

Closed Reduction of Subacute Patellar Dislocation Using Saline Joint Insufflation: A Technical Trick

David Y. Ding, MD, and Kenneth A. Egol, MD

Abstract

Patellar dislocations often spontaneously reduce or are reduced easily by experienced professionals. However, some dislocations can prove difficult to reduce and may require sedation or operative management. Our case report suggests an alternative method to facilitate reduction of patellar dislocations. Our technical trick involves insufflation of the knee joint with sterile normal saline, resulting in improved clearance of the patella over the femoral condyles. This low-risk technique can aid in the reduction of a dislocated patella and save the patient from unnecessary sedation or a surgical operation.

tion is almost universally successful, and there have only been case reports of irreducible, mainly fixed vertical axis patellar dislocations.⁸⁻¹¹ No reports in the literature have described subacute patellar dislocations because of their rarity. Patients present immediately after dislocation, spontaneously reduce, or have a painless, chronically dislocated patella.

We present a case of an elderly man with dementia and a subacute fixed irreducible patellar dislocation, which was reduced using a technique not described in the literature. The patient and the patient's guardian provided written informed consent for print and electronic publication of this case report.

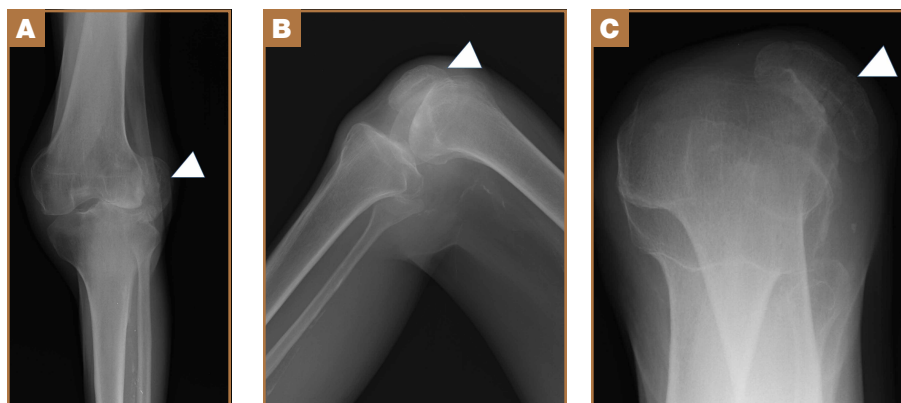
Case Report

A 68-year-old nonambulatory man with a history of dementia and stroke presented to the emergency department with complaints of left knee pain and his knee locked in flexion. The patient's knee had been in that fixed hyperflexed position for at least 10 days after he sustained a twisting injury to his knee while attempting to get out of bed. At baseline, the patient was mostly bedbound and could walk minimally with maximum support, but, given his dementia, he would often attempt to ambulate by himself. After the injury, the patient did not complain of much pain at rest, but attempts at his group

As the largest sesamoid bone in the human body, the patella acts as a fulcrum to enhance the biomechanical advantage of the quadriceps in extension.¹ It is subject to a variety of forces while improving distribution of forces along the extensor mechanism.² With sufficient force, the patella can be dislocated. Acute patellar dislocations are the most common knee injury, encompassing 2% to 3% of all knee injuries³ and occurring in 5.8 per 100,000 individuals.^{4,5} These injuries are associated with acute trauma, frequently from sports and physical activities, occurring while in terminal extension with an axial-valgus stress on the knee during rotation.⁶

With acute patellar dislocations, patients are usually in significant discomfort. Often, the patella may spontaneously reduce; if not, closed reduction is usually successful with pressure applied anteromedially on the lateral patellar margin, while simultaneously attempting gentle extension of the leg.⁷ Closed reduc-

Figure 1. Radiographs showing the lateral patellar dislocation. Given comorbidities of the patient, these are attempted (A) anteroposterior, (B) lateral, and (C) sunrise views. White arrowheads show dislocated patella.



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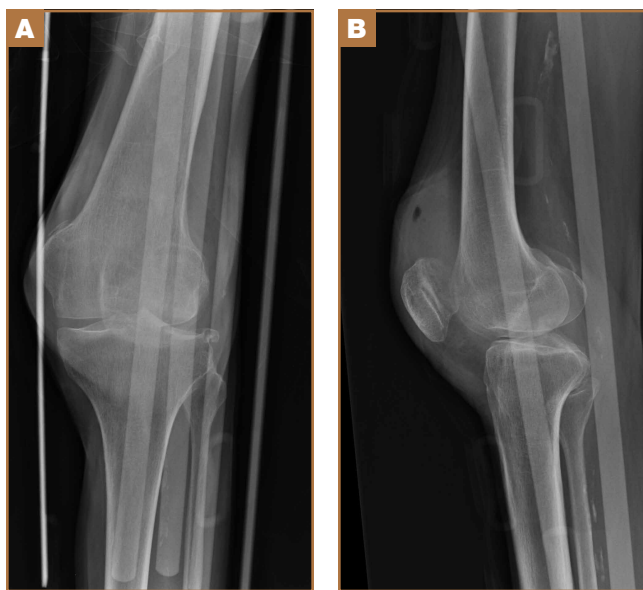


Figure 2. (A) Anteroposterior and (B) lateral radiographs showing the reduced patella in a knee immobilizer.

home to straighten his leg had caused severe pain. As a result, the patient was brought to the emergency department to be evaluated for fractures.

Physical examination in the emergency department revealed atrophy of the lower extremity musculature and a left knee fixed at 120° in flexion. The skin was intact, and there was minimal effusion of the knee joint. The patella was noted to be laterally subluxated and tender to palpation over the lateral and medial facets. He was neurovascularly intact distally and had painless range of motion of his hips. His contralateral right knee had full range of motion with good patellar tracking.

Radiographs of the patient's knee confirmed a lateral dislocation of the patella (Figures 1A-1C). After oral and intravenous administration of pain medication, a reduction was attempted without success. Next, an intra-articular knee injection of 10 mL of 1% lidocaine was given. After waiting 15 minutes, another reduction was tried. While the pain control was sufficient, the reduction was again unsuccessful. The knee was insufflated with 120 mL of sterile saline and reduction attempted again. By extending the knee and applying a medially directed force to the patella, reduction was successful. The patient was placed into a knee immobilizer and postreduction radiographs were taken (Figures 2A, 2B). Saline was extracted from the knee. The patient was admitted to the hospital where repeat examination of his knees during the next week revealed markedly less pain. The patient was lost to follow-up.

Discussion

Our patient presumably had a low-energy mechanism of injury, resulting in an undiagnosed patellar dislocation with delayed treatment. This subacute patellar dislocation was irreducible using the standard techniques. Alternatively, insufflation of the joint with saline provided the necessary impetus to allow

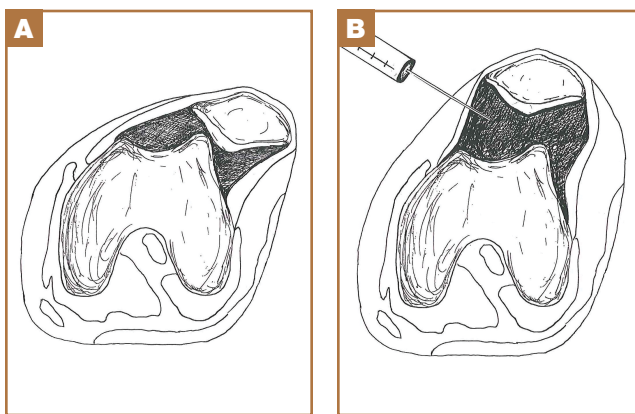


Figure 3. (A) The reduction of a dislocated patella is hindered by the femoral condyle. (B) By insufflating the knee with sterile saline, the patellar clearance is improved, allowing an easier reduction. Illustrations by Brandon Schulman, MD.

for successful patellar reduction. The history of the patient reveals clues about the mechanism of injury. It is likely that the patient's nonambulatory status resulted in a weak vastus medialis muscle that placed the patella at risk for dislocation. While the exact mechanism of dislocation is unknown, the patella was unable to be reduced spontaneously because our patient's knee was maintained in a state of flexion secondary to pain and muscle contraction. The combination of weak quadriceps musculature, increased Q angle, and forced hyperflexion of the knee prevented closed reduction of the patella.

Fixed, irreducible patellar dislocations are rare and discussed infrequently in the literature.^{9,11-12} Reported mechanisms are mostly high energy, including blows during athletics and impacts from motor vehicle collisions.^{9,13} Vertical axis rotation, as first described by Cooper,¹⁴ is commonly implicated in irreducible patellar dislocations. This occurs when the patella internally rotates 180° on its vertical axis, associated with a large tear of the medial retinaculum but intact quadriceps tendon. The patella is fixed over the lateral femoral condyle with the articular surface pointing anterolaterally. Despite adequate sedation and analgesia, these are notoriously difficult to close-reduce and may necessitate open reduction.³ Our patient, while having a fixed dislocation, did not have a vertical axis component and, therefore, was amenable to our closed reduction attempt.

Our first reduction attempts were unsuccessful, likely because the patient continued to be tense, firing his quadriceps. Even after injecting the knee with lidocaine and eliminating the pain component, the patella was still impinging on the lateral femoral condyle (Figure 3A). By insufflating the knee with saline, we were able to increase the distance from the patella to the trochlea (Figure 3B). This is comparable to a knee arthroscopy, in which joint fluid pressure allows passage of arthroscopic instruments into the patellofemoral joint. We postulate that the farther the patella is anterior to the trochlea, the higher the likelihood that the patella can be reduced to its anatomic position.

Insufflation of the knee with sterile saline is a novel technique that involves minimal risk compared with the alternatives. Sometimes, for closed reduction to be successful, individuals need to be consciously sedated to relax their muscles and eliminate pain. While conscious sedation is generally considered low risk, complications have been noted, including hypotension, apnea, and retrograde amnesia.¹⁵ Manual closed reduction may also cause additional chondral damage when the medial patellar facet contacts the lateral femoral trochlea. When closed reduction of the patella fails, open reduction is required; this inherently includes all the risks of surgery, such as bleeding, infection, neurovascular injury, and wound complications.

Our insufflation technique does not require sedation and is minimally invasive. The saline creates space and provides lubrication to allow for easier manipulation of the patella. This theoretically protects the cartilage as the patella passes over the lateral trochlea. In addition to the intended effect of providing more space and lubrication for the reduction of the patella, insufflation of the joint may also relax the vastus musculature.¹⁶ In their study, Torry and colleagues¹⁶ injected 13 knees with 20 mL sterile saline and noted reduction in electromyography readings in the vastus medialis and lateralis muscles. This inhibition of vastus musculature may provide enough relaxation to aid in the successful reduction of the patella.

Our study is limited by our sample size of 1. Because acute patellar dislocations are often easily reduced, our technical trick is not frequently used. Additionally, while we were able to monitor his progress during his inpatient stay, our patient was lost to follow-up after his discharge from the hospital.

If successful, the insufflation technique eliminates the need for urgent open reduction in the operating room. As a result, we recommend attempting closed reduction using insufflation of the knee with sterile saline for irreducible patellar dislocations before proceeding with open reduction.

Conclusion

Saline insufflation of the knee can be safely and easily performed to aid in the reduction of subacute, difficult patellar dislocations.

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This paper will be judged for the Resident Writer's Award.
