

Legwork Differential: Hip to Heel Specialized Examination

Sarah Bolander, DMSc, PA-C, DFAAPA

Objectives

- Review components of a comprehensive musculoskeletal physical exam.
- Identify specialized musculoskeletal exams for the lower extremity.
- Demonstrate appropriate specialized musculoskeletal exam techniques.
- Recognize positive findings.
- Correlate physical exam findings with differential diagnosis.



Hip

Case 1: "My hip hurts"

A

34 F, former gymnast

Deep pain in the front, in the groin

Catches when she climbs out of a low car

Cups the hip with a C-shaped hand

B

58 F, walks for exercise

Pain localized to the lateral hip

Cannot sleep on that side

Worse standing on one leg to dress

Before the special tests: where is the pain, and what makes it worse (loading the joint, or loading the tendon)?

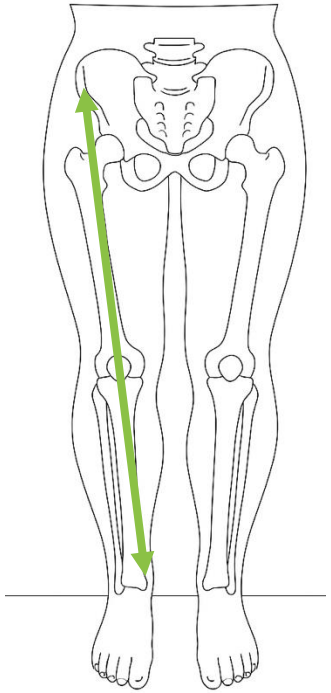
Leg Length Discrepancy

Galeazzi



Align flexed knees while patient is supine and observe for asymmetry

Measurement

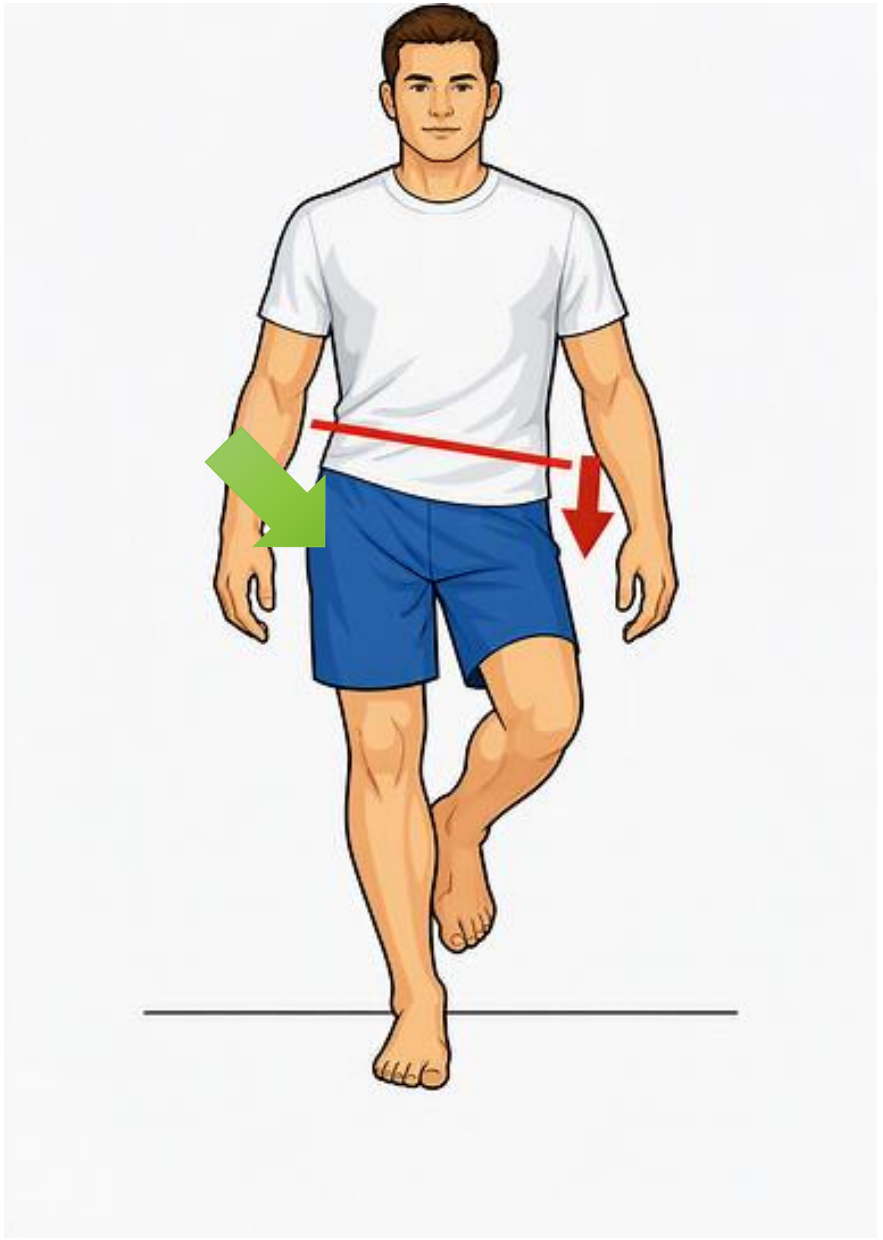


ASIS (anterior superior iliac spine) → medial malleolus of the ankle

Trendelenburg Sign

Patient stands on affected limb

while lifting contralateral limb



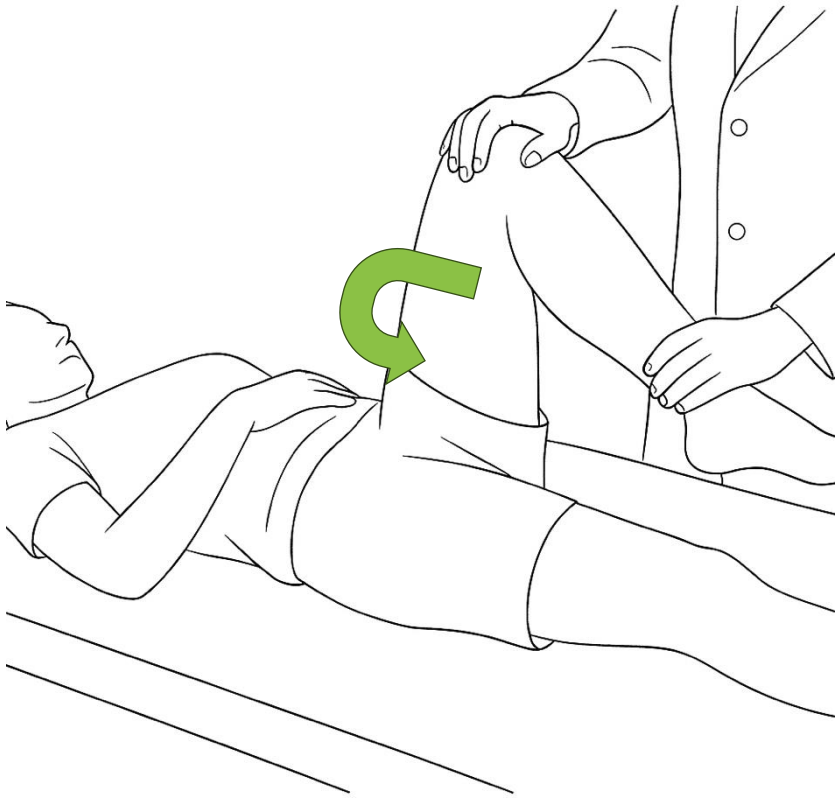
- Positive: pelvis drops on the lifted (non-stance) side; weakness is in the stance (affected) limb abductors
- Indications: Hip abductor weakness or gluteal tendinopathy

Variable accuracy; hold single-leg stance a full 30 seconds; a brief stance misses abductor fatigue

F**AD**IR (Impingement Test)

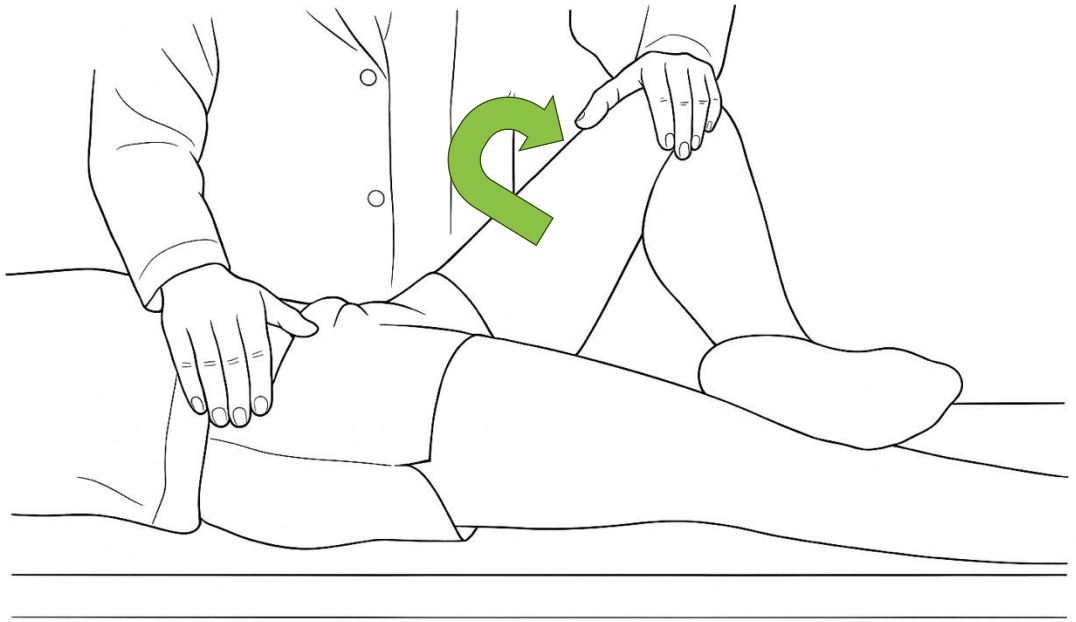
With the patient supine passively provide:
Hip **F**lexion, **AD**duction, **I**nternal **R**otation

- Positive: Reproduction of anterolateral hip pain
- Indication: Hip labral tears, FAI, intra-articular pathology



Sensitive, not specific: a negative FADIR helps rule out; a positive one does not confirm

F**AB**ER
(Patrick Test, Figure-of-Four)



With the patient supine, passively provide:

Hip **F**lexion, **AB**duction, **E**xternal **R**otation

Allow the foot to rest at the knee

Stabilize the contralateral hip

Apply downward pressure at the knee

- Positive: Reproduction of groin pain (hip pathology) or posterior pain (SI joint)
- Indications: Hip labral tears, FAI, sacroiliac joint pathology

Sensitivity 72–91% · Specificity not well reported: lateral pain at end range suggests gluteal tendinopathy, not the joint

Lateral Hip Pain

30-Second Single-Leg Stance

Patient stands unsupported on the affected limb for a full 30 seconds. Fingertip support on a wall is permitted for balance only.

Positive: reproduction of lateral hip pain within 30 seconds.

Rules IN. Specificity 98–100%

Palpation of the Greater Trochanter

Side-lying, affected side up. Palpate the posterolateral facet of the greater trochanter.

- Positive: point tenderness, often with radiation down the lateral thigh.
- Rules OUT. Sensitivity 80%
  - A non-tender trochanter makes gluteal tendinopathy unlikely

Groin Pain is the Joint

A

FADIR + with anterolateral groin pain

FABER reproduces groin pain

Log roll uncomfortable

Femoroacetabular impingement / labral tear

Activity modification and PT first. Refer if it persists.

B

FADIR negative

Point tender over the greater trochanter

Single-leg stance for 30 seconds reproduces it

Weak against resisted abduction

Greater trochanteric pain syndrome

Gluteal tendinopathy, possible bursitis. Load management vs injection if persists.

FADIR is the sensitive one for the joint

Knee





Case 2: "My knee gave out"

A

19 F, soccer

Planted and pivoted; no contact

Heard a pop

Swollen within two hours

B

24 M, skiing

Blow to the OUTSIDE of the knee, foot planted

Medial pain, minimal swelling

Feels unstable moving sideways

C

32 M, restrained driver in an MVC

Knee struck the dashboard

Vague anterior knee pain

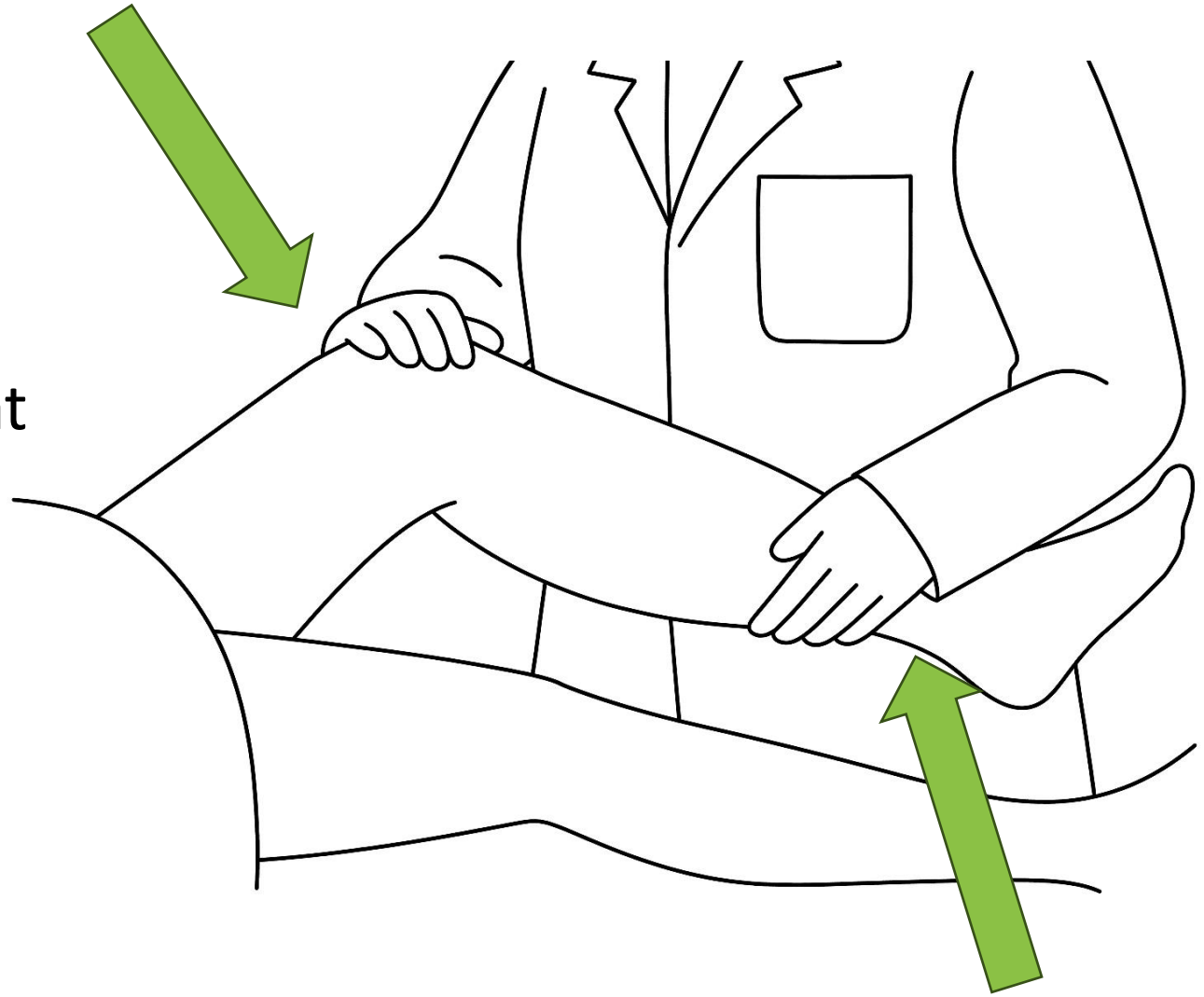
Little swelling, walking on it

How fast did it swell, and which side took the blow?

Valgus Stress Test (MCL)

Lateral force applied to knee at 0° and 30° flexion

- Positive: Pain or medial joint space laxity
- Indication: MCL injury/tear

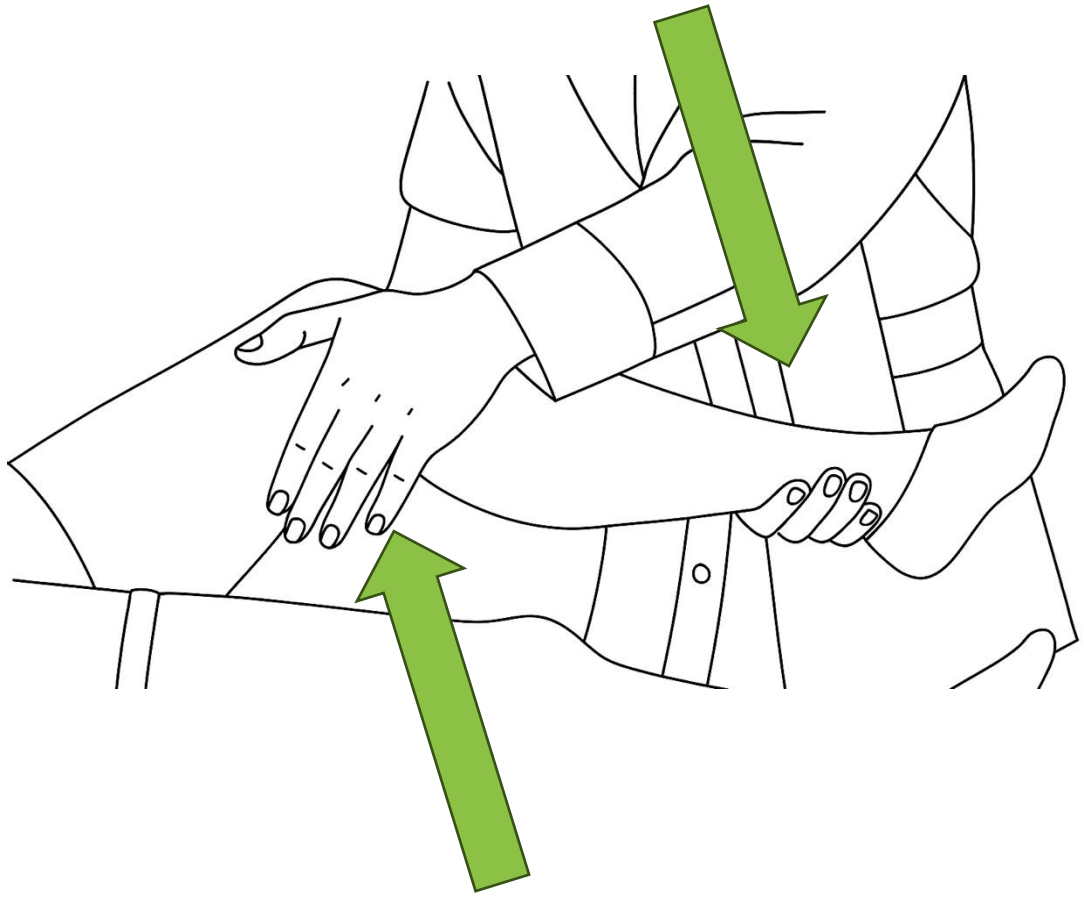


Sensitive and specific when compared at both 0° and 30°

Varus Stress Test (LCL)

Medial force applied to knee at 0° and 30° flexion

- Positive: Increased lateral joint space opening and/or pain
- Indication: LCL injury/tear



Sensitive and specific when compared at both 0° and 30°

Anterior Drawer (ACL)

Anterior displacement of tibia on femur with knee flexed 90°

- Positive: Increased anterior translation of tibia

- Indication: ACL injury/tear



Sensitivity 41–83%, specificity 85–95%. Sensitivity falls to roughly 22% within the first 2 weeks (do not rely on it acutely)

Lachman (ACL)

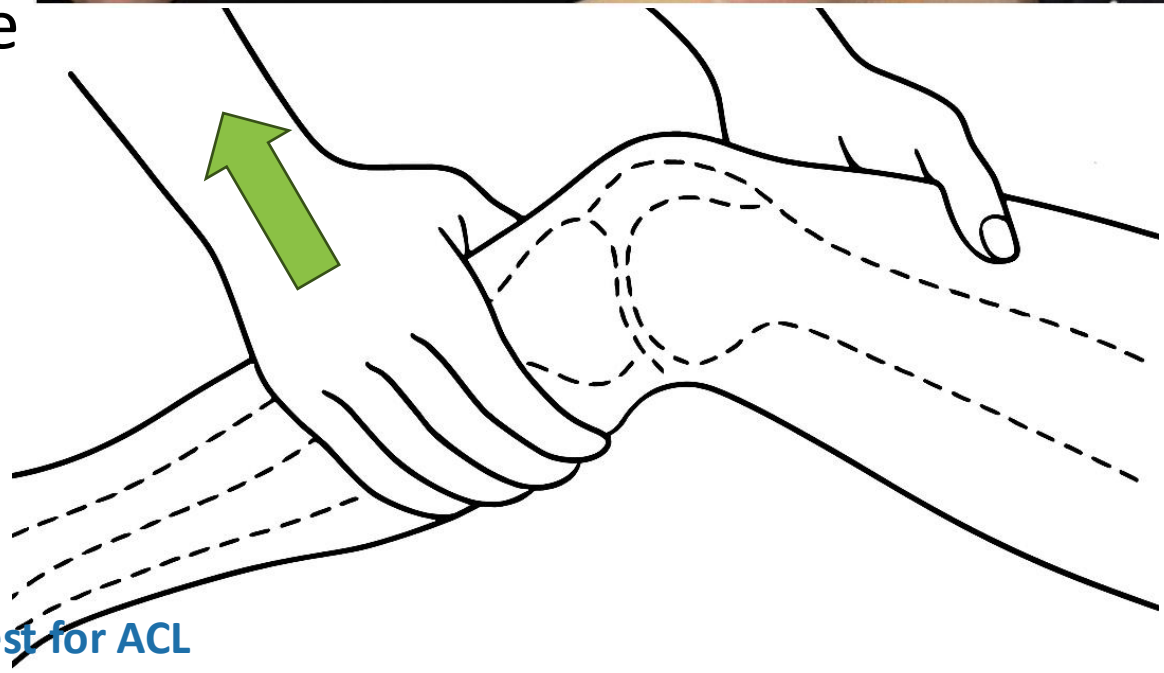


Physiotutors, 2025

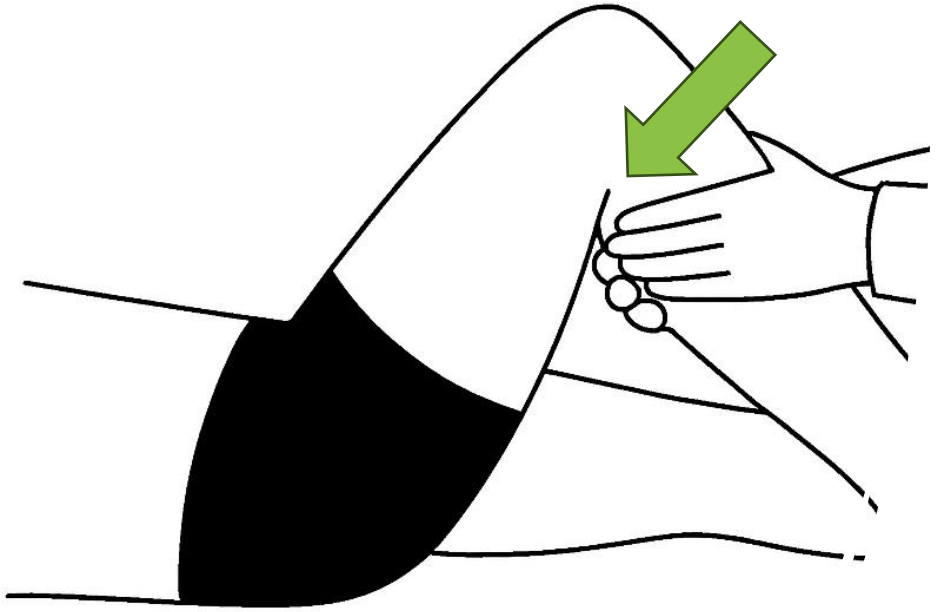
Patient in supine position, anterior displacement of tibia on femur with knee flexed 20-30°

- Positive: Increased anterior translation and/or soft endpoint

- Indications: ACL injury/tear



Sensitivity 81–87%, specificity 85–97%; most sensitive single test for ACL



Posterior Drawer Sign

Posterior displacement of tibia on femur with knee flexed 90°

- Positive: Increased posterior translation of tibia

- Indications: PCL injury/tear

Sensitivity 51-86% · Specificity not well studied alone

3 Acute Knees in Need of an MRI

A

Lachman + with a soft endpoint

Anterior drawer +

Tense effusion

Quadriceps inhibited

ACL tear

Lachman single best test.

B

Valgus laxity at 30°

STABLE at 0°

Tender at the MCL origin

No effusion

Isolated MCL injury

Brace and weight bear. Heals well without surgery.

C

Posterior sag with hips and knees flexed

Posterior drawer +

Lachman intact

PCL injury

Most are managed nonoperatively. Easy to miss if you never look from the side.

Can’t Miss: Laxity at 0° means more than one structure has failed; assess for spontaneously reduced knee dislocation. Check pulses and ABI; palpable pulses alone do not exclude vascular injury.

Case 3: "It catches and locks"

A

27 M, twisted while squatting

Sharp medial joint line pain

Catching, then it stuck

Cannot fully straighten it

B

55 F, no injury she can name

Medial joint line pain after gardening

Stiff for twenty minutes in the morning

Occasional catching

Grinding she can hear

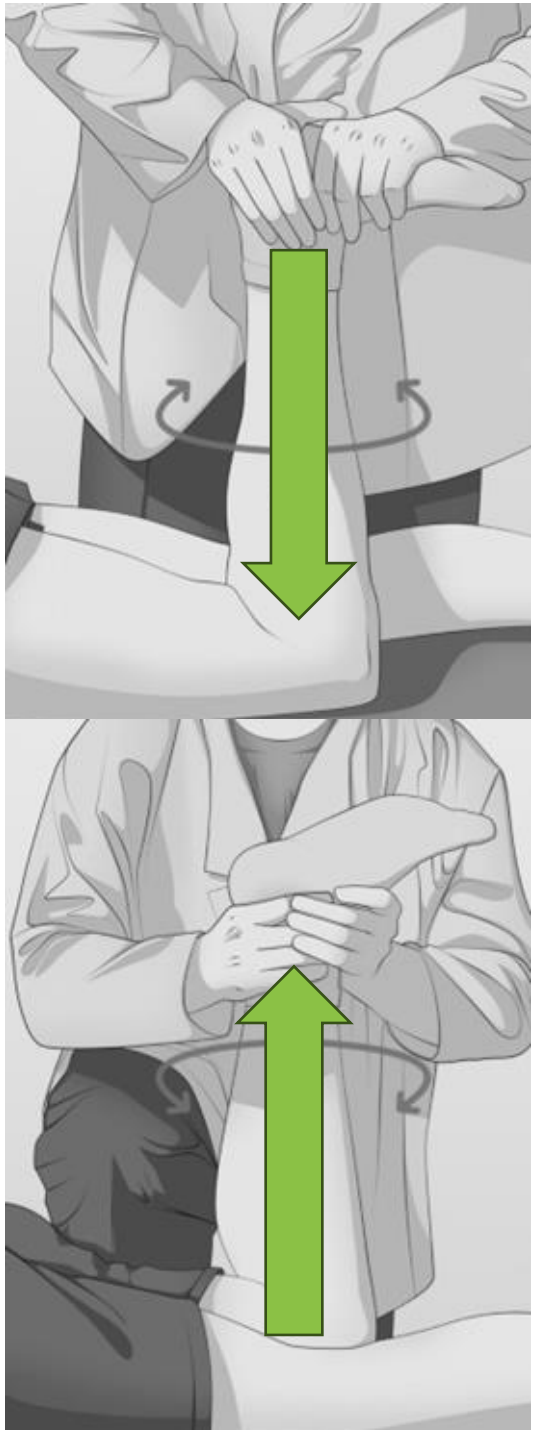
A true mechanical block?

Apley Grind (Compression) and Distraction Tests

Axial compression with tibial rotation while patient prone, knee flexed 90°. Repeat with axial distraction.

- Positive:
  - Pain with compression relieved with distraction (meniscus)
  - Pain with distraction (ligament)
- Indications:
  - Meniscal injury/tear (compression)
  - Ligamentous injury/tear (distraction)

Variable sensitivity and specificity



McMurray Test

Concurrent knee rotation and extension from flexed position

Medial meniscus

- Externally rotate at heel, flex maximally, then slowly extend the knee while providing (*valgus)* stress to knee

Lateral meniscus

- Internally rotate at the heel, flex maximally, then slowly extend the knee while providing (*varus)* stress to knee

Positive: Palpable or audible click/pop with pain at joint line

Indication: Meniscal tear



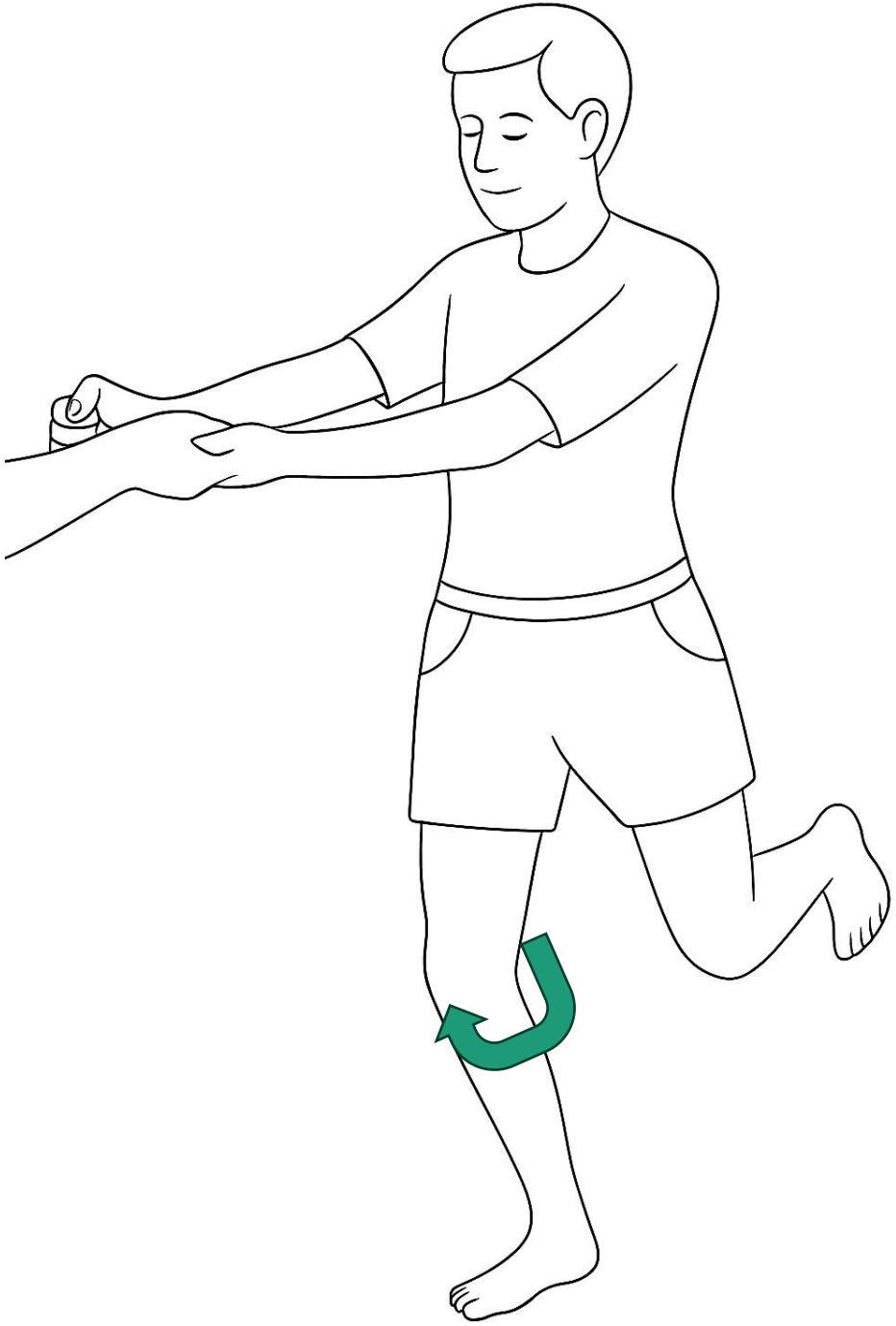
Sensitivity 61%, specificity 84%: joint line tenderness performs about the same

Thessaly Test

Patient stands on affected leg, knee flexed 20°, rotates body internally and externally

Positive: Pain and/or catching sensation at joint line

Indications: Meniscal tear



Variability: Sensitivity 64–66% · Specificity 39–53%

Joint line tenderness is doing most of the work

A

Joint line tender

McMurray + with a palpable click

Thessaly +

True block to full extension

Displaced (bucket-handle) meniscal tear

A locked knee is a phone call, not just a routine MRI order.

B

Joint line tender

McMurray equivocal

Crepitus and varus alignment

Pain with any loaded rotation

Degenerative meniscal tear with osteoarthritis

PT; likely nonsurgical. MRI if symptoms persist.

The special tests add specificity, not the diagnosis, so treat the patient, not the report.

Lower Leg/Ankle



Case 4: "I rolled my ankle"

Both walked in. Both swollen.

A

22 F, stepped off a curb

Ankle rolled INWARD

Swelling in front of the lateral malleolus

Took four steps into the room

B

20 M, football

Foot planted, body rotated OUTWARD over it

Pain ABOVE the ankle joint

Hurts most pushing off

Which direction did it twist — and is the pain below the malleolus or above it?



Squeeze Test

Compress tibia and fibula together at mid-calf

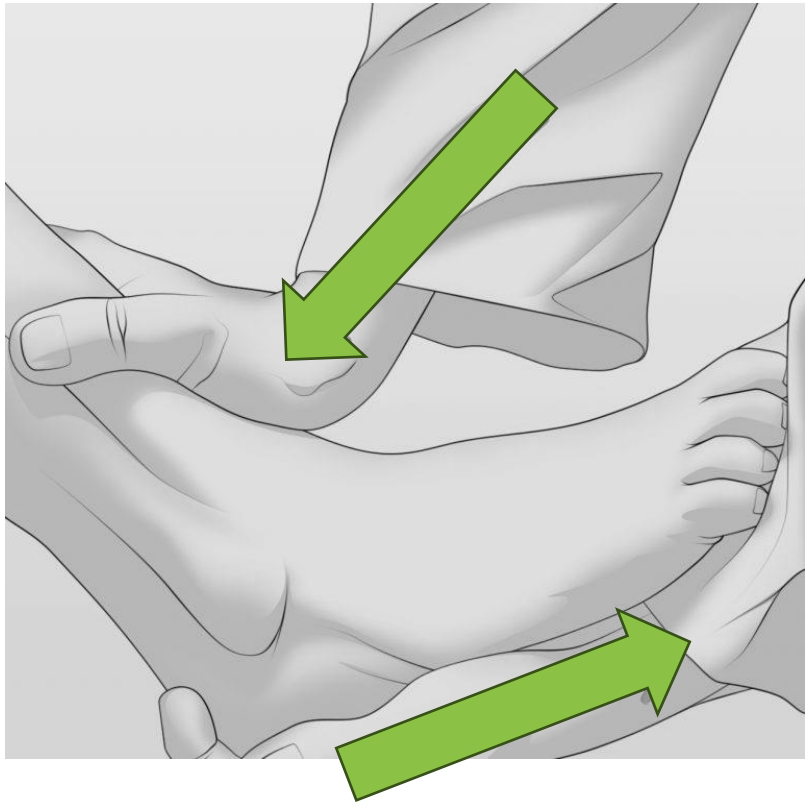
- Positive: Pain at distal syndesmosis
- Indications: High ankle sprain (syndesmotic injury)

Specific, but not sensitive, for syndesmotic injury

Anterior Drawer Test of Ankle

Stabilize distal tibia/fibula, apply anterior force to calcaneus with ankle in neutral or slight plantarflexion

- Positive: increased anterior translation of talus compared to contralateral side
- Indications: ATFL injury/tear

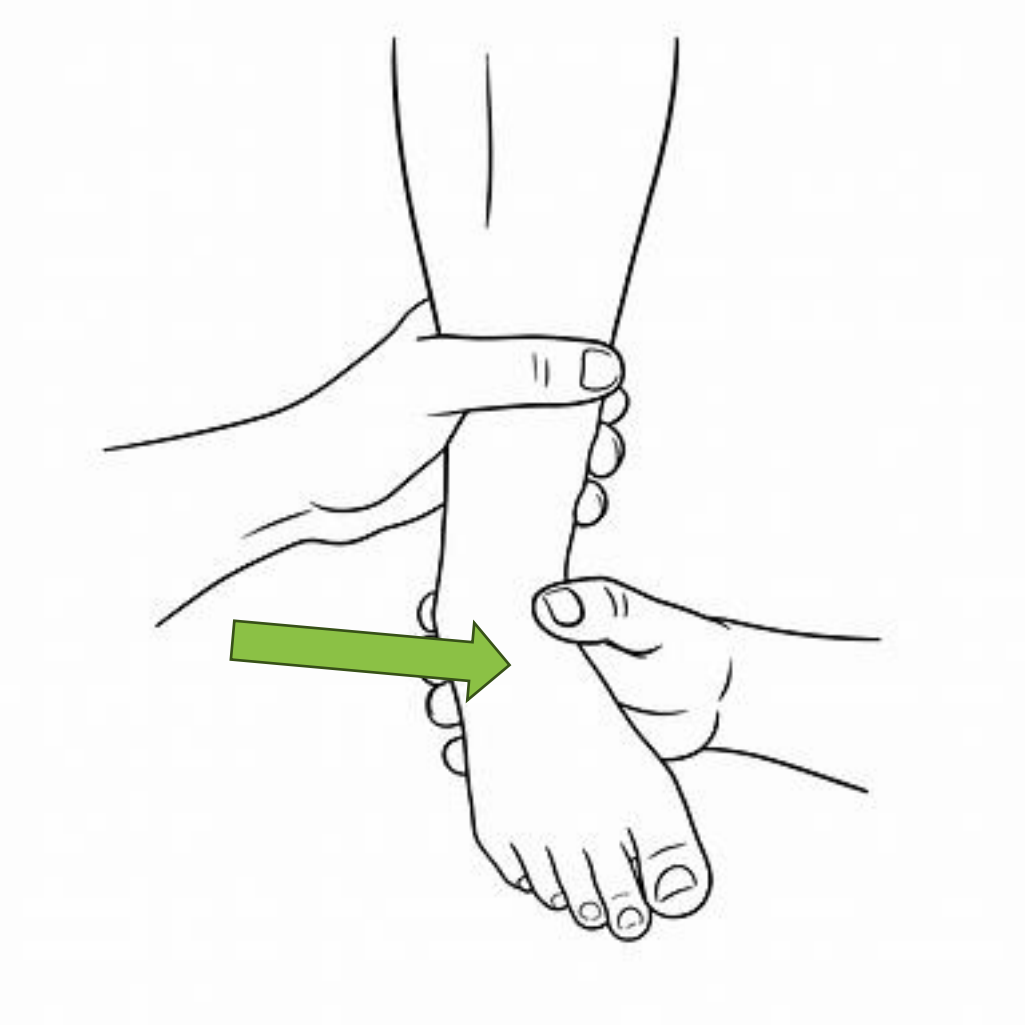


Sensitivity 54% · Specificity 87% (better at 5 days than at 48 hours)

Talar Tilt

Apply inversion stress to calcaneus with ankle in neutral position

- Positive: Increased inversion compared to contralateral side, pain
- Indications: CFL injury/tear, lateral ligament complex injury



Sensitivity ~52% (better at 5 days than at 48 hours)

Inversion or external rotation

A

Tender over the ATFL

Anterior drawer +

Talar tilt +

Squeeze test negative

Lateral ankle sprain

Early mobilization and functional rehab.

B

Tender over the syndesmosis, above the joint line

Squeeze test +

External rotation test +

Talar tilt negative

High ankle sprain (syndesmotic)

Recovery runs longer. Set that expectation on day one.

Tip: Young pediatric patients are more likely to have a fracture than a sprain with the same MOI.

Case 5: "Something hit me in the back of the leg"

A

46 M, weekend basketball

Pushed off; felt a sudden blow to the back of the ankle, looked around for who kicked him

Sharp pain that faded quickly

Cannot rise onto the toes on that side

Walked in, flat-footed

B

52 F, started a running program 3 months ago

Gradual pain 3 cm above the heel

Worst with the first steps out of bed, eases with light activity, returns after a long run

Tendon feels thick to her

Both of them can plantarflex. Does that reassure you? Can the patient push off?


Physiotutors, 2025

Thompson Test

Specificity 88%, sensitivity low

Patient prone with the foot hanging off the end of the table. Squeeze the calf at its widest point.

- Positive: absence of passive ankle plantarflexion
- Indication: complete Achilles tendon rupture

*Always compare with the uninjured side

Two Additional Findings

Palpable gap (tendon gap test)

Prone, palpate along the tendon above the insertion

- Positive: loss of continuity
- Sensitivity 73%, specificity 89%

*Swelling can obscure the defect

Decreased resting tension (Matles)

Prone, passively flex both knees to 90°. Watch the resting foot position

- Positive: affected foot falls into neutral or dorsiflexion instead of resting plantarflexion
- Sensitivity 88%, specificity 85%

A patient who can still plantarflex can still have a ruptured tendon

A

Thompson +

Palpable gap 4 cm above the insertion

Resting foot in neutral with knees flexed

Cannot perform a single-leg heel raise

Achilles tendon rupture

Clinical diagnosis. Urgent referral.

B

Thompson negative

Tender, thickened midportion 2–6 cm above insertion

Painful arc sign +

Heel raise possible but painful

Achilles tendinopathy

Eccentric loading. Counsel on months, not weeks.

When to consider a different problem: Calf pain without a pop or a palpable gap, think DVT. Pain under the heel with first steps, think plantar fascia.

Final Tips

- The history sets the foundation; select the specialized tests that answer the questions the history raised
- Technique determines the answer
- Know which way each test points:
- Rule OUT (sensitive)
- Rule IN (specific)
- Combine, don't rely on one
- No single maneuver in this talk performs as well alone
- Always compare sides
- Document the negatives as deliberately as the positives
- Treat the patient, not the report





Resources

- AAOS: http://www.aaos.org/
- POSNA: https://posna.org/
- AAFP: http://www.aafp.org/

- Radiopaedia: http://radiopaedia.org/
- OrthoBullets: https://www.orthobullets.com
- Physiotutors. Images used with permission. Accessed December 5, 2025. https://www.physiotutors.com/
- Some of the illustrations generated with Microsoft Copilot (2025) and reviewed by the author for anatomic accuracy.
- Books:
  - *Bates' Guide to Physical Examination and History Taking*
  - *Mosby's Guide to Physical Examination*
  - *Essentials of Musculoskeletal Care* by the American Academy of Orthopaedic Surgeons

References

GENERAL / COMPREHENSIVE MUSCULOSKELETAL EXAMINATION

- Bickley LS, Szilagyi PG, Hoffman RM. The musculoskeletal system. In: *Bates' Guide to Physical Examination and History Taking*. 12th ed. Wolters Kluwer; 2017:chap 16.
- Herring SA, Kibler WB, Putukian M, et al. Initial assessment and management of select musculoskeletal injuries: a team physician consensus statement. *Med Sci Sports Exerc*. 2024;56(3):385-401.
- Putukian M, Leclere LE, Herring SA, et al. The adolescent athlete and the team physician: a consensus statement — 2025 update. *Curr Sports Med Rep*. 2026;25(2).
- American Academy of Orthopaedic Surgeons. *Essentials of Musculoskeletal Care*. 5th ed. AAOS; 2016.

HIP

- Chamberlain R. Hip pain in adults: evaluation and differential diagnosis. *Am Fam Physician*. 2021;103(2):81-89.
- Wilson JJ, Furukawa M. Evaluation of the patient with hip pain. *Am Fam Physician*. 2014;89(1):27-34.
- Kuhlman GS, Domb BG. Hip impingement: identifying and treating a common cause of hip pain. *Am Fam Physician*. 2009;80(12):1429-1434.
- Reiman MP, Goode AP, Cook CE, Hölmich P, Thorborg K. Diagnostic accuracy of clinical tests for the diagnosis of hip femoroacetabular impingement/labral tear: a systematic review with meta-analysis. *Br J Sports Med*. 2015;49(12):811.
- Adib F, Hartline J, Donovan JS, et al. Two novel clinical tests for the diagnosis of hip labral tears. *Am J Sports Med*. 2023;51(4):1007-1014.
- Wong SE, Cogan CJ, Zhang AL. Physical examination of the hip: assessment of femoroacetabular impingement, labral pathology, and microinstability. *Curr Rev Musculoskelet Med*. 2022;15(2):38-52.
- Pålsson A, Kostogiannis I, Ageberg E. Combining results from hip impingement and range of motion tests can increase diagnostic accuracy in patients with FAI syndrome. *Knee Surg Sports Traumatol Arthrosc*. 2020;28(10):3382-3392.
- Grimaldi A, Mellor R, Nicolson P, Hodges P, Bennell K, Vicenzino B. Utility of clinical tests to diagnose MRI-confirmed gluteal tendinopathy in patients presenting with lateral hip pain. *Br J Sports Med*. 2017;51(6):519-524.
- Sunil Kumar KH, Rawal J, Nakano N, Sarmento A, Khanduja V. Pathogenesis and contemporary diagnoses for lateral hip pain: a scoping review. *Knee Surg Sports Traumatol Arthrosc*. 2021;29(8):2408-2416.

References

KNEE

- Duong V, Oo WM, Ding C, Culvenor AG, Hunter DJ. Evaluation and treatment of knee pain: a review. *JAMA*. 2023;330(16):1568-1580.
- Solomon DH, Simel DL, Bates DW, Katz JN, Schaffer JL. The rational clinical examination. Does this patient have a torn meniscus or ligament of the knee? Value of the physical examination. *JAMA*. 2001;286(13):1610-1620.
- American Academy of Orthopaedic Surgeons. *Acute Isolated Meniscal Pathology Evidence-Based Clinical Practice Guideline*. AAOS; June 10, 2024.
- Hing W, White S, Reid D, Marshall R. Validity of the McMurray's test and modified versions of the test: a systematic literature review. *J Man Manip Ther*. 2009;17(1):22-35.
- Rinonapoli G, Lucchetta L, Ancillai G, et al. Clinical reliability of 6 meniscal tests: a diagnostic accuracy study of 255 patients. *Acta Orthop*. 2025;96:452-458.

ANKLE AND LOWER LEG

- Wu V, Padilla CA, Smith NA. Management of acute ankle sprains: common questions and answers. *Am Fam Physician*. 2025;112(6):609-617.
- Sman AD, Hiller CE, Rae K, et al. Diagnostic accuracy of clinical tests for ankle syndesmosis injury. *Br J Sports Med*. 2015;49(5):323-329.
- Beckenkamp PR, Lin CC, Macaskill P, Michaleff ZA, Maher CG, Moseley AM. Diagnostic accuracy of the Ottawa ankle and midfoot rules: a systematic review with meta-analysis. *Br J Sports Med*. 2017;51(6):504-510.
- Gomes YE, Chau M, Banwell HA, Causby RS. Diagnostic accuracy of the Ottawa ankle rule to exclude fractures in acute ankle injuries in adults: a systematic review and meta-analysis. *BMC Musculoskelet Disord*. 2022;23(1):885.
- Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Worthington JR. A study to develop clinical decision rules for the use of radiography in acute ankle injuries. *Ann Emerg Med*. 1992;21(4):384-390.

HEEL AND ACHILLES

- Morancie NA, Irvin L, Rayala BZ. Heel pain: diagnosis and management. *Am Fam Physician*. 2025;112(6):648-656.
- Tu P, Bytomski JR. Diagnosis of heel pain. *Am Fam Physician*. 2011;84(8):909-916.
- Cooper MT. Common painful foot and ankle conditions: a review. *JAMA*. 2023;330(23):2285-2294.
- Garras DN, Raikin SM, Bhat SB, Taweel N, Karanjia H. MRI is unnecessary for diagnosing acute Achilles tendon ruptures: clinical diagnostic criteria. *Clin Orthop Relat Res*. 2012;470(8):2268-2273.
- Cuttica DJ, Hyer CF, Berlet GC. Intraoperative value of the Thompson test. *J Foot Ankle Surg*. 2015;54(1):99-101.
- Maffulli N. The clinical diagnosis of subcutaneous tear of the Achilles tendon: a prospective study in 174 patients. *Am J Sports Med*. 1998;26(2):266-270.