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Case report

Proximal tibiofibular osteoarthritis presenting as pain after total knee arthroplasty treated successfully with fusion of the proximal tibial-fibular joint

Kavin Sundaram, MS [a, *], Christian M. Klare, MD [a, b], Wayne E. Moschetti, MD, MS [a, b]

[a] Department of Orthopaedics, Geisel School of Medicine, Dartmouth College, Lebanon, NH, USA
[b] Department of Orthopaedics, Dartmouth-Hitchcock Medical Center, Lebanon, NH, USA

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ABSTRACT

Total knee arthroplasty (TKA) is a common treatment option for end-stage osteoarthritis of the tibiofemoral and patellafemoral joints. Diagnosis and treatment of the painful TKA can pose a significant challenge. In this report, we present the unusual case of a patient 12 years after total knee replacement presenting with isolated proximal tibial-fibular osteoarthritis as a cause of lateral knee pain. Proximal tibiofibular osteoarthritis is not typically on the differential diagnosis for a painful TKA but can be a rare cause of lateral knee pain. Proximal tibiofibular fusion may provide relief of pain and restoration of function.

Introduction

Total knee arthroplasty (TKA) is a common treatment option for end-stage osteoarthritis of the tibiofemoral and patellafemoral joints. As the rate of primary TKA continues to rise, the demand for revision TKA has seen a similar trend [1]. Diagnosis and treatment of the painful TKA can pose a significant challenge [2].

Most commonly, knee replacements fail due to aseptic loosening, infection, instability, and arthrofibrosis [2-4]. Proximal tibiofibular osteoarthritis is not typically on the differential diagnosis for a painful TKA but can be a rare cause of lateral knee pain [5,6].

In this report, we discuss the unusual case of a patient who developed lateral knee pain due to isolated proximal tibiofibular osteoarthritis 12 years after receiving a primary TKA on the same knee. We describe the surgical technique used to fuse the proximal tibiofibular joint in the setting of a prior total knee replacement.

Case history

A 71-year-old female presented with left knee pain 12 years after left TKA. The atraumatic pain began insidiously 1 year ago and had grown progressively worse despite conservative treatment options. It interfered with her ability to play tennis, because it was exacerbated with lateral motion. She presented to the surgeon who performed the primary TKA and who now had concerns for TKA failure. The patient was subsequently referred for further evaluation to the senior author (W.E.M.). On examination, she described the pain as predominantly lateral and posterior. The pain was worse with weight-bearing. She had painless range of motion of the knee while supine and no neurovascular abnormalities including normal peroneal nerve function. There was no effusion or ligamentous laxity. The patient had significant pain that was reproducible with compression of the fibular head. Laboratory assessment was without abnormality (C-reactive protein = 1.1 mg/L [normal less than or equal to 8.0 mg/L] and sedimentation rate 13 mm/h [normal 0-29 mm/h]) and there was no concern of infection. Initial plain radiographs did not demonstrate any significant radiographic findings in regards to osteolysis, loosening, or periprosthetic complication (Fig. 1a and b) related to her prosthesis. Subsequent workup with a computed tomography scan demonstrated severe degenerative changes at the proximal tibiofibular joint with no evidence of prosthetic loosening (Fig. 1c).

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* Corresponding author. 1 Medical Center Drive, Lebanon, New Hampshire, 03756-001, USA. Tel.: +1 603 653 6014.
E-mail address: kavin.sundaram.med@dartmouth.edu

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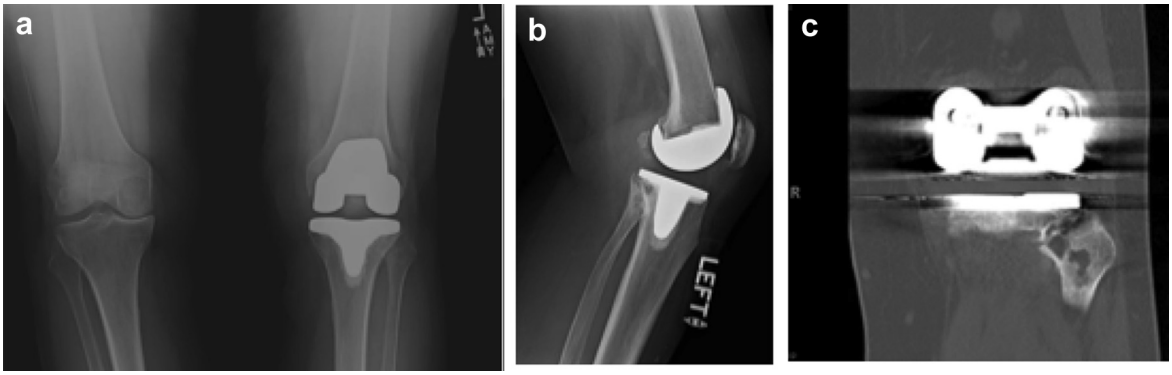

Figure 1. (a and b) Preoperative plain films with anteroposterior (AP) and lateral views show no loosening of the TKA. (c) Preoperative computed tomography imaging shows a cyst in the fibular head.

The patient then underwent computed tomography–guided local anesthetic injection into the proximal tibiofibular joint. Before and after the injection, the patient was asked to perform a series of provocative movements. After the injection, the patient reported a subjective increase in the range of motion at the knee with less discomfort. At that point, a discussion was held with the patient about the likely source of pain and the possibility of fusing the proximal tibiofibular joint to address her pain.

Technique

After administration of a general anesthetic and skin antisepsis, a tourniquet was inflated. A large curvilinear incision over the fibular head was made extending proximally and distally beyond the fibular head. We carried the dissection down sharply to the subcutaneous fat. We identified the fascia of the biceps femoris and dissected posteriorly, where the peroneal nerve was identified. The nerve was dissected distally and tagged with a Vesi-Loop that aided in identification throughout the case (Fig. 2a). We then dissected anterior to the fibular head, identifying the tibiofibular joint. Using a rongeur and curette, we resected the joint and sent samples for pathological analysis. Analysis of a permanent path specimen demonstrated features consistent with osteoarthritis with no signs of a cyst or neoplastic lesion.

A fibular ostectomy was performed to help offload the joint while weight-bearing. We dissected distally on the fibula approximately 5-7 cm. Care was taken to protect the peroneal nerve. A subperiosteal dissection was performed, and small Bennet retractors were placed around the fibula to protect the surrounding soft-tissue structures. Intraoperative fluoroscopy confirmed the location of our planned cut, and before ostectomy, we protected the distal peroneal nerve and tracked its course proximally to the fibular head. Using a microsagittal saw, we removed approximately 1 cm of the bone from the fibula in the region of the metaphyseal-diaphyseal junction.

Under fluoroscopic guidance, 2 guidewires were then placed through the fibular head into the tibia, directing them posterior to the keel of the implant and parallel to the joint. We morselized the resected bone, mixed it with 10 mL of allograft bone chips, and then packed the graft into the tibiofibular joint. The screws' lengths were determined using a depth gauge, and a cannulated drill was placed over the wires. We then achieved compression of the graft using two 4.5 mm cannulated screws placed across the tibiofibular joint. The position of the screws was confirmed using fluoroscopy (Fig. 2b). We removed the guidewires, irrigated the surgical site, deflated the tourniquet, and obtained hemostasis using electrocautery. The wound was then closed in layers. The patient was placed into a hinged knee brace with no limits on flexion and extension. She was kept limited weight-bearing for 3 months.

Outcomes

The patient was kept overnight in the hospital and discharged the next day. Shortly after surgery, she reported a significant improvement in her pain. Postoperatively, she had some transient peroneal nerve weakness that resolved over time without intervention. At 6 months, she had no pain with weight-bearing, was back to activity including tennis and golf, and had no evident peroneal nerve weakness. Radiographs are shown in Figure 3.

Discussion

Revision arthroplasty after TKA has serious consequences both clinically and economically. Each TKA revision costs $49,000 or more, and hospital charges for revision knee arthroplasty for osteoarthritis are $2.7 billion annually [1]. Indications for revision TKA include aseptic and septic causes, with the latter accounting for 25%-31% of cases [2-4]. Despite the many known indications for TKA revision and causes for TKA failure, proximal tibiofibular osteoarthritis is not typically thought of as a cause of the painful TKA. As outlined in this case, this can undoubtedly lead to pain around a previously well-functioning TKA. A review of the literature regarding the basic science, epidemiology, and surgical treatment of the tibiofibular joint informs our approach to our patient.

Recent biomechanical studies have brought attention to the role of the proximal tibiofibular joint both in health and states of disease [5-7]. Cadaveric studies provide evidence that the joint experiences significant rotational stress even in healthy individuals and provides a stabilizing role analogous to the distal tibiofibular joint. In a robotic cadaveric model, TKA balancing altered tibiofibular kinematics [7]. Future biomechanical studies may help further characterize how altered motion can affect the long-term health of the joint. Cadaveric-radiologic investigation has provided insight into the structure of the joint [8]. Researchers have shown that up to 10% of patients may have a channel of communication between the primary knee joint and proximal tibiofibular joint, and this may provide an avenue for extension of infectious and inflammatory conditions between the 2 compartments [9].

Emerging clinical and epidemiological evidence suggests proximal tibiofibular osteoarthritis may represent an underappreciated cause of posterior and lateral knee pain [8]. For example, patients with presumed peroneal nerve dysfunction have been later found to suffer from tibiofibular articular pathology [10]. While patients with proximal tibiofemoral osteoarthritis classically present with