



## Case Report

# Irreducible lateral knee dislocation in an 88 year old female: A case report

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### ABSTRACT

**Case:** We present the unique case of a 88-year-old female who suffered a lateral knee dislocation of the right knee following a fall on a wet bathroom floor. Attempts at realignment via manipulation under anaesthesia (MUA) were unsuccessful, so the patient underwent an open reduction and the application of an external fixator to stabilise the knee.

**Conclusion:** Knee dislocations are characterised by a high rate of neurovascular injuries, therefore special emphasis should be made on the prompt diagnosis and treatment of such injuries.

**Consent:** Informed consent was obtained from the patient and family for the publication of the case report and all the figures included.

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## 1. Introduction

Knee dislocations are rare and only account for approximately 0.02% of orthopaedic injuries.<sup>1</sup> However they are likely to be underreported as many as 50% of knee dislocations are self-reduced and misdiagnosed therefore the true incidence cannot be known. Spontaneously reduced knee dislocations are those with radiological tibiofemoral alignment but may have multiple injured ligaments with gross instability on stress testing.<sup>2</sup> Knee dislocations are typically secondary to a high energy trauma such as a motor vehicle accident, but in our case the patient suffered a knee dislocation secondary to a low energy trauma which is less common. High energy trauma is associated with greater risks of complications compared to low energy trauma, which has a more favourable prognosis.<sup>3</sup> Due to the nature of complications that may arise from knee dislocations, prompt recognition and treatment is vital to ensure good patient outcome.

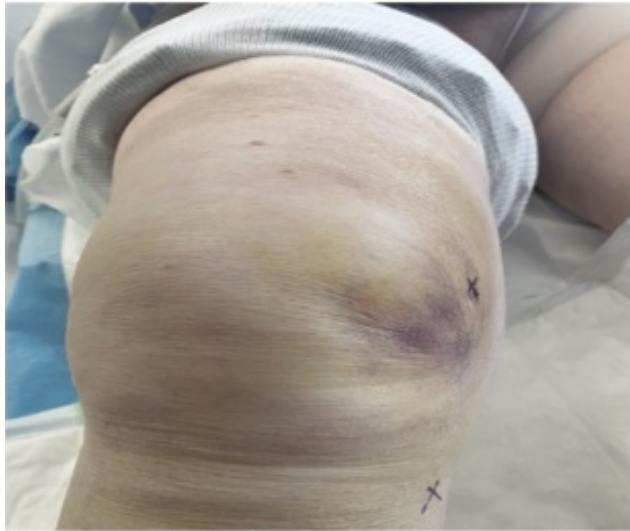
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## 2. Case Presentation

A 88-year-old female presented to the emergency department with acute pain and swelling in the right knee and the inability to weight bear after slipping on the bathroom floor whilst walking. She had no loss of consciousness and no history of seizures. She had full recollection of the event. On examination her vital signs were normal except her temperature which was slightly elevated. Initial inspection of the right knee revealed an abnormal knee contour with diffuse swelling characterised by an anteromedial prominence and skin puckering on the medial aspect (Figure 1). On physical examination there was tenderness over the medial aspect of the knee. The posterior tibial and the dorsalis pedis pulses were palpable and strong. Palpation of the popliteal pulse was omitted to minimise patient discomfort. The patient reported intact sensation distal to the right knee and was able to move her toes. There were no signs of compartment syndrome. Tests to rule out ligamentous injury were not performed due to risk of causing extra discomfort to the patient. The

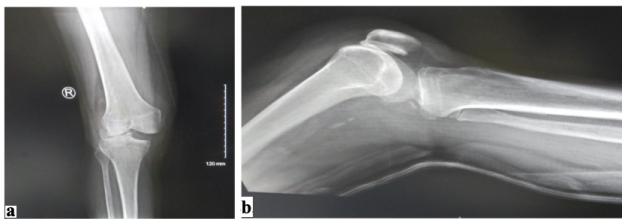
patients leg was placed in a backslab and was supported in a position of comfort. Her past medical history includes hypertension and atrial fibrillation.



**Fig. 1:** The pathognomic "Skin Puckering" sign outlining the articular surface of the medial femoral condyle

### 2.1. Investigations

The x-ray report confirmed a lateral subluxation of the tibia with respect to the femur with widening of the medial joint space (Figure 2 a,b).

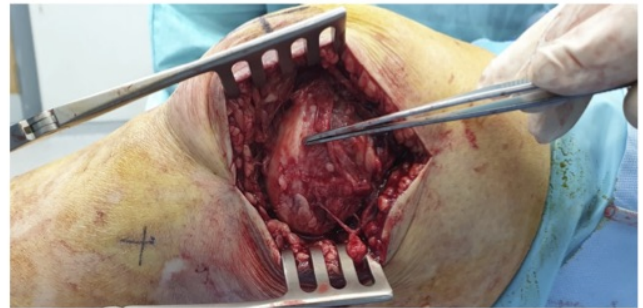


**Fig. 2: a):** AP x-ray showing lateral subluxation of the tibia with respect to the femur and widening of the medial joint space; **b):** Lateral x-ray showing lateral subluxation of the tibia with respect to the femur

CT showed a comminuted fracture involving the posteromedial corner of the right tibial plateau and associated avulsion fractures of the tibial spines. MRI of the knee reported a full thickness rupture of the anterior cruciate ligament (ACL), the posterior cruciate ligament (PCL) and the medial collateral ligament (MCL) along with a grade 3 tear of the medial meniscus. The lateral meniscus appeared intact.

### 2.2. Treatment

The decision for treatment was to attempt Manipulation under anaesthesia (MUA) otherwise resort to open reduction if that was not possible. MUA was unsuccessful so a longitudinal incision was made along the medial aspect of the knee. Upon exploration of the joint space, it became apparent that there was complete disruption of the joint capsule. The medial femoral condyle had buttonholed through the medial aspect of the joint capsule and was visible just under the skin (Figure 3). In addition, there were significant tears of the vastus medialis and the sartorius. The joint alignment was restored and the MCL was repaired using 2 Mitek anchors. The capsule remnant and muscle layers were repaired. To stabilise the knee joint, a modular external fixator was applied using 2x 5mm Schanz pins into the distal femur through the lateral aspect and 2x 5mm Schanz pins into the tibia through the antero-medial aspect. The external fixator was applied for a minimum of 6 weeks (Figure 4).



**Fig. 3:** The medial femoral condyle has become extraarticular and visible just under the skin



**Fig. 4:** External fixator stabilising the knee joint post-op

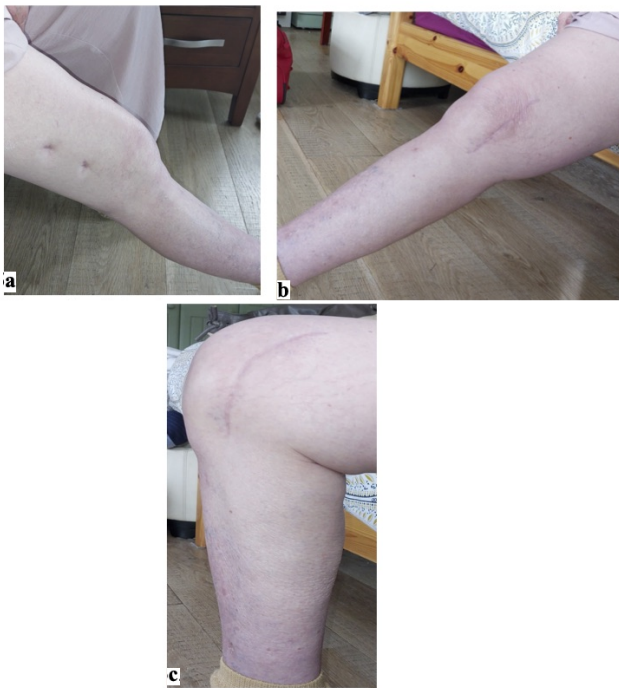
### 2.3. Outcome and Follow-Up

Our patient enjoyed a very good outcome with no serious complications post-op. On day two of post-op the patient

had no new symptoms and was transferred to a specialist orthopaedic hospital where wound review and follow up would continue.

The external fixator was removed 6 weeks later and patient rehabilitation with physiotherapy was commenced. The patient showed promising signs of recovery.

Following up with the patient 6 months later, she had made an excellent recovery. The patient achieved full extension and 90° flexion actively (Figure 5 a,b,c). She was able to walk around the house without a walking aid.



**Fig. 5:** a): Lateral aspect of the right knee at full extension; b): Medial aspect of the right knee at full extension showing good scar healing; c): Medial aspect of the right knee showing 90° active flexion

### 3. Discussion

The knee joint is a synovial joint which is reinforced with various ligamentous structures. Knee dislocations are defined as a complete disruption of the tibiofemoral articulation and ligamentous structures, as opposed to subluxation which can be defined as a partial disruption with some of the tibiofemoral joint still intact.<sup>4</sup>

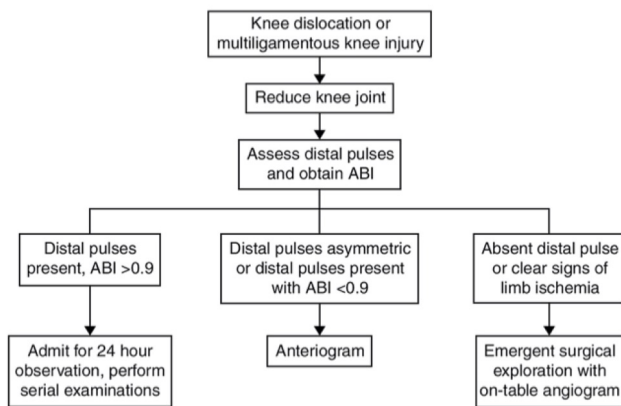
There are two accepted classifications of knee dislocations. The Kennedy classification describes the displacement of the tibia with respect to the femur which can be of 5 main types: anterior, posterior, medial, lateral and rotational.<sup>3</sup> However this fails to consider the high percentage of spontaneously reduced knee dislocations and omits information regarding severity of damage to ligamentous structures.<sup>5</sup> Anterior dislocations are the most

common (70%) and typically occur due to a hyperextension injury which results in a tear of the PCL. Posterolateral dislocation occurs from a valgus force combined with internal tibial rotation delivered to a non-weightbearing and flexed knee.<sup>3</sup> This causes the medial femoral condyle to buttonhole through the anteromedial capsule, as seen in our case. Lateral knee dislocations account for approximately 13% of all knee dislocations and the mechanism of injury is generally from a varus or valgus force.<sup>3</sup> The Schenck classification is anatomic and is based on the damage to ligamentous structures in knee dislocations.<sup>4</sup> In our case, the patient suffered a KD-III injury which is the most common subtype and involves tears of both cruciate ligaments and one of the collateral ligaments.<sup>4</sup>

Unlike other permutations of knee dislocations, closed reduction of a lateral and posterolateral dislocation is often not possible.<sup>6</sup> Although closed reduction is often advocated, this may delay surgical intervention and can be both uncomfortable and unnecessary for the patient. Surgical reduction should be performed promptly to reduce the risk of skin necrosis. If MUA is not possible, the surgeon should be prepared to proceed with an open reduction. A midline surgical incision with a medial parapatellar arthrotomy is useful to address the dislocation and attempt ligament reconstruction.<sup>7</sup> The anatomy is usually only slightly distorted in most knee dislocations.<sup>7</sup> The patella may be tightly approximated to the lateral aspect of the trochlear groove and the medial femoral condyle will have perforated the medial joint capsule.<sup>7</sup> The fundamental technique to reduction is the use of a small retractor that is inserted between the medial condyle and the capsule to “shoehorn” the condyle back into the joint.<sup>7</sup> This will restore the joint relationships despite multidirectional instability. The use of an external fixator is recommended if the knee is unable to be held in a satisfactory reduced position. Two pins placed anterolaterally and two pins placed anteromedially should be sufficient to hold the joint in place, as seen in Figure 4. Postoperatively, the patient's neurovascular status must be closely examined for at least 24 hours before discharge.<sup>7</sup> Although they are rare, knee dislocations can be devastating due to the potential complications that can arise from the associated neurovascular injuries. Injuries to the popliteal artery, common peroneal nerve and development of compartment syndrome are well known complications of knee dislocations, but were not seen in our case as it was a low energy trauma. The pathognomonic ‘Pucker sign’ in Figure 1 is an important physical sign that must be noticed on inspection of the knee, as it is an indicator of irreducibility and possible neurovascular compromise, therefore prompt recognition and treatment is crucial.<sup>8</sup>

Of all the complications, vascular damage is the most serious. The incidence rate of popliteal artery injury varies from 32-45% with vast literature reports regarding knee amputations resulting in failure to diagnose limb-

threatening vascular injuries following knee dislocations.<sup>5</sup> Injury to the popliteal vessels is more likely during an anterior dislocation.<sup>9</sup> If the dislocation is not reduced and the vascular flow is not restored for several hours, it can lead to compartment syndrome which is a serious complication with often irreversible consequences.<sup>9</sup> The current literature supports careful examination of pulses along with Ankle Brachial Index (ABI) and selective angiography to rule out vascular injury even in self-reduced knee dislocations. Figure 6 illustrates an algorithm which can be followed to manage a potential vascular injury following a knee dislocation. The common peroneal nerve is more likely to be injured with a lateral or posterolateral dislocation.<sup>9</sup> Neuropathic pain, leg function and quality of life are all negatively affected by peroneal nerve injury.<sup>10</sup> Signs of peroneal nerve palsy such as a foot-drop and high-stepping gait may require the use of ankle foot orthosis.<sup>10</sup>



**Fig. 6:** Algorithm of assessing and managing vascular injury in patients with a knee dislocation. Adapted from.<sup>7</sup>

In summary, identifying knee dislocations and treating them swiftly are crucial to ensure good patient outcome. Ideally, a thorough assessment of neurovascular compromise should be done in any patient with a suspected knee dislocation, regardless of whether they are self-reduced. Prompt recognition and treatment of injuries will reduce the risk of complications such as compartment syndrome and amputations

#### 4. Conflict of Interest

None.

#### Acknowledgments

None.

#### References

1. Darcy G, Edwards E, Hau R. Epidemiology and outcomes of traumatic knee dislocations: Isolated vs multi-trauma injuries. *Injury*. 2018;49(6):1183–7.
2. Schenck R, Richter D, Wascher D. Knee Dislocations. *Orthop J Sports Med*. 2014;2(5):1–9.
3. Henrichs A. A Review of Knee Dislocations. *J Athl Train*. 2004;39(4):365–9.
4. Scott WN, Diduch D, Iorio R. Insall & Scott surgery of the knee. 6th ed. Philadelphia: Elsevier; 2018. p. 819–32.
5. Douma M, Burg M, Dijkstra B. Knee Dislocation: A Case Report, Diagnostic Vascular Work-Up, and Literature Review. *Case Rep Emerg Med*. 2017;2017(6):9745025. doi:10.1155/2017/9745025.
6. Woon C, Hutchinson M. Posterolateral dislocation of the knee: Recognizing an uncommon entity. *World J Orthop*. 2016;7(6):401–5.
7. Boyce RH, Singh K, Obremsky WT. Acute Management of Traumatic Knee Dislocations for the Generalist. *J Am Acad Orthop Surg*. 2015;23(12):761–8.
8. Jeevanavar S, Shettar C. Pucker Sign' an indicator of irreducible knee dislocation. *BMJ Case Rep*. 2013;2013(10):bcr2013201279. doi:10.1136/bcr-2013-201279.
9. Iannotti J, Parker R. The Netter Collection of Medical Illustrations: Musculoskeletal System. In: Spine and Lower Limb E-Book. vol. Vol 6. Philadelphia: Elsevier Saunders; 2013. p. 129–72.
10. Peskun C, Chahal J, Steinfeld Z, Whelan DB. Risk Factors for Peroneal Nerve Injury and Recovery in Knee Dislocation. *Clin Orthop Relat Res*. 2012;470(3):774–8.

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