Knee Ultrasound

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Fundamentals of Musculoskeletal Ultrasound are copyrighted
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Outline
- Joint effusion
- Extensor mechanism
- Baker cyst and other bursa
- Meniscus

Joint Effusion
- Suprapatellar recess
  - Superior
    - Prefemoral & quadriceps fat pad separation
    - Distends with partial knee flexion
  - Medial and lateral to patella
    - Distends with knee extension
    - Transducer pressure displaces joint effusion

Joint Effusion: sagittal plane

Joint Effusion: transverse plane
Joint Effusion: transverse plane

Knee Joint
- Suprapatellar recess or medial/lateral recesses
- In plane
- Transducer: axial
- Needle: lateral to medial

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Tendon Abnormalities
- Tendinosis:
  - Swollen, hypoechoic, no inflammation
- Tear:
  - Partial-thickness tear
  - Full-thickness tear: retraction

Quadriceps Tendon: tendinosis

Femur Patella Long Axis

Femur Patella Short Axis
**Quadriceps Tendon: tear**

- Partial tear:
  - One to two of three tendon layers torn
- Full-thickness tear
  - Complete tendon disruption
  - Tendon retraction: *dynamic imaging*
  - Joint fluid extending through tear
- 100% accuracy for diagnosis of high-grade and full-thickness tears requiring surgery

Foley R et al. J Ultrasound Med 2015; 34:805

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**Quadriceps Tendon: Partial Tears**

- Rectus Femoris Tear (1 layer)
- Vasti Tear (2 layers)

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**Quadriceps Tendon: full-thickness tear**

- **Long Axis**
- **Sagittal PDw**

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**Quadriceps Femoris Tear: dynamic imaging**

- **Long Axis**

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**Patellar Tendinosis:**

- Jumper’s knee
- Mucoid degeneration
- No inflammatory cells
- Possible partial thickness tear

Radiology 1996; 200:821

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**Patellar Tendinosis**

- Proximal patellar tendon
- Hypoechoic
- Swelling
- No tendon retraction

Radiology 1996; 200:821
Patellar Tendon: tendinosis
- Color Doppler
- Power Doppler

Patellar Tendon: fenestration
- Long Axis
- Non-sterile technique for simulation only!

Patellar Tendon: PRP
- Pre-procedure
- PRP injection

Patellar Tendon Tear
- Full-thickness tear
  - Hypoechoic
  - Posterior shadowing at ends of torn tendon
  - Tendon retraction
  - Patellar alta

AJR 2001; 176:1535

Patellar Tendon: full-thickness tears
- 3 Different Patients

Patellar Tendon: full thickness tear
- Prox
- Distal
- Longitudinal
**Osgood-Schlatter Disease:**
- Painful condition affecting the distal patellar tendon insertion on tibia
- Young male athletes
- Radiography: swelling and tibial tuberosity irregularity

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- *Baker cyst and other bursa*
- Meniscus

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**Baker Cyst:**
- Semimembranosus-medial gastrocnemius bursa
- 50% over age of 50 have communication with knee joint
- Cyst communication to posterior knee between SM-MG tendons required

AJR 2001; 176:373

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**Anatomy: posterior**

From: Netter’s Atlas of Human Anatomy

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**Baker Cyst Evaluation: pitfall**
Baker Cyst
- Aspiration
- Inferior to superior
- Medial to lateral
- Aspirate joint effusion first if present
- Steroid injection

Knee Bursae
- Suprapatellar Recess
- Prepatellar Bursa
- Deep Infrapatellar Bursa
- Superficial Infrapatellar Bursa
- Pes Anserinus Bursa
- Pes Anserinus
- "goose foot"
  - Sartorius
  - Gracilis
  - Semitendinosus
- Bursa:
  - Deep to conjoined tendon
  - Adjacent to proximal tibia
- Bursitis: rare

Pes Anserinus

Anterior Knee Bursa:
- Prepatellar bursa
- Superficial infrapatellar bursa
- Deep infrapatellar bursa
Prepatellar Bursa: aseptic fluid

Superficial Infrapatellar Bursa

Deep Infrapatellar Bursa

Adventitious Bursae:
- Site of friction
- Myxomatous degeneration of fibrous tissue
- Medial epicondyle:
  - Rider's bursa: horseback riding
  - Limbo-dancing
    - Trinidadian art form of limbo dancing

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Meniscus:
- Normal: hyperechoic
- Degeneration: hypoechoic
- Tear: defined hypoechoic cleft to articular surface

*Invest Radiol 1986; 21:332
Meniscus: Accuracy

- 35 patients
- Sensitivity / Specificity = 86% / 69%
- PPV / NPV = 83% / 75%
- Most studies:
  - US is markedly limited

*JBJS-Br 2008; 90-B:1045.
Parameniscal Cyst:

- Medial more common\(^1\)
- Anechoic or hypoechoic
- Extends to periphery of meniscus\(^2\)
- Look for meniscal tear

\(^1\)AJR 2001; 177:409
\(^2\)AJR 1998; 171:491

Take Home Points

- Joint effusion:
  - Knee flexion: suprapatellar recess
  - Knee extension: medial/lateral recesses
- Extensor mechanism:
  - Tendon tear: dynamic evaluation
  - Tendinosis: ultrasound-guided treatments
- Baker cyst:
  - Must see neck or channel to diagnose!

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