

The Knee – Scanning Protocol



Diagnostic imaging of the Knee: Introduction

The knee maybe considered as consisting of four quadrants, anterior, medial, lateral and posterior. Ultrasound would normally be focused only one or two of these quadrants depending upon the clinical diagnosis.

Imaging includes:

Anterior:

- Patellar tendon
- Tibial tubercle and deep and superficial infrapatellar bursae
- Quadriceps muscle and tendon
- Prepatellar bursa
- Suprapatellar pouch (for effusion)
- Vastus medialis muscle and medial retinaculum

Medial:

- Medial collateral ligament (include valgus stressing if indicated)
- Medial tibiofemoral joint space and medial meniscus
- Pes anserine tendons and bursa (if pathological)

Lateral:

- Lateral collateral ligament (including varus stressing if indicated)
- Iliotibial band and bursa (if pathological)
- Lateral tibiofemoral joint space and meniscus
- Popliteus tendon
- Proximal tibiofibular joint

Posterior:

- Semimembranosus and semitendinosus muscle and tendon
- Biceps femoris muscle and tendon
- Medial and lateral gastrocnemius muscles and tendons
- Popliteal fossa
- Popliteal artery and vein

1. Anterior

Anterior Knee – Infrapatellar: Longitudinal & Transverse Scan

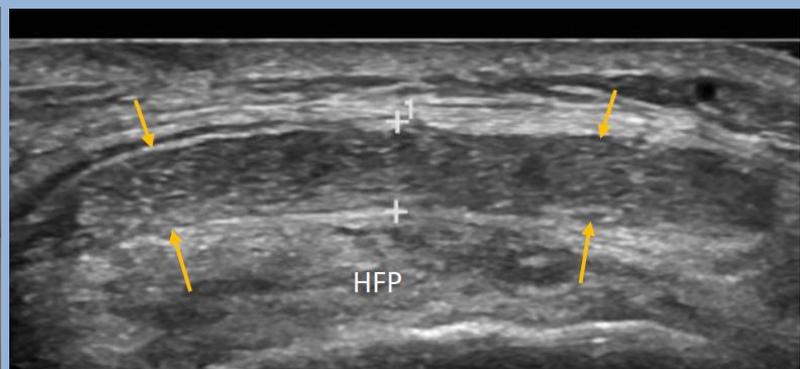
The patient is positioned in supine with the knee placed in 20 to 30 degrees flexion. This puts both the patellar and quadriceps tendon under some tension allowing better visualisation of these structures. The probe is placed in the anatomical sagittal plane so that it lies over the tibial tuberosity and distal patellar tendon. The probe is then moved proximally to visualise in turn the proximal patellar tendon, the quadriceps tendon and suprapatellar region.



Legend: DP-distal patella; HFP-hoffa's fat pad; Yellow arrows-patella tendon; Curved white arrow-position of the deep infrapatellar bursa; White arrow-position of the superficial infrapatellar bursa; TT-tibial tuberosity; Curved yellow arrow-position of prepatellar bursa.

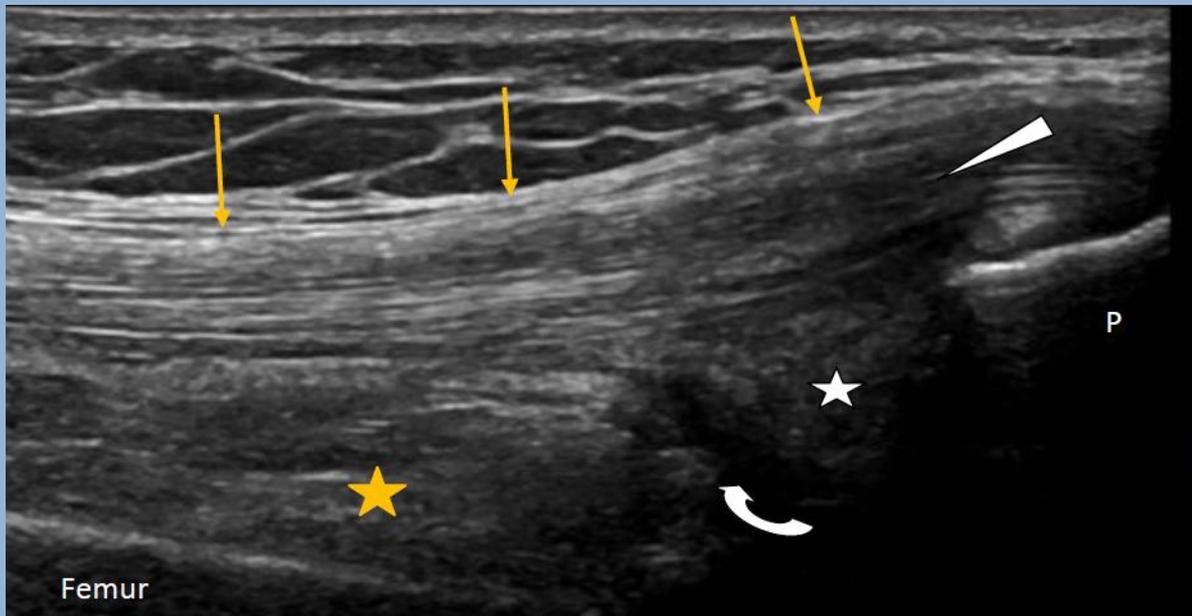


The probe is turned through 90 degrees so that it lies in the anatomical transverse plane over the tibial tuberosity and then moved in a proximal direction over the patellar tendon as far as the distal pole of the patella.

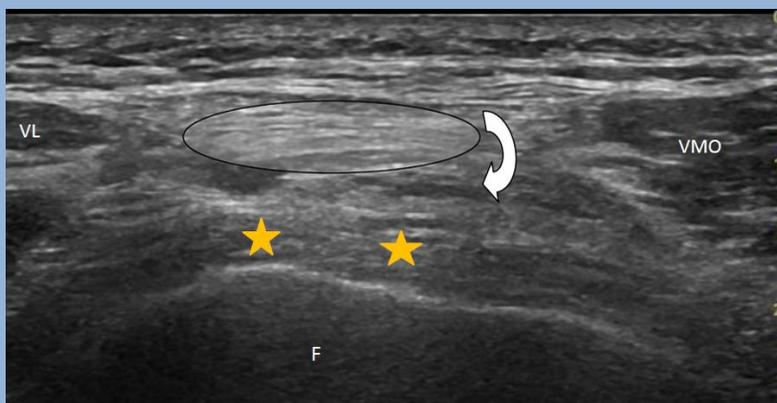


Anterior Knee - Suprapatellar: Longitudinal & Transverse Scan

The knee is maintained in 20 to 30 degrees flexion and the probe is moved proximally so that it lies over the quadriceps tendon and suprapatellar region in the anatomical sagittal plane



The probe is then turned through 90 degrees so that it lies in the anatomical transverse plane over the quadriceps tendon and suprapatellar region.



Legend: P-patella; Yellow arrows-quadriceps tendon; White arrowhead-anisotropy; White star-superior patella fat pad; Yellow star-pre-femoral fat; Curved arrow-suprapatellar pouch; VMO-vastus medialis obliquus; VL-vastus lateralis.

Maintaining the probe in the transverse plan and flexing the knee allows for visualisation of the femoral trochlea (below).



Legend: Yellow arrows-femoral trochlea articular cartilage; Oval-quadriceps tendon.

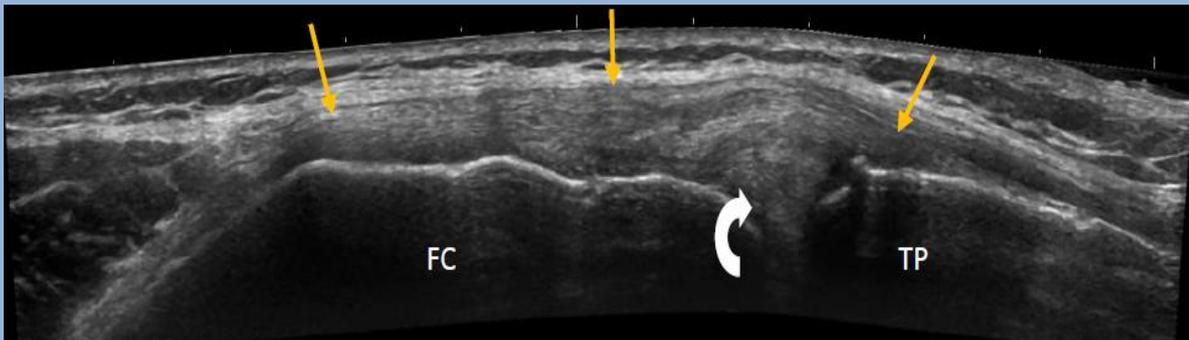
2. Medial

Medial Knee Joint: Longitudinal Scan

The patient is positioned in supine with the knee placed in 80 to 90 degrees of flexion. The probe is placed in the anatomical coronal plane so that it lies over the medial collateral ligament and medial joint line.

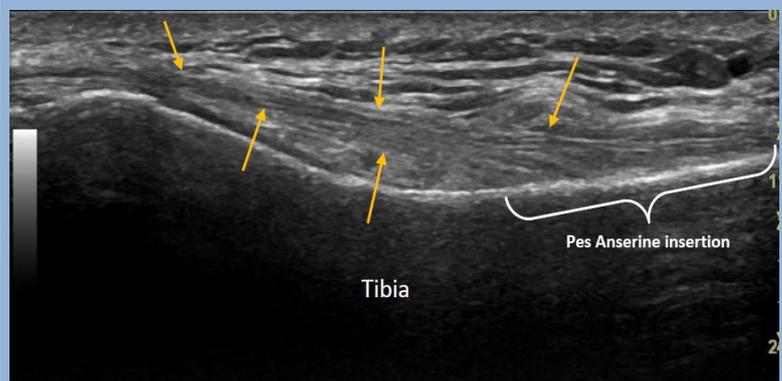


Legend: FC-femoral condyle; TP-medial tibial plateau; Yellow arrow-medial collateral ligament; White curved arrow-medial meniscus.



Medial Knee: Pes Anserine insertion

The patient is positioned in supine with the knee placed in 20 to 30 degrees of flexion. The probe is placed in the sagittal oblique plane over the upper aspect of the medial tibia approximately half way between the tibial tuberosity and the medial collateral ligament.

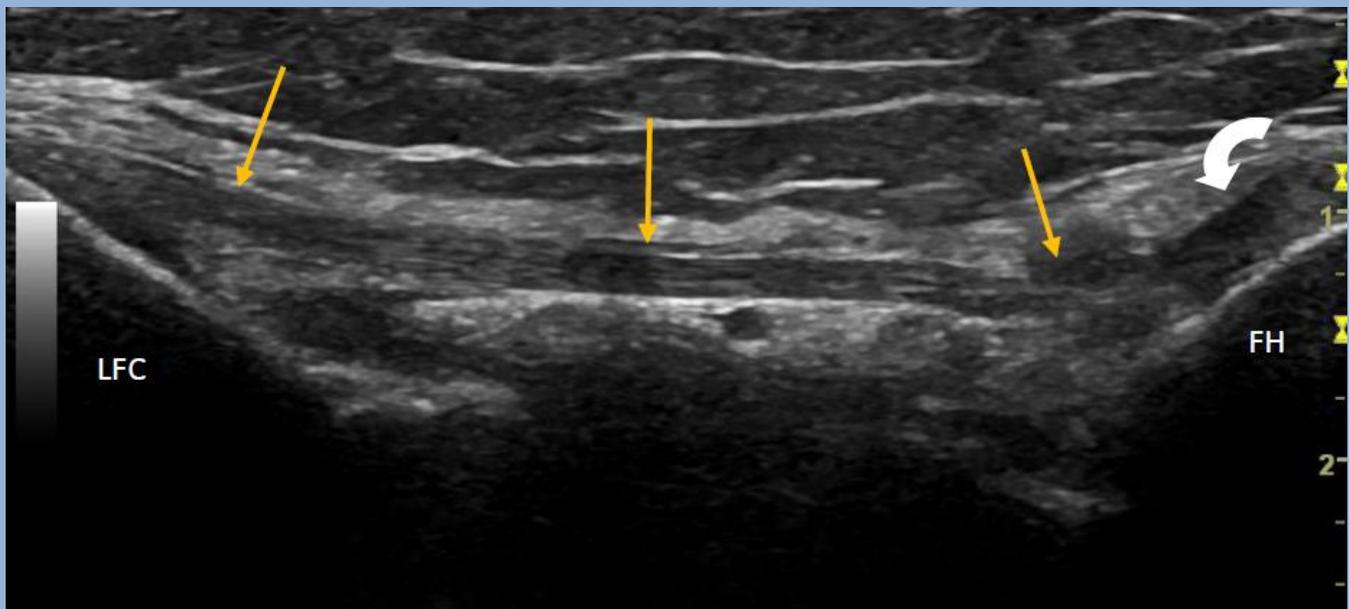


Legend: Yellow arrows-pes anserine tendon; White bracket-pes anserine insertion.

3. Lateral

Lateral Knee Joint and Lateral Collateral Ligament - Longitudinal Scan

The patient is positioned in supine with the knee placed in 80 to 90 degrees of flexion. To view the lateral collateral ligament the probe is placed in the anatomical coronal plane so that it lies along the long axis of the tibia and fibula. The distal edge of the probe is placed over the head of the fibula which can be used as a landmark to find the ligament at its insertion.



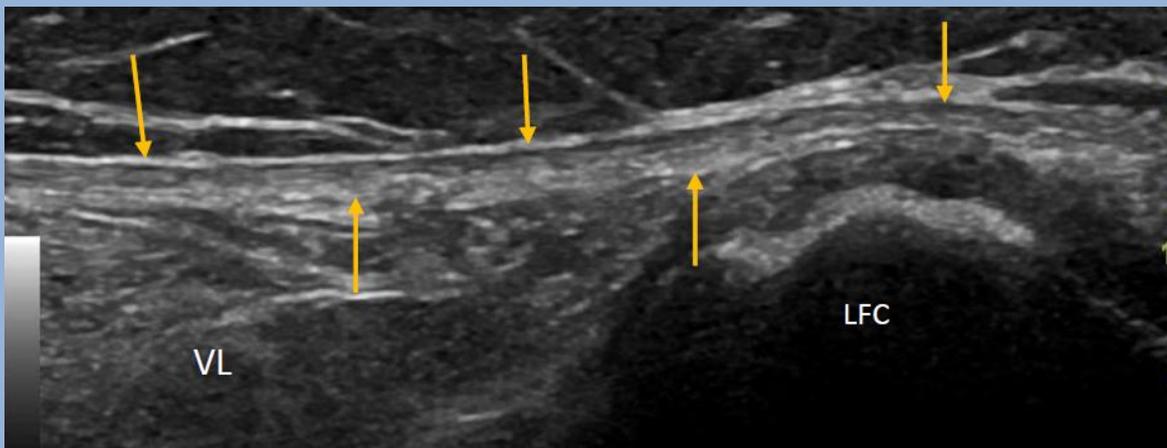
Legend: LFC-lateral femoral condyle; FH-fibular head; Yellow arrows-lateral collateral ligament; White curved arrow-anisotropy.

Lateral Knee Joint - Distal Iliotibial band: Longitudinal Scan

The patient is positioned in supine with the knee placed in 80 to 90 degrees of flexion. To view the distal iliotibial band the probe is placed in the anatomical coronal plane so that it lies along the long axis of the femur over the lateral femoral condyle.



Legend: Yellow arrows-iliotibial band; VL-vastus lateralis; LFC-lateral femoral condyle; LTP-lateral tibial plateau; White curved arrow-lateral knee joint and meniscus; Grey oval-popliteus tendon.



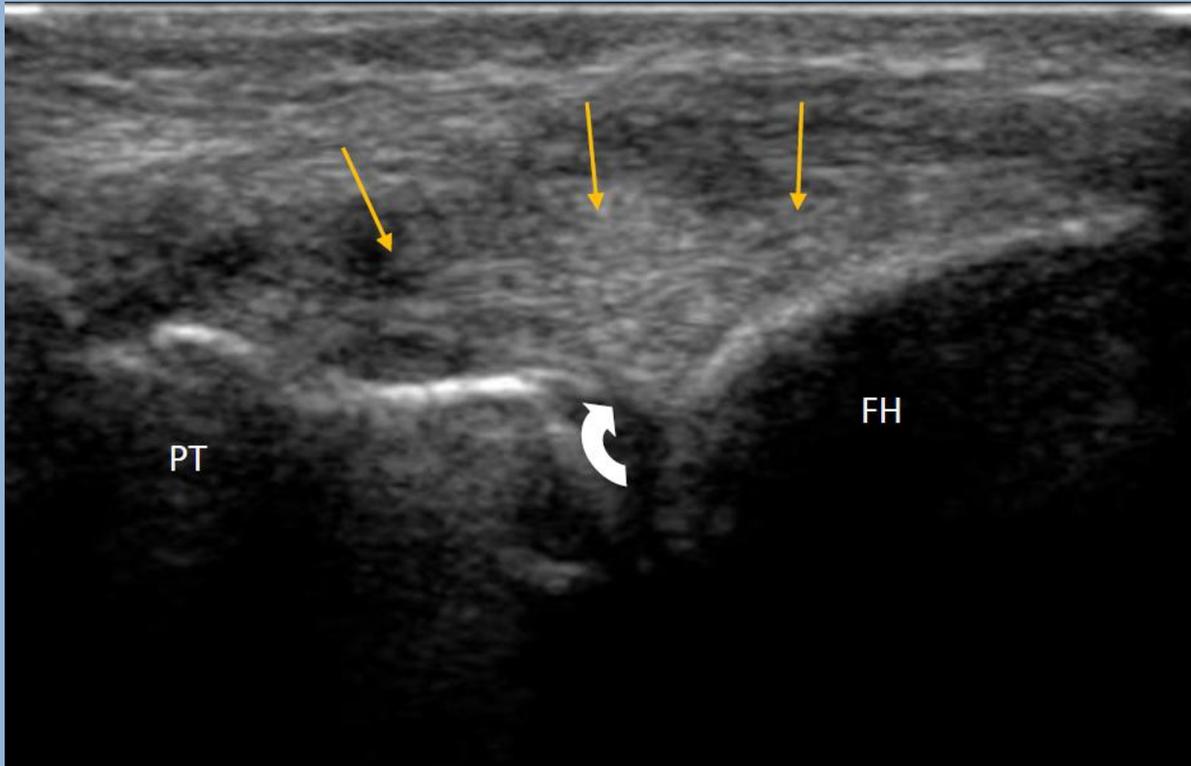
Lateral Knee Joint: Popliteus Tendon

To view the popliteus tendon the probe is placed in the anatomical coronal plane so that it lies along the long axis of the femur over the lateral femoral condyle and lateral knee joint.



Lateral Knee Joint: Proximal tibiofibular Joint

The patient is positioned in supine with the knee placed in 80 to 90 degrees of flexion. To view the proximal tibiofibular joint the probe is placed in the anatomical transverse oblique plane over the anterior aspect of the joint at the upper aspect of the shin.

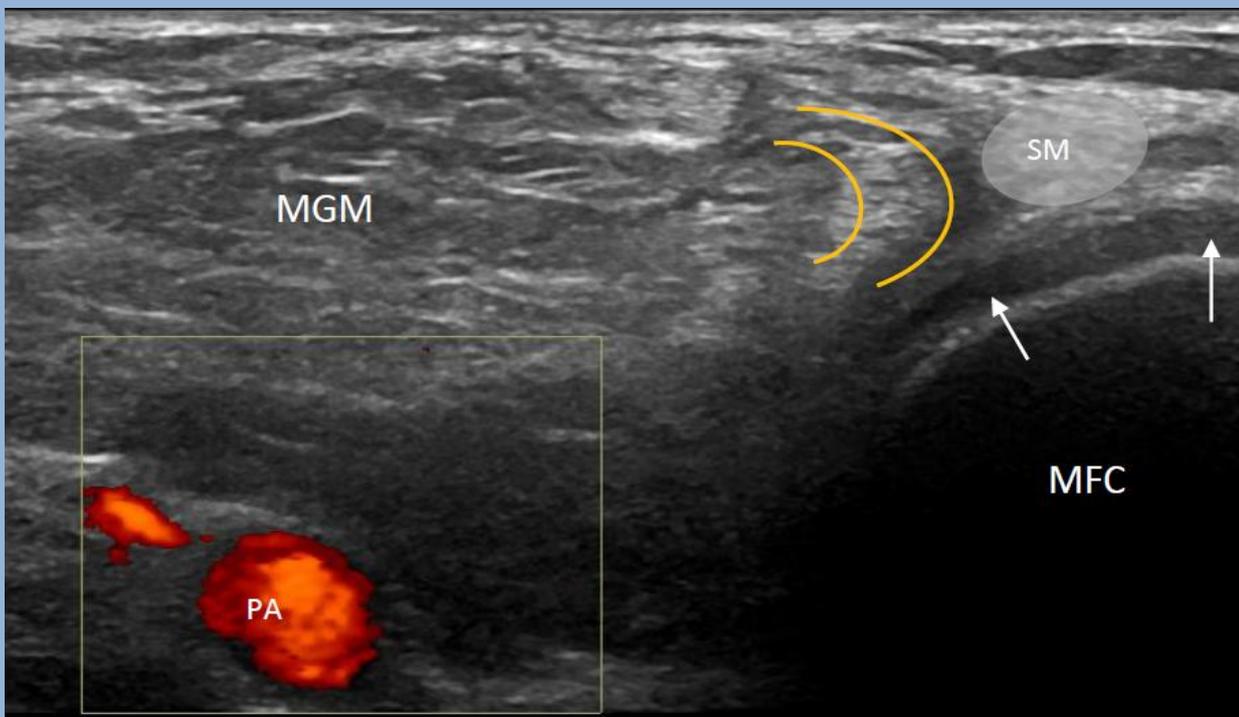


Legend: PT-proximal tibia; FH-fibular head; Yellow arrows-anterior superior tibiofibular ligament; White curved arrow superior tibiofibular joint.

4. Posterior

Posterior Knee Joint: Transverse Popliteal Fossa

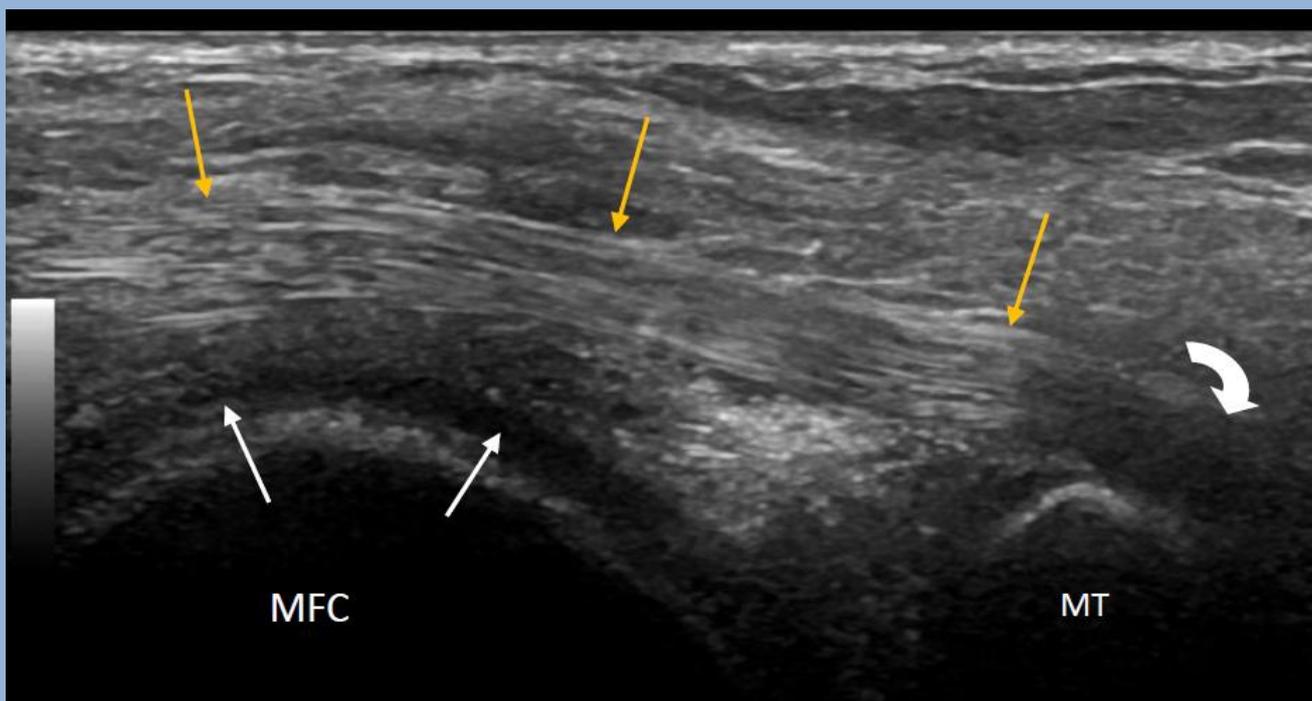
The patient is positioned in prone with the ankle and foot placed over a pillow so that the knee rests in 20 to 30 degrees of flexion. The probe is placed in the anatomical transverse plane over the medial aspect of the popliteal fossa.



Legend: MGM-medial gastrocnemius muscle; MFC-medial femoral condyle; White arrows-articular cartilage; Yellow lines-medial gastrocnemius tendon; SM-semimembranosus tendon; PA-popliteal artery.

Posterior Knee Joint: Longitudinal Popliteal Fossa

The patient is positioned in prone with the ankle and foot placed over a pillow so that the knee rests in 20 to 30 degrees of flexion. The probe is placed in the anatomical sagittal plane along the medial side of the popliteal fossa to view the tendon of semimembranosus in longitudinal aspect.



Legend: MFC-medial femoral condyle; MT-posterior aspect of the medial tibial plateau; White arrows-articular cartilage; Yellow arrows-semimembranosus tendon; Curved arrow-anisotropy.