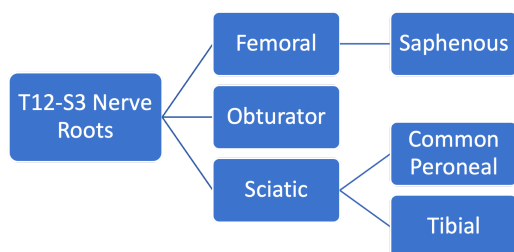


Ortho Lower Extremity Exam Reference Sheet

Strength Testing

0	1	2	3	4	5
None	Contraction	Joint Movement without Gravity	Joint Movement with Gravity	Moderate Resistance	Full Resistance

Major Nerves of the Lower Extremity



Nerve	Sensory	Motor	Clinical Risk
Femoral -> Saphenous	Anteromedial thigh (F) and lower leg (S)	Hip flexion, knee extension (F)	Pelvic or hip fractures
Obturator	Superomedial thigh	Hip adduction	Pelvic fracture
Sciatic		Hip extension, hip adduction	Hip fracture or dislocation, piriformis syndrome
Common peroneal (aka fibular)	Lateral leg and dorsal foot	Ankle dorsiflexion, great toe extension	Fibular neck fracture
Tibial	Posterolateral leg, lateral foot, sole of foot	Plantar flexion, toe flexion, and ankle inversion	Baker's cyst, tarsal tunnel syndrome

Ottawa Ankle Rules	
Malleolar Pain - Bone tenderness over the distal (6cm) posterior edge of the lateral malleolus - Bone tenderness over the distal (6cm) posterior edge of the medial malleolus Inability to walk or limp 4 steps	Midfoot Pain - Bone tenderness at the base of the 5th metatarsal - Bone tenderness over the navicular Inability to walk or limp 4 steps
If ANY of the above are true, XR ankle.	If ANY of the above are true, XR foot.

Lower Extremity Pearls & Pitfalls

- Always test strength against resistance and always compare sides for extremity injuries.
- The **Ottawa Ankle Rules** are validated for patients (> 2 yrs) with acute traumatic ankle or foot pain and are useful to **rule out** (high sensitivity) **clinically significant fractures without XR**. As with any decision-making tool, make sure you apply them to the correct patient population (i.e., avoid use if patients are intoxicated, otherwise altered, have a distracting injury, have sensory or perfusion deficits, etc) and defer to your clinical judgment.

Knee Exam Review

ACEP Video: [Knee Exam](#)

- Follow the link to watch a 4 minute video reviewing essential components of the knee exam.
- While you watch the video, review the knee exam essentials listed below.

Ortho Knee Exam Essentials

- **Perfusion:** dorsalis pedis and posterior tibial pulses (palpable? If not, doppler?), distal cap refill
- **Inspection:** alignment, position of patella, “divot” near quad tendon, swelling, external signs of infection or trauma (including popliteal fossa), ambulatory trial as able
- **Palpation:** femur, medial and lateral condyles, patella, medial and lateral tibial plateau, medial and lateral joint line, tibial tuberosity, fibular head, tibia and fibula
- **Range of Motion:** extension to 0°, flexion to 140°
- **Sensation:** [none, reduced, normal] medial and lateral knee and ankle (L3-S1 dermatomes)
- **Muscle Strength:** [rated 0-5] flexion, extension
- **Special Tests**
 - **Ballottement Test (Patellar Tap):** evaluates the presence of a **knee effusion**
 - Patient lies supine with knee extended, apply distal and posterior pressure superior to the patella, use the other hand to tap over the patella
 - Positive test if floating or bouncing of the patella
 - **Lever Sign Test:** evaluates for **anterior cruciate ligament tear** (85%+ sensitivity, minimal pain)
 - Patient lies supine with knees extended, place a fist under the proximal third of the calf, use the other hand to apply downward pressure over the distal third of the femur
 - With intact ligament, heel will rise; positive test (ACL tear) if anterior translation of the tibia without heel rise
 - **Lachman:** evaluates for **anterior cruciate ligament tear**
 - Knee flexed to 30°, grasp outer distal thigh and inner calf, pull on the tibia
 - Positive test if excessive anterior movement of the tibia (compare sides)
 - 85% sensitivity, but varies with acute injury; preferred over anterior drawer
 - **Posterior Drawer:** evaluates for **posterior cruciate ligament tear**
 - Knee flexed to 90°, foot flat on table, grasp the tibia with both hands and push posteriorly
 - Positive test if excessive posterior movement of the tibia (compare sides)
 - **Valgus or Varus Stress:** evaluates for **medial collateral ligament (MCL)** or **lateral collateral ligament (LCL)** tear
 - Place one hand over lateral joint line and the other holding up the distal leg, keep the knee in full extension, apply varus force (medial/adduction), then valgus force (lateral/abduction); repeat with the knee in 30° of flexion.
 - Positive test if laxity with valgus/lateral stress (MCL tear) or varus/medial stress (LCL tear)
 - **Apley Compression:** evaluates for **meniscal tear** (more sensitive than McMurry)
 - Patient lies prone with knee flexed to 90°, apply downward pressure on the foot with internal, then external rotation of the lower leg
 - Positive test if pain or a click with external (medial meniscus) or internal (lateral meniscus) rotation
 - **McMurry:** evaluates for **meniscal tear**
 - With knee flexed to 90°, stabilize the knee at the lateral joint line and use the other hand to hold the foot and exert external rotation while extending the knee; repeat with internal rotation while supporting the medial knee
 - Positive test if pain or a click with external (medial meniscus) or internal (lateral meniscus) rotation

Knee Exam Pearls & Pitfalls

- Expose both legs (remove pants) for a proper knee exam.
- Baker's cyst is indicated by swelling over the posterior aspect of the knee.
- Twisting knee injuries + knee effusion are suspicious for significant structural injury.
- If exam shows limited extension consider a meniscal tear or effusion; if hyperextension consider a PCL tear.
- Patients will lose the ability to extend the knee with disruption of the extensor mechanism from quadriceps or patellar tendon rupture or complete patella fractures.

Ankle & Foot Exam Review

ACEP Video: [Ankle & Foot Exam](#)

- Follow the link to watch a 5 minute video reviewing essential components of the ankle exam.
- While you watch the video, review the ankle & foot exam essentials listed below.

Ortho Ankle & Foot Exam Essentials

- **Perfusion:** dorsalis pedis and posterior tibial pulses (palpable? If not, doppler?), distal cap refill
- **Inspection:** alignment, swelling, external signs of infection or trauma (inc. plantar surface), gait
- **Range of Motion:** dorsiflexion 20°, plantar flexion 50°, eversion 20°, inversion 30°
- **Palpation:** proximal and distal tibia and fibula, distal tibiofibular joint (syndesmosis), medial and lateral malleoli, navicular, talus, Achilles tendon, calcaneus, metatarsals, toes
- **Sensation:** [none, reduced, normal] dorsal foot, 1st dorsal web space, lateral foot, medial foot
- **Muscle Strength:** [rated 0-5] dorsiflexion, plantar flexion, inversion, eversion
- **Special Tests**
 - **Anterior Drawer Ankle:** evaluates for **anterior talofibular ligament disruption** (lateral sprain)
 - Patient sitting with knee flexed over table, stabilize distal lower extremity, apply anterior force to the heel
 - Positive test if excessive laxity (compare sides)
 - Often limited in the acute setting due to pain, swelling
 - **Talar Tilt:** evaluates for **calcaneofibular ligament disruption** (lateral sprain)
 - Patient sitting with knee flexed over table, stabilize medial distal lower extremity, apply inversion force to the hindfoot
 - Positive test if asymmetric laxity or increased pain
 - Same technique can be used to evaluate for laxity with eversion (deltoid ligament disruption, medial ankle sprain)
 - **Compression Test:** evaluates for **high ankle/syndesmosis injury**
 - Patient sitting with knee flexed over table, apply pressure with both hands over the medial and lateral aspect of the lower leg, starting proximally and working distally
 - Positive test if pressure produced pain anteriorly over the syndesmosis
 - **External Rotation Stress Test:** evaluates for **syndesmotic sprain**
 - Stabilize the lower leg, grasp the plantar foot and rotate the foot externally
 - Positive test if pain anterior to the lateral malleolus
 - **Thompson Test:** evaluates for **Achilles tendon rupture** (must compare sides)
 - Patient prone, flex knee to 90°, squeeze the calf, foot should plantar flex
 - Positive test if foot does NOT plantar flex with calf squeeze

Ankle & Foot Exam Pearls & Pitfalls

- Bruising or swelling to the plantar surface of the foot can occur with mid foot injuries such as **LisFranc injuries**. If the patient has persistent midfoot pain with ambulation despite negative foot XR, get a weight-bearing AP view of the foot or CT foot.
- Don't forget to specifically palpate the **proximal fibula** (fracture here + unstable ankle injury such as sprain, syndesmotic injury or medial malleolus fracture = Maisonneuve fracture) and areas included in the **Ottawa ankle rules**:
 - Posterior edge of lateral malleolus
 - Posterior edge of the medial malleolus
 - Navicular bone (start at the anterior medial malleolus, palpate slightly inferior and anterior to find the navicular tubercle)
 - Base of the 5th metatarsal
- **Syndesmotic** ("high") **ankle sprains** result in ankle instability and require splinting, non-weight-bearing, and prompt orthopedics evaluation. Suspect this in a patient who has inability to walk even if XR (AP/lateral/mortise) is negative for fracture, particularly if provocative tests (above) are positive.
- When evaluating the Achilles, evaluate patients in a prone position.
- **Plantar fasciitis** is a common cause of foot pain, classically involves heel pain worse after inactivity (first steps in the AM), and is treated with rest, silicone heel inserts, and sometimes steroid shots.

Lower Extremity Exam Visuals

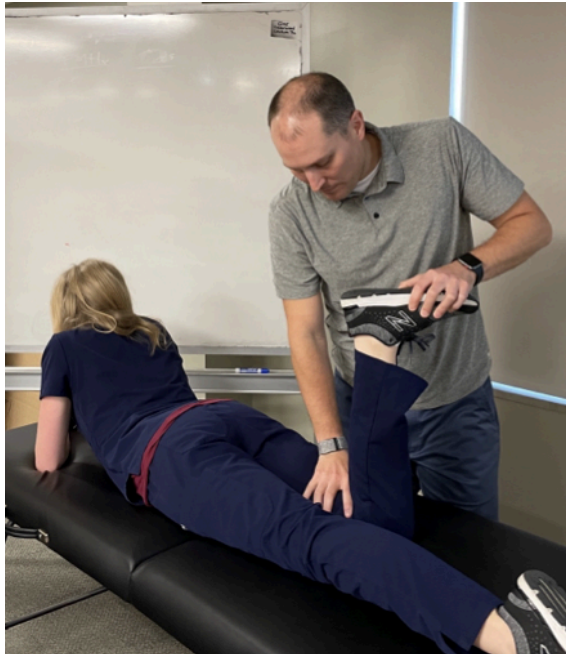
Lachman



Anterior (or Posterior) Drawer



Apley Compression



Thompson



Paired Asynchronous References

The following are vetted FOAM references that are strategically paired with this module. You may also access these on the [FoEM website](#) (Learner Resources -> Ortho) and review them before or after the learning session.

- EMRA Ortho Guide (Chapter 14)
- ACEP Sports Medicine: [Musculoskeletal Exam Video Series](#)
- EM Cases: [Occult Knee Injuries](#)
- NUEM Blog: [Knee Dislocation](#)
- CORE EM: [Ankle Fractures](#)

Attributions

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- **Editors:** Dr. Moira Davenport, Dr. John Kiel, Dr. Eric Steinberg
- **References:**
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 - Geiderman JM, Torbati S. Chapter 41: General Principles of Orthopedic Injuries. In: Ron Walls, Robert Hockberger, Marianne Gausche-Hill et al, editors. Rosen's Emergency Medicine: Concepts and Clinical Practice (10th ed). Philadelphia: Elsevier, Inc; 2023.
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 - Image References:
 - L1-S1 Sensory/Motor Table: Courtesy of Dr. Christopher Trigger
 - Dermatomes: Courtesy of Picryl. Available at: <https://picryl.com/media/grant-1962-663-19bcd0>
 - Lower Extremity Exam Visuals: Courtesy of Dr. Christopher Trigger