Acute Knee Trauma

The knee joint is one of the most commonly injured joints. 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.

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 haematoma. The two most common and important causes for a rapid onset knee joint effusion are an anterior cruciate ligament (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 appearing up to 24 hours after injury is more likely due to a meniscal or chondral injury.

The anterior cruciate ligament (ACL) is well visualized and assessed with MRI. In a complete ACL tear, ligament fibres are disrupted and hyperintense (Fig 1). 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 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 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 management.

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 centre 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).

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 assess the bone marrow (Fig 7).
Figure 2: Anterior lateral femoral condyle osteochondral impaction lesion and bone contusion. Posterior lateral tibial plateau bone contusion.

Figure 3: Distal MCL tear and ligament retraction.

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

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

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

Figure 7: Patellar trabecular fracture with surrounding bone contusion.