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## Case study

## Patellar dislocation: Not the bees knees

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## ABSTRACT

**Background:** Patellar dislocations are common, particularly in the adolescent population. Registered Advanced Nurse Practitioners are healthcare professionals who can appropriately manage these injuries to minimise the risk of chronicity.

**Methods:** This is a case study which uses a clinical exemplar from the authors practice focusing on the assessment, diagnosis and management of patellar dislocations. Particular reference is made of the significance of the MPFL.

**Results:** This paper highlights the importance of recognition of appropriate management of patellar dislocations in the ED setting. Discussion points include the role of the MDT and the role of exercise prescription in the injury management.

**Conclusion:** The diagnosis of patellar dislocation is heavily dependant on eliciting a comprehensive history and conducting an appropriate clinical exam. Patient outcomes may be optimised by adopting an MDT approach.

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## 1. Introduction

Registered Advanced Nurse Practitioners (RANP) working in Irish Emergency Departments (ED) are increasingly central to the management of injuries that do not threaten life or limb. RANP's engage in complex decision making and practice at a standard of clinical proficiency which enables them to manage complex injuries in the ED (Appendix A). For certain injuries RANP's must be cognisant that there is an increased risk of future instability and chronicity [34] and therefore the initial management of these injuries must be optimised to mitigate the risk. Disruption of the delicate balance between osseous and non-osseous patellofemoral structures through direct, indirect or overuse injury may result in a range of pathologies from patellofemoral pain syndrome to frank patellar dislocation.

## 2. Initial patient presentation

During the early afternoon a young man entered the ED waiting room and alerted staff that his friend was outside in a sports utility vehicle (SUV). He stated that his friend could not get out of the

SUV, and that he had sustained a knee injury while visiting an open farm that afternoon. The patient was assisted from the SUV with the assistance of the ED staff. The RANP, who was involved in removing the patient from the SUV, remained with the patient as he was brought into the ED and bypassed triage. The patient reported that he "twisted his knee" when he stood on uneven ground, which caused severe pain and an immediate inability to bear weight.

The patient reported no significant past medical history, no previous knee injuries, he was not taking any regular medications and did not have any known drug allergies. His self-report of pain was 8/10 on initial assessment. Patient controlled nitrous oxide by inhalation was prescribed by the RANP, which reduced the patient's pain to 5/10 within 5 min.

## 3. Relevant physical examination findings

The musculoskeletal approach of look, feel, move, and stress were performed in an integrated manner to frame this patient's assessment [16]. The patient was examined on an ED stretcher in a semi-recumbent position. His trousers were removed which revealed a patellofemoral joint deformity and loss of the normal anterior anatomical landmarks of the knee. Specifically he had a right knee antero-lateral prominence, which was suspected to represent a dislocated patella with abnormal prominence of the

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Fig. 1. Right knee effusion.

medial femoral condyle. The patient held his knee in approximately 30 degrees flexion with external hip rotation. Maintaining this position of ease with the support of a pillow assisted in providing analgesia and reducing patient apprehension. There were no wounds or areas of critical skin (i.e. where the skin was under tension from an underlying fracture/bony fragment).

Palpation revealed an effusion (Fig. 1). The maximal area of tenderness was to the medial patella, however palpation was limited at this stage by patient apprehension. Range of movement was limited in all planes by the patient's pain, apprehension and the obvious bony deformity. Although rare, numbness or paralysis distal to the dislocation from pinching, cutting, or pressure on the blood vessels or nerves may occur [23] and therefore a detailed neurovascular assessment should be performed prior to any relocation manoeuvres. Both the dorsalis pedis and posterior tibialis pulses were present and normal, and capillary refill was <2 s distally. Normal sensory distribution of the sural and saphenous nerves along with common, superficial and deep peroneal nerves was observed.

Active and passive range of movements (ROM) were restricted in all planes due to the obvious dislocation but also due to the patient's pain and apprehension.

#### 4. Overview of patellar dislocations

As is common to many joints patellofemoral joint stability is maintained by a balance of passive (peri-patellar ligaments), active (quadriceps including the vastus medialis obliquus (VMO)) and static (patellofemoral bony anatomy) restraints. The pivotal role of the medial patellofemoral ligament (MPFL) which is the primary passive restraint to lateral patellar displacement and provides 50–80% of restraint at 0–30 degrees of flexion is increasingly recognised [2,9,14]. The incidence of MPFL rupture is thought to be greater than 90% in first time patellar dislocations [22,35] and this may cause increased patellar tilt following the initial dislocation leading to future instability. The anatomy of the MPFL is debated particularly the femoral attachment where fibres fan out in the region of the epicondyle and adductor tubercle [18,21].

Patellar instability (i.e. abnormal positioning of the patella) can exist on a continuum from mild lateral maltracking to frank dislocation [13]. The incidence of patellar dislocation (i.e. that is

**Table 1**  
Pre-disposing factors for patellar dislocation.

- Genu valgum
- Femoral anteversion
- Femoral trochlea dysplasia
- Loose medial retinaculum
- Tight lateral retinaculum
- Vastus medialis dysplasia
- Increased Q angle
- Patella Alta/Patella Dysplasia

complete disengagement of the patellar from the femoral trochlea) is estimated to be approximately 43 per 100,000 people [32] and accounts for 2–3% of all knee injuries. Females are more likely to be affected than males [11] with patellar dislocations being the second most common reason for knee haemarthrosis [28]. A number of factors predisposing patients to patellar dislocation have been identified in the literature (see Table 1) [6,19,24,31].

#### 5. Initial management

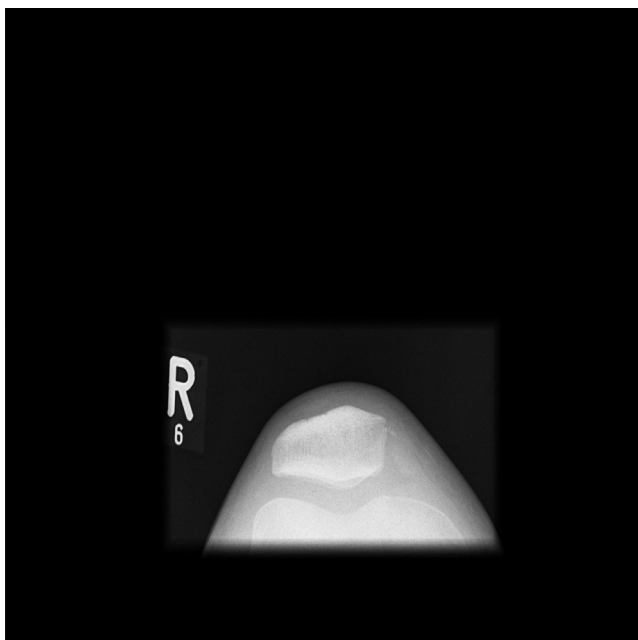
The initial management is focused around reduction of the dislocation, and subsequently to mitigate against the risk of recurrent patellar instability. Pre-reduction X-rays are recommended in all patients following patellar dislocation [25]. The RANP requested X-Rays for this patient and accompanied him to the diagnostic imaging department. During transfer from the ED stretcher to the X-ray table the patella was observed to spontaneously relocate resulting in immediate decrease in the patient's pain and apprehension.

#### 6. Relevant diagnostic findings

Plain X-ray films revealed a joint effusion with an avulsion fracture from the medial aspect of the patella, suggesting avulsion of the MPFL (Figs. 2–4). No lipohaemarthrosis or fractures involving other knee structures were visualised.



Fig. 2. X-ray images.



**Fig. 3.** Skyline view with avulsed medial fragment.



**Fig. 4.** Lateral view.

It is recognised that MRI evaluation is increasingly required to fully elucidate the pathology associated with patellar dislocation [3]. The MR images confirmed a patellar based rupture of the medial patellofemoral ligament with a joint effusion and a contusion of the lateral femoral condyle (which likely occurred when the dislocating patella impacted the condyle). A grade 2–3 strain to the VMO muscle was also found with proximal displacement of the muscle belly.

### 7. Post imaging findings

On return to the ED the knee was re-examined. Observation confirmed restoration of the normal bony contours, and an

increased joint effusion. Diffuse anterior tenderness was found on palpating the knee, with maximal tenderness over the peripatellar soft tissues including the medial patellar edge and adductor tubercle (Bassett's sign). There was no tenderness elicited over the medial or lateral femoral-tibial joints or posterior soft tissues. There was no neurovascular deficit identified. Movement was assessed within the confines of the patients pain [10]. There was decreased range of movement with painful arc of flexion between 20 and 80 degrees only. There were normal endpoints on stressing of the medial and lateral collateral ligaments as well as the anterior and posterior cruciate ligaments. The patient had a positive Fairbank apprehension test [5]. This test involves the clinician attempting to stimulate a dislocation by placing both thumbs on the medial patella and applying lateral pressure as the patient flexes his knee. Apprehension or pain indicates a positive test.

Functional bracing is increasingly preferred to rigid immobilisation due to the increasing awareness of the detrimental effects of rigid immobilisation such as quadriceps atrophy with loss of both muscle fibre size and aerobic capacity [33]. This patient was initially managed in an adjustable knee immobiliser, and provided with crutches with instructions to remain non-weight bearing. A multi-modal pain management plan including relative rest, regular icing, elevation and analgesics was implemented. Relative rest is advocated rather than absolute rest due to the importance of mobilisation in maintaining joint cartilage trophicity [15,27]. Additionally he was prescribed a combination drug of paracetamol/codine 1000/30mgs four times daily for one week. This analgesia was chosen due to studies which support the improvement in analgesic action from the synergistic action of paracetamol and codeine [12,30], and controversy around the safety profile of NSAIDs in analgesic practice [8,20]. He was also provided with an exercise prescription with the aim of promoting the patients health and wellbeing during his recovery from injury.

### 8. Patient referrals

There is a paucity of studies which predict the patients who will have recurrent instability [19] and therefore it can be difficult to stream patients to appropriate treatment at the time of the first dislocation. This patient was jointly referred to our department of rehabilitation and orthopaedic fracture clinic.

This patient was introduced to his physiotherapist on the day of initial presentation and he was seen in the department of rehabilitation 72 h later. The ideal rehabilitation protocol remains elusive [26] and individualised plans based on clinical reasoning likely offer the best opportunity to optimal management. The initial goals of this patient's physiotherapy management were;

- Pain minimisation and effusion management.
- Restoration of knee extension.
- Stabilisation of the patella in the femoral trochlea.
- Strengthening of the stabilising (quadriceps) muscles.

These goals were achieved using a multi-modal approach of secure immobilisation of the knee (achieved with the knee immobiliser initiated in the ED), patellofemoral joint taping, cryotherapy and manual therapy. In addition to quadriceps drills, his exercise programme also included calf raises, and hip abduction drills. One week subsequent to the injury the patients range of motion was flexion to 90 degrees (normal 130–140 degrees), extension to +10 degrees (normal 0 degrees).

At initial review at the orthopaedic trauma clinic six days post injury it was determined that this patient would be managed conservatively. The patient's management plan initiated in the ED was continued, however there was an increased emphasis on functional

rehabilitation and improving range of motion. He progressed to using an exercise bicycle 21 days post injury and weight bearing the same week. Predominant exercises in this phase were range of motion drills, quadriceps/vastus medialis oblique setting, squats and lunges, balance drills and gait re-education drills.

## 9. Psychological support

It is well recognised that psychological variables can affect the patient's ability to cope with and recovery from injury [4]. It is therefore incumbent on RANPs to interact and care for patients in a manner which extends beyond the medical management of their injury and that results in a clinical encounter sensitive to the patients perspective [29]. In this case the patient was reassured that the injury would likely not result in an end to him participating in sport which was among his primary concerns. In addition to education regarding pain relief and injury management this patient was provided with an exercise prescription at discharge which would allow him to maintain his cardiovascular fitness and contribute to his psychological wellbeing during his recovery. Exercise prescription is an important role for all clinicians including nurse practitioners [17] to mitigate against the deleterious effects of physical inactivity for patients post injury.

## 10. Teaching points and final outcome

The available evidence has established a correlation between previous joint injury and resultant joint instability [34]. There is also a risk of posttraumatic osteoarthritis which may occur in up to 40% of patients who have previously sustained a significant ligamentous or articular surface injury [1,7]. The incidence of recurrent patellar dislocation has been shown to be approximately one-third [26], while between 50% and 70% report recurrent instability. Patellar instability has the potential to decrease physical activity levels in the young active population [3] and therefore may have wide-ranging physical and psychological sequelae.

Fortunately this patient successfully completed a rehabilitation programme, reports a return to full sport participation (football) and has not had a recurrent dislocation in the six months post his initial dislocation.

## 11. Conclusion

Acute patellar dislocation is a severe injury which is associated with pain and apprehension in the initial period and may result in long term instability for the affected patient. A comprehensive understanding of the pathoanatomy is essential for the RANP to guide patient treatment on an individual basis. Collaboration with members of the multi-disciplinary team is integral to advanced nursing practice, and can maximise health outcomes for patients as illustrated in this case.

## Appendix A: Author and section editor's note

Registered Advanced Nurse Practitioner (RANP):

Is a protected title for a nurse who is on the Nursing and Midwifery Board of Ireland (NMBI) register of Advanced Nurse Practitioners. She/he must have fulfilled the criteria and standards for the specific advanced practice role. These include

- Be educated to master's degree level (or higher).
- Have a minimum of seven years' post-registration experience.
- Five years' experience in the chosen area of specialist practice.
- Demonstrate competencies relevant to context of practice.
- Provide evidence of continuing professional development.

In addition to the registration criteria, the clinical RANP role rests on the four core concepts of autonomy in clinical practice, expert practice, professional and clinical leadership and research.

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