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Posterior Knee Dislocation Following a Knee Arthroplasty

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Abstract

Total knee arthroplasty is one of the most commonly performed surgeries in the United States. Complications following knee arthroplasty are uncommon, especially dislocations. Knee dislocations can be associated with popliteal artery injuries, which are potentially catastrophic and limb threatening. Emergency Department (ED) physicians should be familiar with the management of knee dislocations and complications following total knee arthroplasty. A 61-year-old female presented to the ED with acute right knee pain approximately 10 weeks after undergoing a total knee replacement for tricompartmental osteoarthritis. While at her first outpatient physical therapy evaluation, the patient felt a pop while going from a seated to standing position. Subsequently, she experienced a popping sensation and was unable to bear weight or extend the knee. On exam, she was in obvious pain, her surgical scar was well healed, and her knee was flexed to about 90 degrees and could not be extended. She had a palpable dorsalis pedis pulse and brisk capillary refill. Radiography revealed a posterior dislocation of her tibial prosthesis relative to her femoral prosthesis. Under procedural sedation, the dislocation was reduced and placed in a knee immobilizer. Her neurovascular exam was intact pre and post-reduction. Several months later she experienced another episode of spontaneous dislocation during a routine office visit requiring a second ED visit for reduction under procedural sedation. She was subsequently scheduled to undergo a revision of her total knee replacement due to suspected flexion instability with an inadequate extensor mechanism.

INTRODUCTION

Total knee arthroplasty (TKA) is one of the most commonly performed surgeries in the United States. Complications following TKA are uncommon, especially dislocations. Knee dislocations can be associated with popliteal artery injuries which are potentially catastrophic and limb threatening.

CASE REPORT

A 61-year-old female presented to the emergency department (ED) with acute right knee pain

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approximately 10 weeks after undergoing a total knee replacement for tricompartmental osteoarthritis. Post-operatively, she was noted to have quad weakness and atrophy. While at her first outpatient physical therapy evaluation, the patient felt a pop while going from a seated to standing position. Subsequently, she was unable to bear weight or extend the knee. On exam, her surgical scar was well healed. However, she was in obvious pain, and her knee was flexed to about 90 degrees with an extension block. She has a palpable dorsalis pedis pulse and brisk capillary refill. The patient was administered intravenous (IV) analgesics and stat radiography revealed a posterior dislocation of her tibial prosthesis relative to her femoral prosthesis, which is known as a 'Cam Jump' type dislocation of a posterior stabilized total knee prosthesis.

Under procedural sedation, the dislocation was reduced and placed in a knee immobilizer. Her neurovascular exam is intact pre- and post-reduction. The orthopedic surgery team elected not to pursue a further vascular workup in the ED.



Figure 1 Lateral radiograph of knee showing posterior dislocation of tibial component indicated by the white arrow. Note knee flexed to 90 degrees.

She was referred back to her orthopedic surgeon as an outpatient. In follow-up, she was noted to have progressive quadriceps atrophy, placed in a hinged PCL brace, and referred back to physical therapy. Several months later she experienced another dislocation during a routine physical exam requiring a second ED visit for reduction under procedural sedation. She was subsequently scheduled to undergo a revision of her TKA.

DISCUSSION

Dislocations following TKA are uncommon, with only a few cases reported in the literature.¹ They may occur anteriorly, with the tibial component moving anterior relative to the femur, or posteriorly, with the tibial component (and its associated polyethylene insert) moving posterior relative to the femoral component. Generally, they are associated with low energy trauma. Reported risk factors include



Figure 2 Lateral radiograph following reduction with tibial component now articulating with femoral component indicated by white arrow.

component malalignment, polyethylene wear, extensor mechanism dysfunction, and flexion-extension gap mismatch.² Patients with underlying neuromuscular disease or multidirectional instability are also at risk. In the case of this patient, suspected flexion instability with an inadequate extensor mechanism and suspected underlying neuromuscular disease likely contributed to her dislocation. In most cases, radiographs of the knee can clearly identify the dislocated prosthesis.

Knee dislocations, whether native or prosthetic, are associated with potentially catastrophic injury to either the popliteal artery, popliteal vein, posterior tibial nerve, or peroneal nerves. For this reason, knee dislocations must be considered a medical emergency when presenting to the ED and orthopedic surgical services should be consulted. Primary and post-reduction examination should include careful evaluation of the popliteal, dorsalis pedis and posterior tibial arteries. Similarly, neurological exam should evaluate branches of the tibial nerve. Following initial examination

and radiographic evaluation, reduction should be performed as soon as possible. Post-reduction immobilization in a knee immobilizer is critical to stabilize the joint.¹

Following reduction, strong consideration should be made for a vascular evaluation. A palpable dorsalis pedis or posterior tibialis arterial pulse does not exclude an arterial injury.³ The appropriate vascular workup remains controversial. Ankle-brachial index (ABI) above 0.9 in the affected limb is reassuring and may be sufficient. However, computed tomography arteriogram and/or arterial doppler ultrasound of the affected leg should be carefully considered. Note that in patients with a knee prosthesis, significant scatter may require specific metal subtraction protocols and radiology assistance for interpretation of imaging. If no pulse is present or an arterial injury is identified, prompt surgical revascularization is indicated. In at least one case report, an above knee amputation was required.⁴ Other complications include geniculate artery injury, tibial nerve or peroneal nerve injuries, recurrent dislocations, and need for revision of the TKA.

In the outpatient setting, workup is directed at evaluating the etiology of the dislocation. In the case of our patient, there are two significant contributing factors. First, she had flexion instability with an inadequate extensor mechanism. She was also suspected of having an underlying neuromuscular disorder due to her profound quad atrophy. Her second dislocation occurred without any trauma during a routine physical exam of strength, a rarely reported mechanism for a knee dislocation following TKA. To correct her flexion instability, she was subsequently scheduled to undergo a revision of her total knee replacement. The goal of revision surgery in her case was restoration of the joint line and improved soft tissue balancing. A hinged or linked prosthesis may need to be considered.⁵

CONCLUSION

Dislocations following TKA are uncommon, with only a few cases reported in the literature¹. They may occur anteriorly, with the tibial component moving anterior relative to the femur, or posteriorly, with the tibial component (and its associated polyethylene insert) moving posterior

relative to the femoral component. All patients with known or suspected knee dislocation require an emergent orthopedic surgery consultation and vascular evaluation, although the type of evaluation remains controversial.

Emergency physicians should be familiar with the presentation and management of knee dislocations and complications following total knee TKA, particularly since they may occur after or are associated with low energy trauma.

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