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Case report

Instability of the proximal tibiofibular joint associated with total knee arthroplasty

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ABSTRACT

To our knowledge, proximal tibiofibular joint instability has never been reported in a patient with a total knee arthroplasty (TKA). We present the case of a patient with anterolateral proximal tibiofibular joint instability associated with a complex primary TKA. In 2010, a male patient of 47 years was referred for TKA after posttraumatic osteoarthritis. The patient's history includes a fracture of the left lateral tibial plateau in 2008 and removal of osteosynthesis material in 2009. TKA with a lateral metal augment and intramedullary stem was performed in 2010. After TKA, instability of the left proximal tibiofibular joint (PTFJ) was diagnosed. The patient underwent PTFJ arthrodesis and, at 5 years' follow-up, had no residual pain, with full range of motion. In this case, arthrodesis was the only possible surgical option because reconstruction surgeries require the establishment of bone tunnels in the tibia and fibula for the passage of a graft. Low bone quality and the use of an intramedullary stem with a metal augment in the tibia made any reconstruction technique unfeasible because the proximal tibia was obliterated. Although several PTFJ reconstruction techniques are available, they are difficult to apply to patients with a complex TKA.

Introduction

Proximal tibiofibular joint instability (PTJI) is increasingly reported in the literature. Clinically, PTJI can be seen in patients with no history of knee trauma (eg, idiopathic subluxation of the joint) and in patients experiencing high-energy traumatic dislocations that may be associated with long bone fractures. Injury to the proximal tibiofibular joint (PTFJ) is most commonly observed among athletes whose sports require violent twisting motions of the flexed knee, such as soccer, rugby, football, baseball, and basketball [1-6].

PTFJ pathologies can be classified into 6 types: subluxation, anterolateral, posteromedial, superior, posterolateral, and inferior dislocations [3,7,8]. Of these, anterolateral PTJI is the most common, ranging from 69% to 85% of cases [9,10]. The last 2 dislocations are both unusual and associated with floating knee injuries. Their diagnoses are mainly based on the presence of neurovascular injuries. Treatment options for PTJI are variable and include closed/open reduction with reconstruction, fibular head resection, and arthrodesis [7,8]. To our knowledge, none of these treatment options have been reported in patients with PTJI after total knee arthroplasty (TKA). We present the case of a patient with anterolateral PTJI associated with a complex primary TKA. The patient gave written informed consent for the publication of this case report.

Case history

The patient's case history is summarized in Table 1. A 47-year-old white male computer technician underwent an open reduction and internal fixation in 2008 after a Schatzker type 2 [11] lateral tibial plateau fracture after a fall from a height of 10 feet (3 m). In 2009, malunion with significant depression of the lateral tibial plateau was diagnosed, leaving the patient with pain and functional impairment marked by an inability to bear weight. It was decided at

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Table 1
Timeline of the patient's case history.

Date	Event
2008	Patient undergoes an open reduction internal fixation after had a Schatzker type 2 lateral tibial plateau fracture after a fall from a height of 10 feet (3 m).
2009	Patient is diagnosed with malunion with significant depression of the lateral tibial plateau. Osteosynthesis material is removed, leaving the patient with pain and functional impairment marked by an inability to bear weight.
2009-2010	Patient develops posttraumatic osteoarthritis, is unable to bear weight on the affected knee, and is required to use crutches for 2 years.
April 2010	Patient undergoes TKA. After TKA, patient reports lateral knee pain when bearing weight on the affected knee.
July 2011	Dynamic fluoroscopy of the proximal tibiofibular joint is done, and PTJI is diagnosed. Patient undergoes arthrodesis on the affected knee.
January 2012	Patient reports complete pain relief after arthrodesis.
February 2015	Patient has no residual pain in the knee or in the ankle, with full range of motion, at the latest follow-up.

this time to remove the osteosynthesis material. The plate removal was staged from the TKA procedure because preoperative templating showed that the planned intramedullary stem would end at the same level as the most distal screw hole in the plate and therefore induce a stress riser for a potential fracture in the diaphysis of the tibia.

The patient developed posttraumatic osteoarthritis, and in April 2010, underwent TKA. Before TKA, the patient had been unable to bear weight on the affected knee and had been using crutches for 2 years. Before surgery, the patient's mechanical axis was 15° of valgus, range of motion (ROM) was 0°-130°, and erythrocyte sedimentation rate, C-reactive protein level, and white blood cell count were normal. Preoperative and postoperative radiographs are shown in Figures 1 and 2.

After TKA, the patient reported lateral knee pain when bearing weight on the affected knee. Dynamic fluoroscopy of the PTFJ was done at 15 months and PTJI was diagnosed (Fig. 3).When looking back at previous radiographs, lateralization of the fibular head was present from the initial trauma and was missed by the surgeon initially taking care of this patient. At 15 months after TKA, the patient underwent PTFJ arthrodesis.

Arthrodesis was performed by a separate lateral skin incision, allowing access to the PTFJ. Protecting the fibular nerve, fibular head cartilage was exposed and removed using a curette. Two short-threaded 4.0 cancellous screws were placed across the PTFJ to stabilize the proximal fibula (Fig. 4). Postoperatively, immediate weight bearing was allowed and early motion was encouraged.

The patient reported complete pain relief at 6 months after arthrodesis. At the latest follow-up (43 months after arthrodesis and 58 months after TKA), the patient has no residual pain in the knee or in the ankle, with full ROM.

Discussion

The PTFJ is a stable joint located in the posterolateral corner of the knee which serves as the attachment site for many structures that function as primary and secondary stabilizers of the joint [12,13]. The primary stabilizers are mostly the lateral collateral ligament, the biceps femoris tendon, and the capsular and ligament attachments. The arcuate ligament, the popliteofibular ligament, and the popliteus muscle and tendon are secondary stabilizers. The joint is reinforced anteriorly by the biceps femoris tendon insertion into the fibular head, posteriorly by the popliteus tendon,

Figure 1. Radiograph of the patient's knee before TKA revealing posttraumatic osteoarthritis.

superiorly by the fibular collateral ligament, and inferiorly by the interosseous membrane. The joint is surrounded by a fibrous capsule which is attached to the margins of the articular facets on

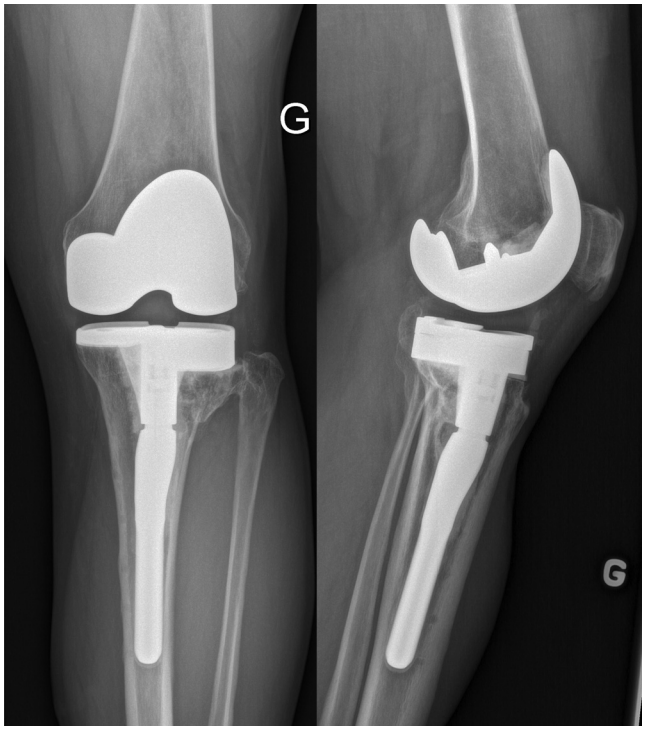

Figure 2. Radiograph of the patient's knee after TKA.