

IMAGING THE KNEE

The most common reasons for imaging the knee are trauma and arthritis. It is essential to include a concise clinical history and the specific question to be answered on the referral form. This is especially important for plain xrays, as this information allows us to select additional views, where appropriate.

Radiographs

Radiographs or "plain xrays" are useful in trauma to identify fractures and assess bone alignment. A fat-fluid level within a joint effusion, on a **horizontal lateral film**, indicates an intra-articular fracture (Fig 1). The **skyline patellar view** is useful to assess patellar fractures, patellar alignment and patellofemoral articular cartilage thickness (Fig 3b). **Weight-bearing AP views** are useful in osteoarthritis to assess articular cartilage narrowing and bone alignment. A **flexed PA view** can be helpful in identifying mild cartilage thinning in the medial or lateral tibiofemoral compartments.



Fig 1. Horizontal ray lateral shows a large knee joint effusion (yellow arrows) with a fat-fluid level (red arrow). This indicates the presence of a fracture, with leakage of marrow fat into the joint.

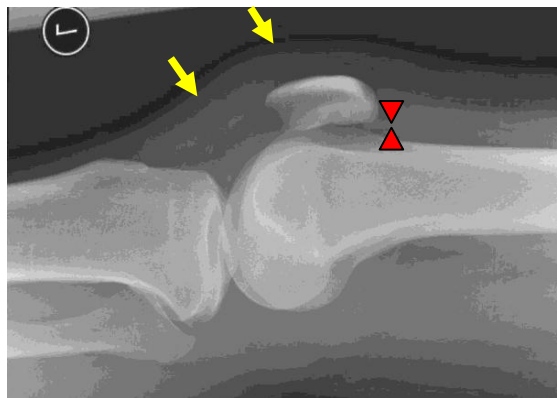


Fig 2. Lateral view shows soft tissue swelling in the prepatellar region due to bursitis (yellow arrows). A thin suprapatellar bursa (arrowheads) excludes a knee joint effusion.

Assessing the **soft tissues** on a lateral film can help distinguish between a joint effusion and prepatellar bursitis as a cause of knee swelling (Fig 2). **Calcification** may be seen in the articular cartilage, menisci and joint capsule in older patients with calcium pyrophosphate deposition (CPPD) arthropathy. This is often accompanied by marked cartilage narrowing and subchondral sclerosis at the patellofemoral joint (Fig 3).



Fig 3a.



Fig 3b.

Fig 3. CPPD

(a) AP view shows meniscal calcification (arrow). The cartilage spaces in the tibiofemoral compartments are normal.

(b) Skyline patellar view shows complete loss of the cartilage space in the patellofemoral articulation and marginal osteophytes.

Ultrasound

Ultrasound is useful to assess the extra-articular soft tissue structures about the knee. It is very good at identifying whether a para-articular mass is **cystic or solid**. Most masses about the knee are cystic. These include a Baker's cyst, distended bursa, meniscal cyst and ganglion (Fig 4). US is good for assessing the **large tendons** about the knee, namely the patellar, quadriceps, biceps femoris and pes anserinus tendons and their muscles, as well as the

gastrocnemius muscles. It can identify tendon thickening and tears, muscle strains and fluid collections (Fig 5). Ultrasound can detect **increased vascularity** associated with bursitis and tendopathy.

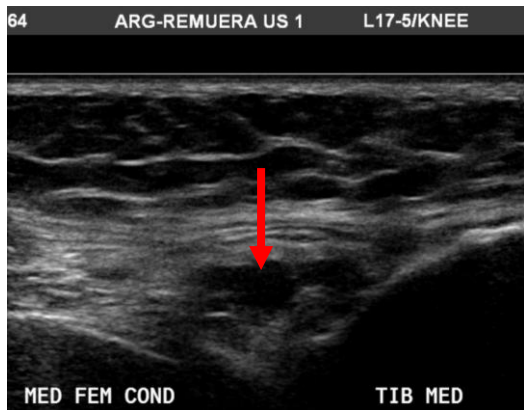


Fig 4. Parameniscal cyst. Long axis ultrasound image shows a septated anechoic mass at anteromedial aspect of tibiofemoral joint within the paraarticular fat.

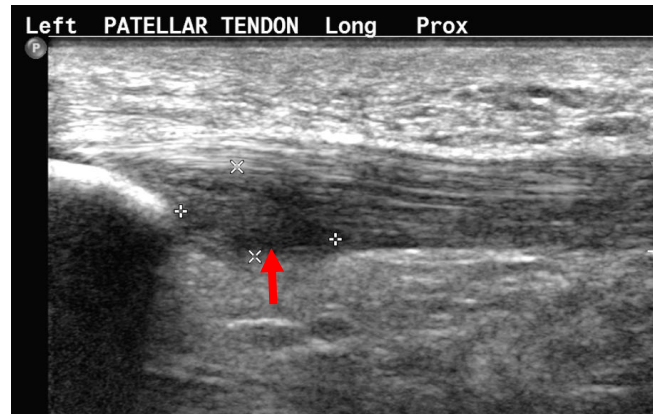


Fig 5. Tendinosis of the patellar tendon. There is thickening of the proximal patellar tendon with a focal hypoechoic area in the deep infrapatellar portion of the tendon.

US struggles to visualise the deep muscles at the posterior aspect of the knee i.e. popliteus, plantaris and soleus. It cannot assess the intra-articular soft tissues i.e. menisci or cruciate ligaments because it cannot image through bone. It has little if any clinical value in looking at the medial or lateral collateral ligaments. Mild ligament sprains are usually well assessed clinically and moderate and severe sprains are often associated with injury to the bones, menisci and cruciate ligaments which require assessment with MR.

MR Imaging

MR is very useful in assessing the injured or painful knee. It can detect **fractures which are occult on plain xrays** (Fig 6). It can detect **cartilage fractures** and identify displaced cartilage fragments and their site of origin (Fig 7). In **moderate to severe ligament injuries** MR is helpful to assess the number and extent of ligaments that have been injured and confirm or exclude associated **meniscal tears**. MR can be helpful in **muscle and tendon injuries** when there is loss of function suggesting rupture or if haematoma is mimicking a tumour clinically or on ultrasound.



Fig 6.



Fig 7.

Fig 6. Coronal fat-saturated proton density (PD) image shows an occult fracture in the medial aspect of the proximal tibia (arrow).

Fig 7. Sagittal fat-saturated PD image shows a large cartilage fragment with a very small attached bone fragment which has been fractured off the patella (arrow). The patella is not shown on this image.

MR can assess articular cartilage loss, subchondral reactive change and cyst formation in **osteoarthritis** and synovitis, bone oedema and erosions in **inflammatory arthritis** or **septic arthritis**

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All ARG branches now have Digital Radiology.