized tomography (CT) revealed no tracer uptake within the tibiofemoral joint. The osteotomy site had healed indicating no tracer uptake. Increased tracer uptake was seen in the proximal tibio-fibular joint (pTFj). In the inherent CT data it was found that there was an iatrogenic screw perforation of the pTFj and subsequent osteoarthritis had developed

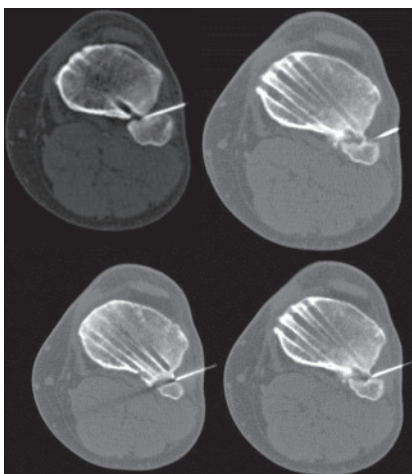


Figure 4: A local infiltration under computerized tomography guidance confirmed the diagnosis, leading to complete pain relief for 8 h

into the pTFj. It was noted that in patients with a decreased slope of the lateral tibial plateau, the fibular head and the pTFj could be as close as 2 mm to the osteotomy site. However, there is no study or case report describing that the pTFj might be at risk for screw perforation during HTO. It is therefore recommended to use intraoperative fluoroscopy for guidance of the k-wire and screw placement.⁹ None of the studies analyzing complication rates after HTO, report or even consider the possibility of an iatrogenic lesion of the pTFj. Laidlaw *et al.*⁷ described two cases of an iatrogenic lesion of the pTFj due to the proximal screws of a tibial nail. The authors further noted that there is an area, in which the pTFj is at risk while placing the proximal screws in tibial nailing. This area, which is in an axial view oriented 44.7° to 72.1° on the right side and 40.6° to 73° on the left side, should be carefully avoided. In our case, the distal tibial osteotomy site and consequent distal plate position were the reason for this iatrogenic lesion. Hence, a horizontal and distal orientation of the osteotomy site should be avoided under all circumstances.

Computer assisted navigated open wedge HTO improves the precision of the osteotomy line, diminishing to 1% the mean deviation from the planned line in nearly 100% of the samples considered. It is clear that with this technique the position of the screws are under 3D images control. The dose of radiation under CT and the costs of use and maintenance of the navigation systems in comparison with a normal fluoroscopy machine are the main limiting factors.¹⁰

In the case of unexplained knee pain and equivocal clinical and radiological findings one should consider SPECT/CT, which was able to elucidate the cause of the patient's problems. The benefit of SPECT/CT is that it is able to pinpoint the origin of the problem, which then shows increased tracer uptake. The combined structural and

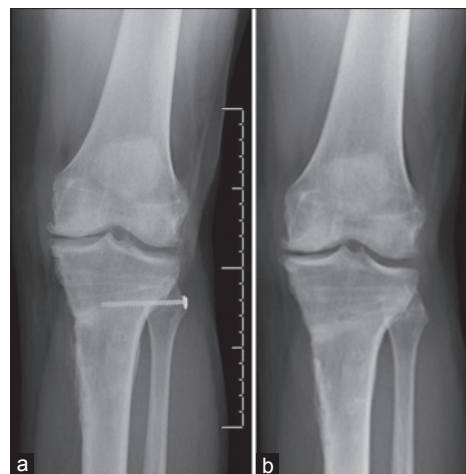


Figure 5: The radiograph of knee joint anteroposterior projection (a) showing arthrodesis with a compression screw 3 months after the operation (b) 3 months after the screw removal

metabolic information makes it easier to identify the site of problems, which is beneficial in a joint consisting of several compartments. In addition, overloading of the medial or lateral tibiofemoral as well as the patellofemoral joint can be evaluated. As SPECT/CT also detects osteoarthritic changes, it was able to show not only the absent medial compartment uptake, but also the increased uptake in the pTFj.⁴⁻⁶

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