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Case report

Fracture of an uncemented tantalum patellar component

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ABSTRACT

A 62-year-old man presented with the acute, atraumatic onset of pain 3 years after uncemented right total knee arthroplasty. He complained of new mechanical locking with the knee held in extension on examination and unable to flex the knee. On the plain radiographs, the patellar component peg was fractured and the plate was dislocated. The knee was immobilized, and revision to a cemented 3-peg component was performed. Fracture of a single-peg, tantalum-backed uncemented patellar component has not been described. Clinical suspicion for this should be given in the setting of acute locking. We recommend revision with a cemented polyethylene component.

Introduction

Uncemented porous-coated patella components were introduced in the mid-1980s but were abandoned because of wear, breakage, and subsequent metallosis of these usually titanium components. However, tantalum-trabecular metal components for acetabular components and metaphyseal cones have been very successful. With renewed interest in uncemented total knee arthroplasty, this strong and highly porous material has been used for the fabrication of uncemented tibial and patella components with 4- and single-peg fixations, respectively. There have been several reports of the successful results of the 4-peg tantalum tibial component. To our knowledge, there are no data on the results or complications of the single-peg tantalum patella component, and surgeons should be cautious in the use of novel implants.

We report a case of fracture of a single-peg tantalum patellar component with resultant metallic synovitis and dislocation of the patellar plate. The patient is aware that the data pertaining to this unique case will be presented and that the patient's protected health information will not be disclosed in accordance with the Health Insurance Portability and Accountability Act regulations. The patient has agreed.

Case history

The patient is a 62-year-old man with history of type II diabetes, hypertension, and depression who had a primary uncemented right total knee arthroplasty for primary osteoarthritis 3 years before presentation. He had no postoperative complications and a good clinical result for 3 years. He developed the acute onset of anterior knee pain and effusion while doing housework in a kneeling position. He presented to the Emergency Department for urgent evaluation with a new onset of pain and inability to flex his knee. There was no history of trauma to the knee.

The patient had a well-healed anterior right knee incision. There was a large effusion without warmth or erythema. He had tenderness about the medial joint line and the sensation of a discrete mass within the joint on the medial site. He was unable to actively flex his knee out of full extension because of discomfort, and passive motion examination isolated only 10° of knee flexion before anterior joint pain and a palpable mechanical block. The distal neurovascular examination was normal.

Anteroposterior, lateral, and sunrise radiographs were obtained in the emergency department (Fig. 1). On the sunrise view, there was a metallic density in the medial joint gutter and remnant metallic density in the native patella consistent with a broken

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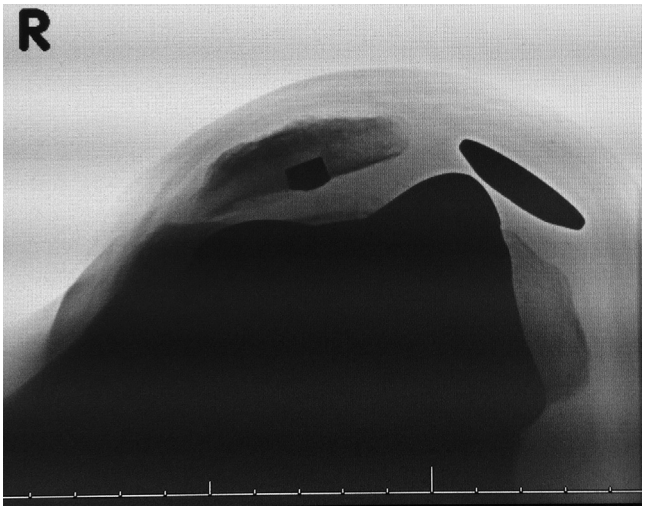

Figure 1. Initial radiograph showing fractured patellar component dislocated to medial joint.

Figure 3. Fractured patellar component ex situ.

single-peg tantalum patellar component (Zimmer NexGen; Zimmer Inc., Warsaw, IN).

The patient's knee was placed in a knee immobilizer, and he was advised non–weight bearing on this leg with crutches. After preoperative evaluation was completed, he was taken to the operating room 5 days later for revision.

With the use of a tourniquet, the patient's previous anterior incision was used. The knee joint was then aspirated, with the finding of 700 nucleated cells, with 51% lymphocytes on differential. An Insall-type medial arthrotomy [1] and a synovectomy were performed (Fig. 2). The patella plate, sitting free in the medial gutter, was removed. A 15-mm superficial scratch was noted in the anteromedial aspect of the femoral component, in a location that did not articulate with the polyethylene. The femoral and tibial components were well fixed, well positioned (no malrotation on direct inspection), and otherwise not damaged. The patella was everted, the single-tantalum peg was removed with a fine-nose rongeur, and fibrous tissue overlying the remnant patella was aggressively debrided to expose healthy bone (Figs. 2 and 3).

The patella was prepared including a pencil-tip burr to trephinate the bone surface, and a 38-mm all-polyethylene 3-peg component was cemented into the patella (Fig. 4). The wound was copiously irrigated, and periarticular anesthetic infiltration and layered wound closure were performed.

The patient had no postoperative complications and was discharged on the first postoperative day. The knee was not immobilized, full weight bearing was allowed, and the wound healed uneventfully. At 6 weeks after revision, the patient had 120° of knee flexion. He was satisfied with the function of his knee.

Discussion

The first generation of uncemented porous-coated total knee arthroplasty patella components, usually fabricated from pure titanium or titanium alloy, had relatively poor results, with accelerated polyethylene wear, plate and peg breakage, and metallic synovitis [2-6]. With the development of trabecular metal-tantalum for enhanced ingrowth coatings, high strength, and biocompatibility [7], a new generation of uncemented tibial components with 4 pegs and 2 different patella components, single hexagonal peg, and dome revision was introduced.

Fracture of porous-peg metal-backed [4, 8, 9] and all-polyethylene [10-12] patellar components have been reported. To our knowledge, this is the first report of fracture of this single-peg, metal-backed tantalum uncemented patellar component. This fracture was not associated with a traumatic event, at only 3 years of implantation in a relatively low-demand patient. We presume that the theoretical mode of failure was lack of bone ingrowth into the tantalum patella baseplate, some ingrowth or fixation of the hexagonal tantalum peg, and a fatigue fracture of the peg at the peg-plate junction. As pointed out by Unger and Duggan [13] in their series, it can be challenging to completely seat the undersurface of the patella against the host bone, and therefore, only the peg is in close contact with the bone leading

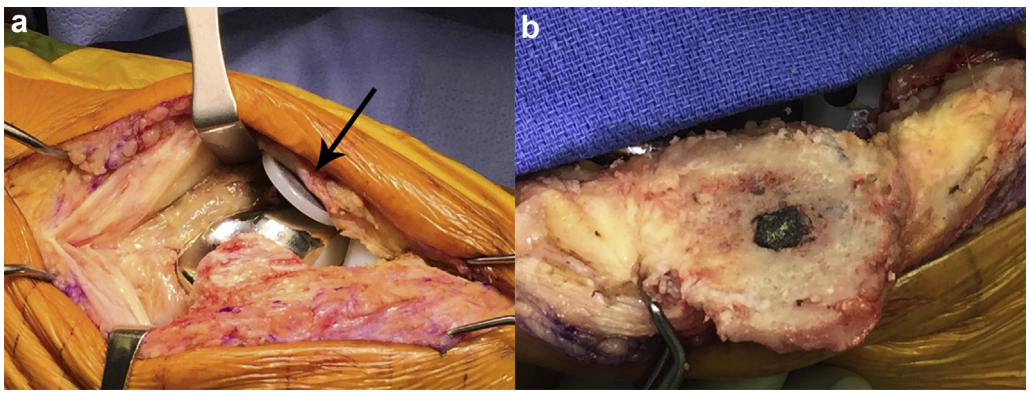

Figure 2. (a) Arthrotomy of knee showing fractured component (arrow) in medial gutter and (b) showing patellar component peg in situ.

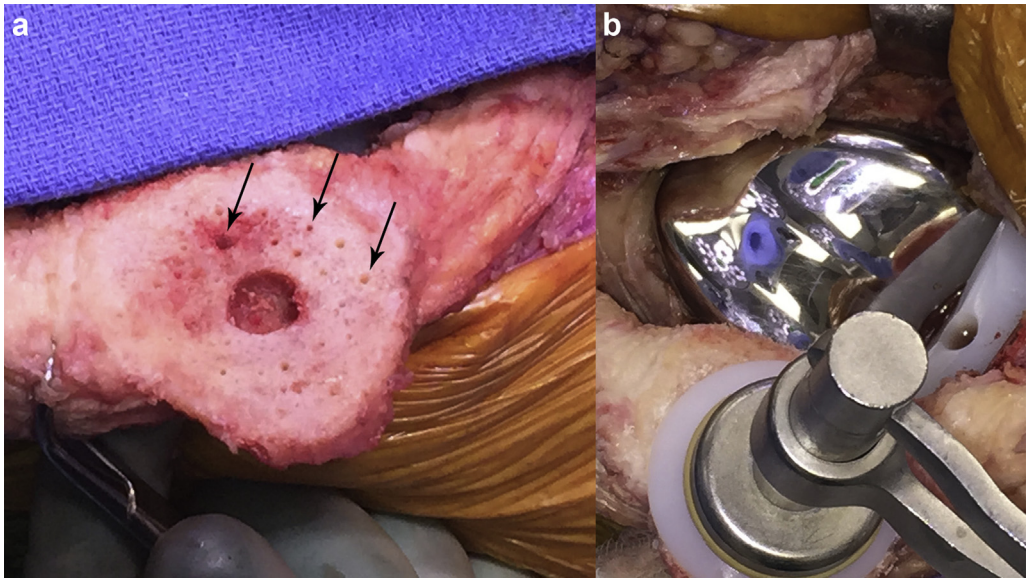

Figure 4. (a) Preparation of patella (arrow shows trephinations) for cemented component and (b) pressing of polyethylene patellar component into prepared patella.

to increased stress across the peg, with micromotion leading to a weakening of the peg contributing to the mode of failure. Until there are further reports of the longer-term success of this single-peg tantalum patella component, we recommend against the use of this prosthesis and agree with the recommendations of Unger and Duggan to use an all-poly cemented patellar component [13].

Summary

As the evolution of arthroplasty component types has evolved, a search for the most ideal material remains constant. Although more recently tantalum has gained a lot of traction in the literature because of its increased strength and biocompatibility, it is not without complications. This case highlights the concern for potential fracture of the tantalum component and the complications that come along with such an adverse event. Future studies will continue to focus on material refinement for use in arthroplasty components.

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