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## Case study

# Acute knee trauma

By Dr Andrew Rotstein MBBS, FRANZCR

**The knee joint is the most-commonly injured joint. Acute knee injuries can be caused by a direct blow, sudden twisting, an instability event or a fall onto the knee. Acute knee injuries often present clinically with a knee joint effusion, locking of the knee or focal knee pain. Acute knee injuries can occur to patients of any age.**

### KNEE JOINT EFFUSION

The clinical presence of a new knee joint effusion following trauma is an indication of internal derangement of the knee. It is important to determine how quickly the effusion has developed. A rapid onset effusion, within the first hour of injury, indicates a haemaethrosis.

The two most common and important causes for a rapid onset knee joint effusion are an ACL tear or patellar dislocation. These two diagnoses can sometimes be difficult for even an experienced musculoskeletal clinician to differentiate in the acute setting. A slowly developing effusion, next day onset, is more likely due to a meniscal or chondral injury.

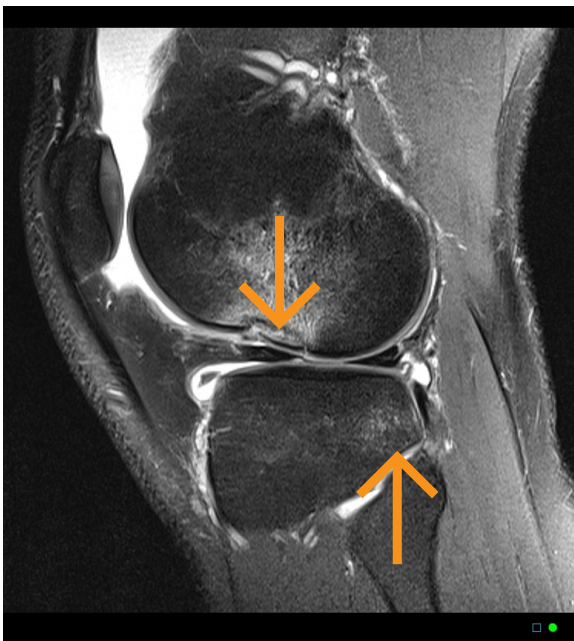
The anterior cruciate ligament (ACL) is well visualised and assessed with MRI. In a complete ACL tear, ligament fibres are disrupted and hyperintense (Fig 1). Figure 1 demonstrates the knee of a 53 year old patient who injured his knee while skiing. The secondary findings of an ACL tear include the classic anterior lateral femoral condyle and posterior lateral tibial plateau bone contusions due to impaction at the time of instability (Fig 2).

The patient was managed conservatively with physiotherapy and returned to skiing the following year with a customised knee brace.

The medial collateral ligament (MCL) is the most commonly injured ligament at the knee and injury to the ligament is accurately graded with MRI (Fig 3). MCL injuries are traditionally managed conservatively while lateral collateral ligament (LCL) injuries are traditionally managed surgically. Transient patellofemoral dislocation typically occurs in young patients and is well demonstrated with MRI. Patellofemoral dislocation is classically characterised by medial patella facet and lateral femoral condyle bone contusions (Fig 4). MRI is crucial for detecting unstable patellofemoral osteochondral lesions that require arthroscopy (Fig 5). MRI can also demonstrate predisposing factors for the patellofemoral dislocation such as patella alta (high riding patella), shallow femoral trochlear groove and tibial tuberosity lateralisation. These factors have implications for prevention and management.



**Figure 1:**  
ACL tear at the femoral attachment



**Figure 2:**  
Anterior lateral femoral condyle osteochondral impaction lesion and bone contusion. Posterior lateral tibial plateau bone contusion.

## KNEE JOINT LOCKING

Acute knee injuries can present with locking of the knee. The locking can be fixed or intermittent. Locking can be due to meniscal tears or intra-articular cartilaginous or osseous bodies. A meniscal tear will often cause loss of end range extension. A loose body can cause locking in variable degrees of flexion.

MRI is the only radiology modality that can adequately assess the meniscus. A bucket handle tear of the meniscus occurs when the inner portion of the meniscus is torn and then flips into the center of the knee. This is like the handle of a bucket swinging from one side to the other. The bucket handle fragment of the meniscus is clearly shown within the intercondylar canal of knee adjacent to the ACL and PCL (Fig 6).

Figure 7 demonstrates a medial meniscal meniscotibial flap tear in a 54 year old woman who twisted her knee crossing the road. The patient experienced locking and medial joint line pain. The meniscal flap fragment is displaced inferiorly into the meniscotibial recess as shown on MRI (Fig 7). The patient was reviewed by an orthopaedic surgeon, aware that the meniscotibial recess is a blind spot at arthroscopy. At arthroscopy, the surgeon was able to remove the meniscal fragment. Following arthroscopy, the patient soon became pain free and her knee regained full range of movement.

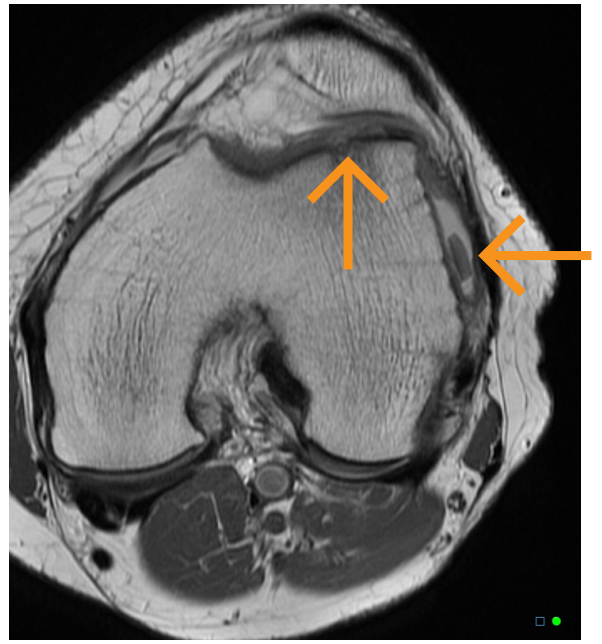
## KNEE PAIN AND FRACTURE

For clinical suspicion of a fracture, x-ray is the first investigation.

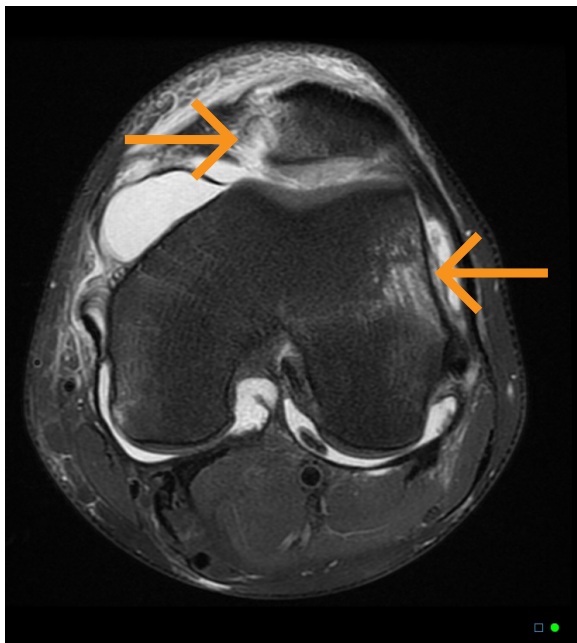
If the knee x-ray is normal, fractures and bone contusions are very well identified with MRI due to MRI's tremendous ability to assesses the bone marrow (Fig 8).



**Figure 3:**  
Distal MCL tear and ligament retraction.



**Figure 5:**  
Lateral femoral trochlear chondral lesion following patellofemoral dislocation. Chondral fragment displaced into the lateral patellofemoral recess.



**Figure 4:**  
Medial patellar facet osteochondral impaction lesion and bone contusion and lateral femoral condyle bone contusion following patellofemoral dislocation.

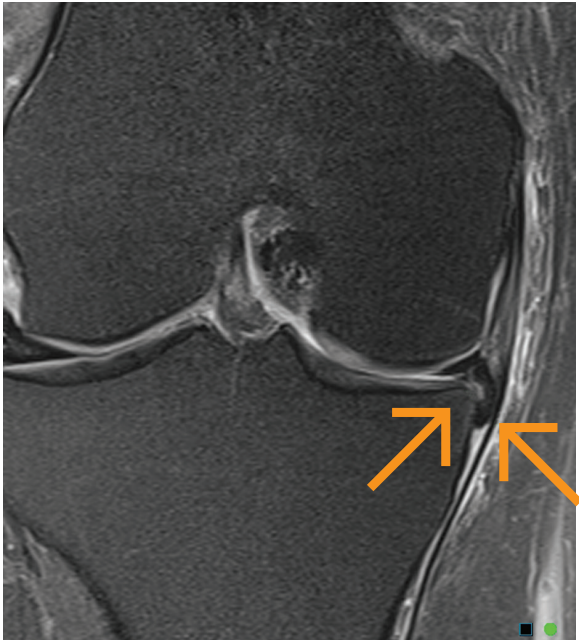


**Figure 6:**  
Medial meniscal bucket handle fragment is displaced into the intercondylar canal. Small residual medial meniscal body with tear.



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**Figure 7:**  
Meniscal flap fragment is displaced inferiorly into the meniscotibial recess.



**Figure 8:**  
Patellar trabecular fracture with surrounding bone contusion.



**Dr Andrew Rotstein**  
**MBBS, FRANZCR**

Andrew is the Clinical Director of MRI, CT and Nuclear Medicine at I-MED's Victoria House in Melbourne, Victoria. He joined VHMI in 2005 and became a Clinic Director in 2009. He is an experienced musculoskeletal radiologist, able to perform all Musculoskeletal Ultrasound and Fluoroscopic injections as well as CT spinal interventional procedures. Andrew provides expert imaging for the AFL, professional athletes and their doctors. In 2006 he was radiologist for the Melbourne Commonwealth Games. Andrew lectures at Melbourne University, presents at national and international conferences and supervises Musculoskeletal Fellowship training at the clinic. He is a pioneer of weight bearing CT for Syndesmosis and Lisfranc ligament injuries and is a current member of the MIA Radiology Advisory Board.