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CASE REPORT

Avascular Necrosis of the Patella Following Patellofemoral Arthroplasty

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ABSTRACT

Patellofemoral Arthoplasty is an accepted surgical treatment option for select patients with isolated patellofemoral osteoarthritis. Avascular necrosis of the patella is a rare post-operative complication of total knee arthroplasty, but it has not been previously reported following patellofemoral arthoplasty. We report a case of avascular necrosis of the patella following patellofemoral arthoplasty.

Level of Evidence: V; Case report.

Keywords: Total knee arthroplasty; Avascular necrosis, Patellofemoral syndrome.

INTRODUCTION

Patellofemoral osteoarthritis (PFOA) can be a debilitating knee pain that affects approximately 9% of patients over the age of forty [1]. Current treatment plans include both nonoperative and operative options. Nonoperative treatments, such as physical therapy and injections, can provide some relief, albeit usually temporary [2]. Surgical options include total knee arthroplasty (TKA), and, less commonly, patellofemoral arthroplasty (PFA). While avascular necrosis of the patella is a recognized but relatively rare, complication following TKA, we have not found any literature describing this rare complication following PFA. Here, we present a case of avascular necrosis (AVN) of the patella following PFA.

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CASE PRESENTATION

A 65-year-old woman who presented to the orthopedic clinic with longstanding bilateral knee pain localized to the anterior aspect of her knees. The pain was moderate to severe and worsened with prolonged standing and going up and down stairs. She denied any feeling of instability, catching, or locking. Prior treatments included injections, physical therapy, activity modification, and anti-inflammatory medications. She received minimal symptomatic relief with these treatment modalities and wished to pursue surgical intervention for her knee pain.

Patient's past medical history was significant for chronic asthma and mitral regurgitation; however, she did not have a history of long-term steroid use. Her past surgical history included hysterectomy and cholecystectomy.

On physical exam, both knees demonstrated significant patellofemoral crepitus, positive patellar grind test, and pain along patellar upon palpation. Muscle strength was 5/5 bilaterally and sensation was intact and symmetrical. Range of motion was 0 to 115 degree with pain with deep flexion. She denied joint line pain and ligaments were found to be stable.

Plain standing radiographs revealed advanced degenerative arthritis of bilateral patellofemoral joints with loss of joint space, sclerosis, and osteophyte formation (Figure 1).

The patient had exhausted nonoperative management of patellofemoral arthritis, and we discussed TKA versus PFA. The decision was made to proceed with a right PFA. PFA (Gender Solutions Patellofemoral Joint Prosthesis, Zimmer Inc., Warsaw, IN), was performed using a medial parapatellar approach. Intraoperatively, both of the menisci were intact, and the medial and lateral compartment articular surfaces were

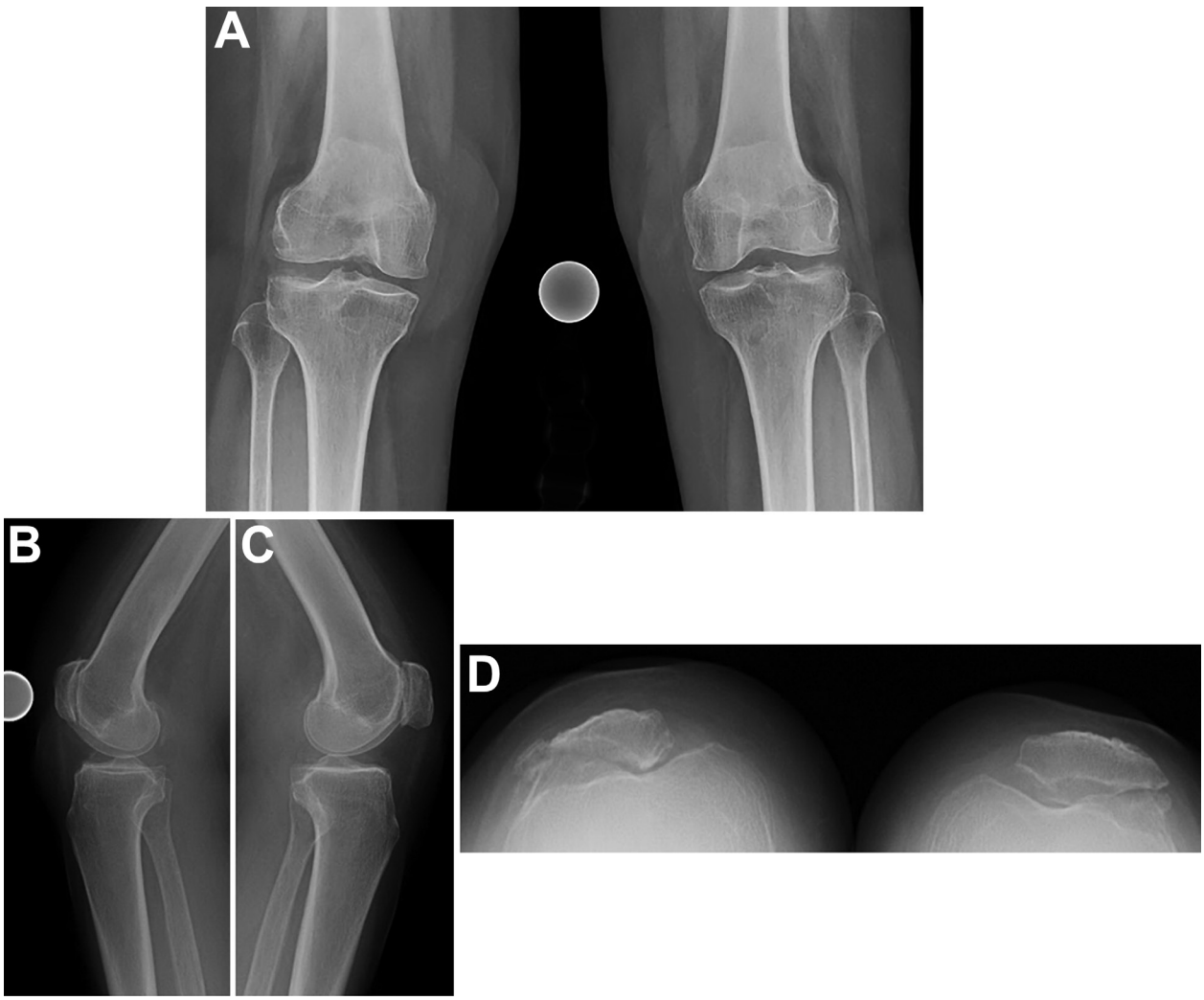

Figure 1A-D. Plain standing radiographs of 65-year-old female with chronic bilateral anterior knee pain with crepitus demonstrate severe patellofemoral arthritis.

well preserved. Patellar tracking was assessed and found to be satisfactory after final components were implanted, and the patient recovered without complication.

Post-operatively, the patient demonstrated central tracking of the patella, and the patient gained excellent range of motion and complete resolution of preoperative pain at 6-week postoperative visit (Figure 2). However, at 4-months postoperative visit, she complained of intermittent, moderate pain at the lateral aspect of the patella. Radiographs revealed fragmentation of the lateral aspect of the patella consistent with avascular necrosis. The patellar button still remained well fixed. The patient was placed in a knee immobilizer for 4 weeks, followed by progressive range of motion exercises (Figure 3).

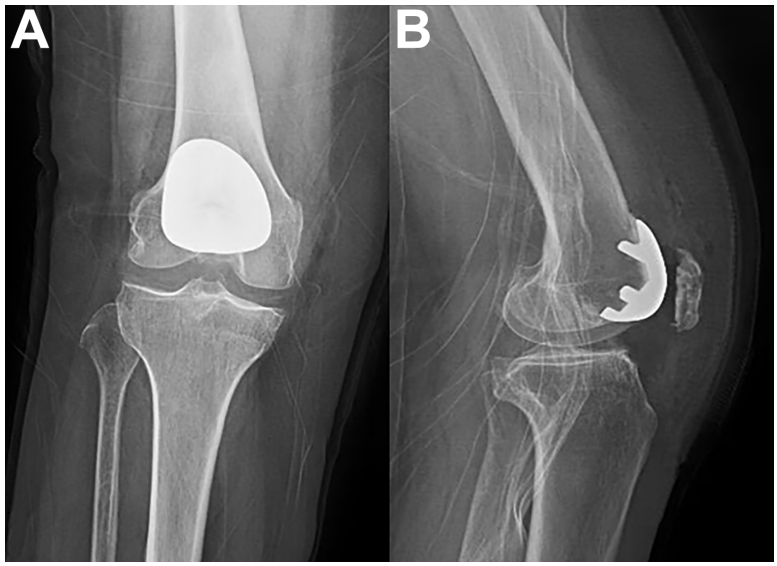

Figure 2A-B. Post-operative radiographs after PFA.

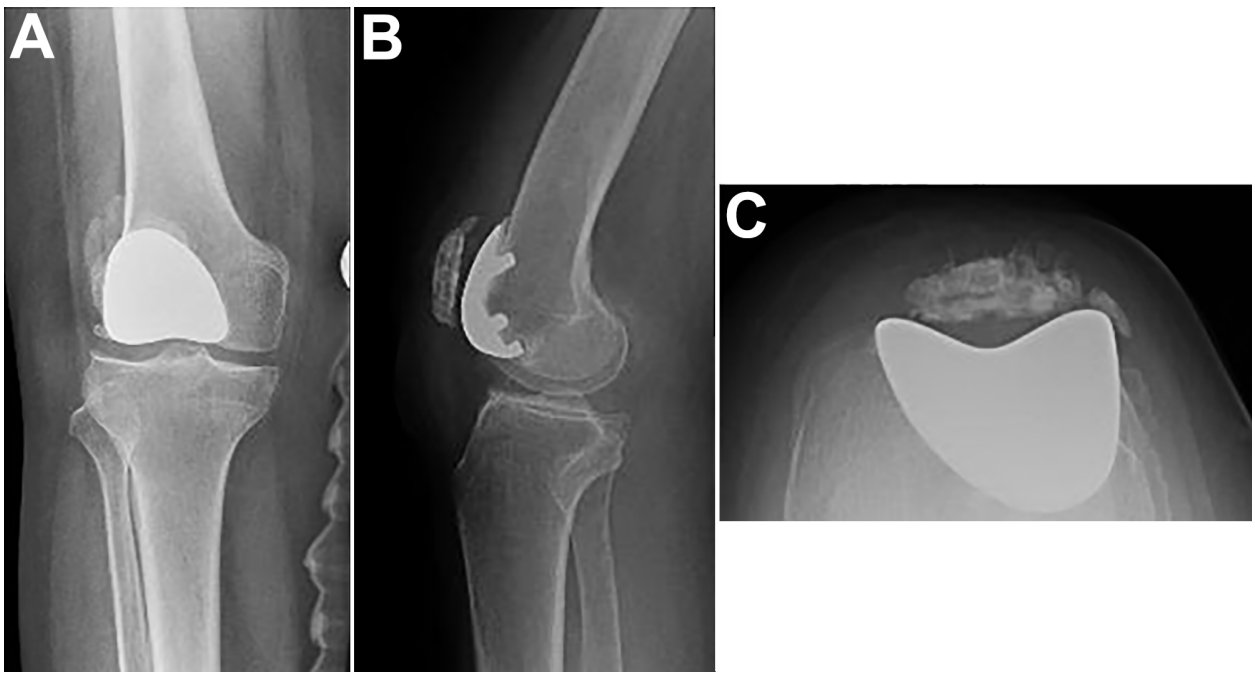

Figure 3A-C. 3-month post-operative radiographs showing AVN of the patella.

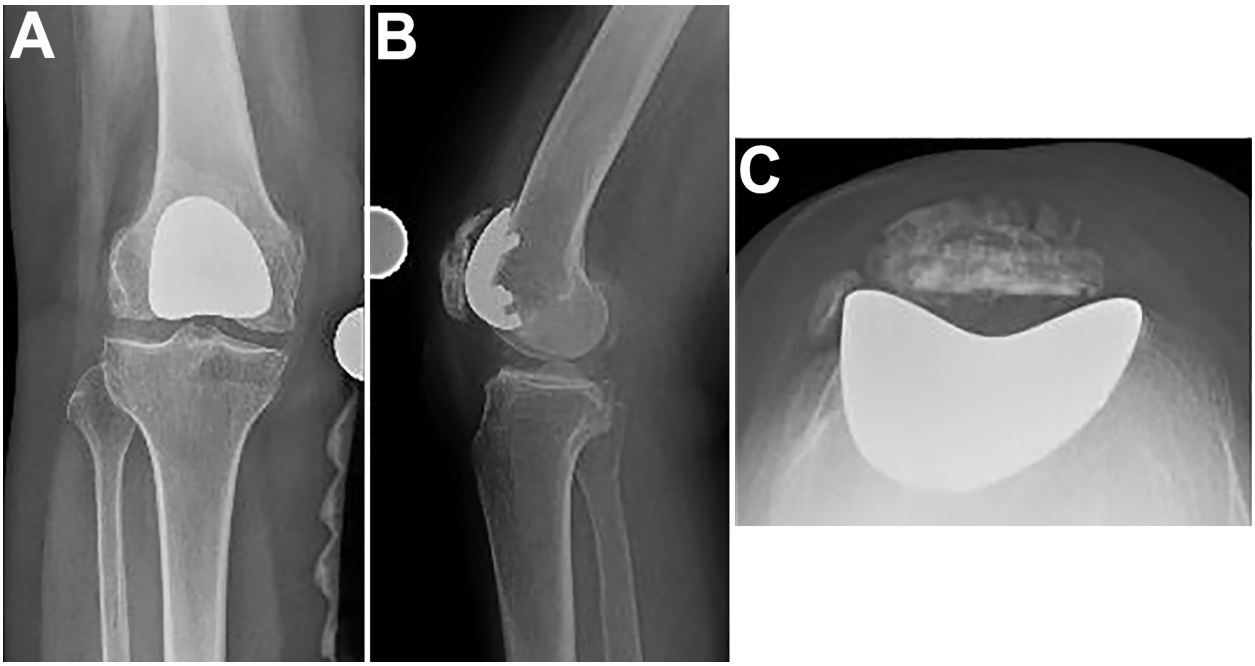

Figure 4A-C. 12-month post-operative radiographs demonstrating AVN of the patella.

At 12 months post PTA surgery (Figure 4), the patient continued to experience occasional mild pain, but she reported no functional limitations and was satisfied with her surgery. The range of motion was measured at 0 degrees of extension and 115 degrees of flexion, and her preoperative Knee Society Score (KSS) of 53 improved to 88 at her latest follow up visit.

DISCUSSION

While TKA has been the mainstay for surgical treatment of PFOA, studies have shown that PFA can be successful in a select patient population [3]. This option has the advantage of maintaining native knee kinematic and physiologic function, while still addressing the diseased area. However, PFA is not without its own set of complications, many of which are similar to TKA.

The complications of total knee arthroplasty have been well documented and characterized. Of these, complications related to the extensor mechanism may account for as many as 50% of TKA revisions [4]. Specifically, some authors estimate up to 30% of poor outcomes are associated with the patella [5], and there can be a 10% to 15% incidence of vascular compromise to the patella [6,7]. This reduction in perfusion can lead to AVN of the patella and possible hardware loosening, presenting as continual anterior knee pain.

The patella is supplied by an intraosseous as well as extraosseous vascular system, via the superior medial and lateral, the middle, and the inferior medial and lateral genicular arteries (Figure 5). Previous studies have identified an association between patellar AVN and performing a lateral release during TKA [6,8]. If a medial parapatellar approach is used with a concomitant lateral release, both the medial and lateral genicular vessels can be compromised, increasing the risk of AVN of the patella [4,9].

PFA shares many complications with TKA, including persistent pain, arthro-

fibrosis and polyethylene wear. Some early complications are more common in PFA, such as persistent anterior knee pain, intraoperative fracture, and extensor mechanism failure [10,11]. There are also documented complications specific to PFA that do not seem to appear after TKA, such as the presence of a hematoma in the lateral compartment and incorrect extensor mechanism alignment [3]. The most common cause of PFA failure is the progression of osteoarthritis resulting in conversion to TKA, accounting for approximately 25% of revisions at 15 years [12,13]. However, while AVN of the patella leading to patellar fracture and button loosening are known complications of TKA, no mentions of this complication were found during our literature review. This may be in part due to the fewer number of PFAs performed relative to TKAs. Since many patients with persistent pain after PFA will eventually undergo TKA, this complication may be not be reported due to revision secondary to another complication. Additionally, PFA is less commonly associated with a lateral release, which has been shown to have greater implication in patellar AVN. Our patient is unique in that she developed clear radiologic evidence of AVN of the patella in the absence of a lateral release during a PFA. Initially, she appeared to be progressively healing. Despite early success after PFA, the patient developed AVN at 4 months that was radiologically appreciable.

CONCLUSION

AVN of the patella is a complication that can result after PFA. Even in the absence of a lateral release, damage to the surrounding vasculature during this procedure can be significant enough to disrupt critical blood supply. Continual anterior knee pain after a PFA should raise suspicion for this complication.

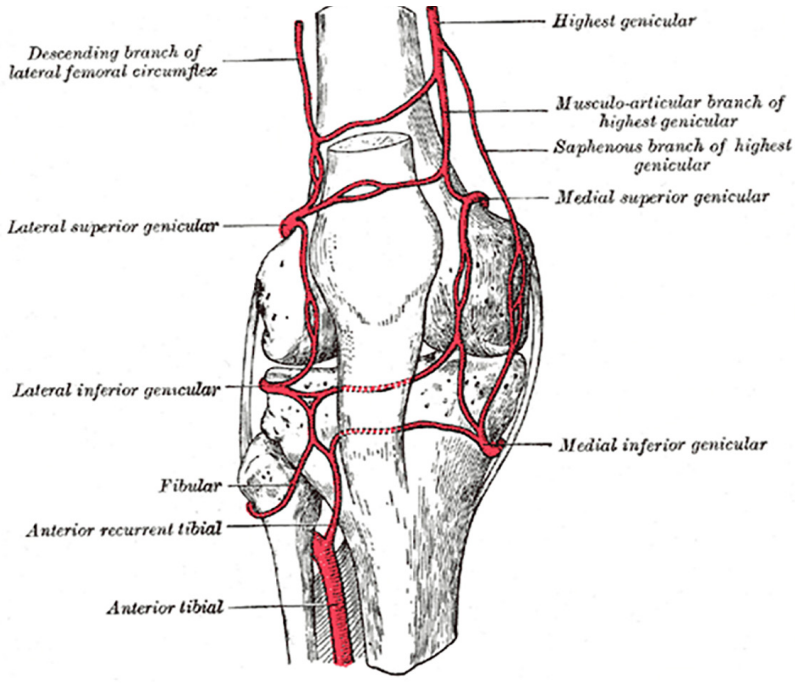

Figure 5. Blood supply to the patella. From: Bartleby.com, Gray's Anatomy, Plate 552, Public Domain at: *https://commons.wikimedia.org/w/index.php?curid=541417.*

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