Overuse Injuries in Active Adults

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Learning objectives

- Recognize common overuse injuries in active adults and athletes
- Differentiate the clinical presentation of major tendinopathies
- Perform focused physical examination maneuvers and interpret key findings
- Utilize evidence-based diagnostic workup, including indications for imaging
- Implement appropriate rehabilitation and conservative treatment strategies
- Counsel patients on activity modification, return-to-sport, and injury prevention
- Identify indications for MRI, procedural intervention, and orthopedic referral
- Apply current literature and guideline-supported management in outpatient practice

References: Kane SF et al. Am Fam Physician. 2019; Wilson JJ et al. Am Fam Physician. 2005; Pompan DC. Am Fam Physician. 2011.

THE TENDON DISEASE SPECTRUM

A Continuum, Not a Linear Process

CONTINUUM OF TENDON HEALTH

NORMAL TENDON	TENDINITIS (Reactive)	TENDINOSIS (Degenerative)	TENDINOPATHY (Clinical Spectrum)
Healthy tendon structure and function	Acute overload with inflammation	Chronic degeneration with tendon matrix changes	Umbrella term for tendon pain and dysfunction; may include tendinitis, tendinosis, or both

	NORMAL TENDON	TENDINITIS (Reactive)	TENDINOSIS (Degenerative)	TENDINOPATHY (Clinical Spectrum)
KEY CHANGES	• Normal collagen alignment • Balanced matrix turnover • Normal ground substance • No inflammation	• ↑ Ground substance • ↑ Water content • Inflammatory cell infiltration • Edema	• Collagen degeneration • Fiber disorganization • ↑ Proteoglycans • Microtears	• Variable combination of inflammatory, degenerative, and reactive changes • Pain and functional impairment
CELLULAR CHANGES	• Normal tenocyte population	• ↑ Inflammatory cells (neutrophils, macrophages)	• Tenocyte density ↑ or ↓ • Apoptosis may occur	• Variable cellular activity depending on stage and load
COLLAGEN STRUCTURE	• Well-aligned, organized fibers	• Collagen generally intact	• Disorganized, crumby collagen	• Spectrum from intact to severely disorganized
VASCULARITY	• Normal	• Increased (hyperemia)	• Increased neovascularization	• Variable; may be increased or normal
CLINICAL FEATURES	• Asymptomatic • Full function	• Acute pain • Pain with activity • Improves with rest	• Chronic pain (>3 months) • Pain with load • May have rest pain	• Pain and dysfunction that fluctuates with load and tissue capacity

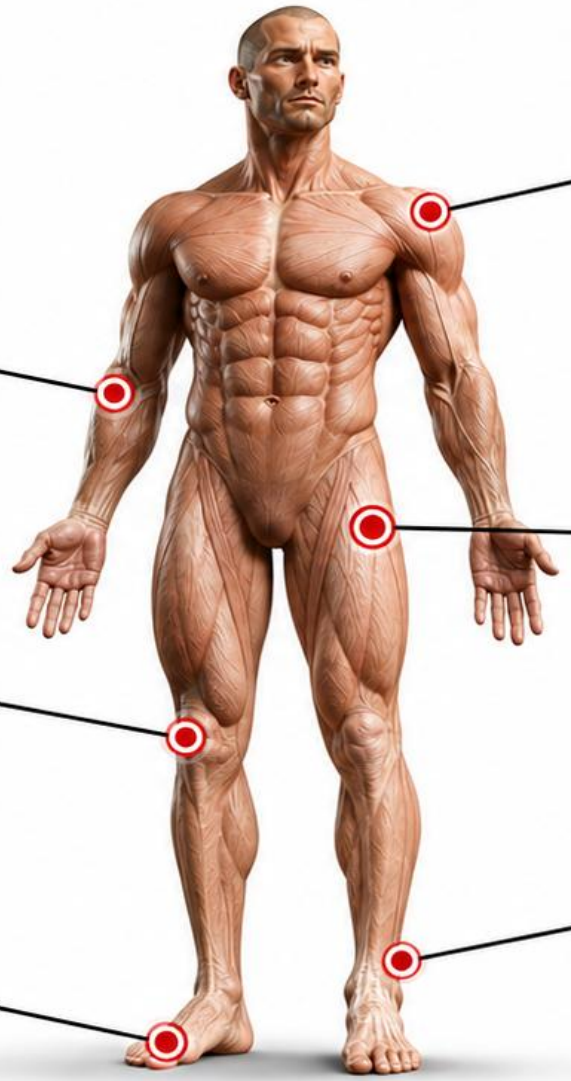
This is a **CONTINUUM**, not a **LINEAR PROCESS.**

Tendons may move between stages based on load, capacity, and individual factors.

References: Cook JL, Purdam CR. Is tendon pathology a continuum? A pathology model to explain the clinical presentation of load-induced tendinopathy. Br J Sports Med. 2009;43(6):409-416. Khan KM, Cook JL, Bonar F, et al. Time to abandon the "tendinitis" myth. BMJ. 2002;324(7338):626-627. Scott A, Docking S. Diagnosis and management of tendinopathy. Br J Sports Med. 2015;49(1):3-4.

BURDEN OF DISEASE – US ONLY

>24 MILLION PATIENTS PER YEAR*



SHOULDER
Rotator Cuff / Calcific Deposits
2 MM PATIENTS / YEAR

ELBOW
Tennis / Golfer's Elbow
7 MM PATIENTS / YEAR

HIP / GLUTEUS MEDIUS
4 MM PATIENTS / YEAR

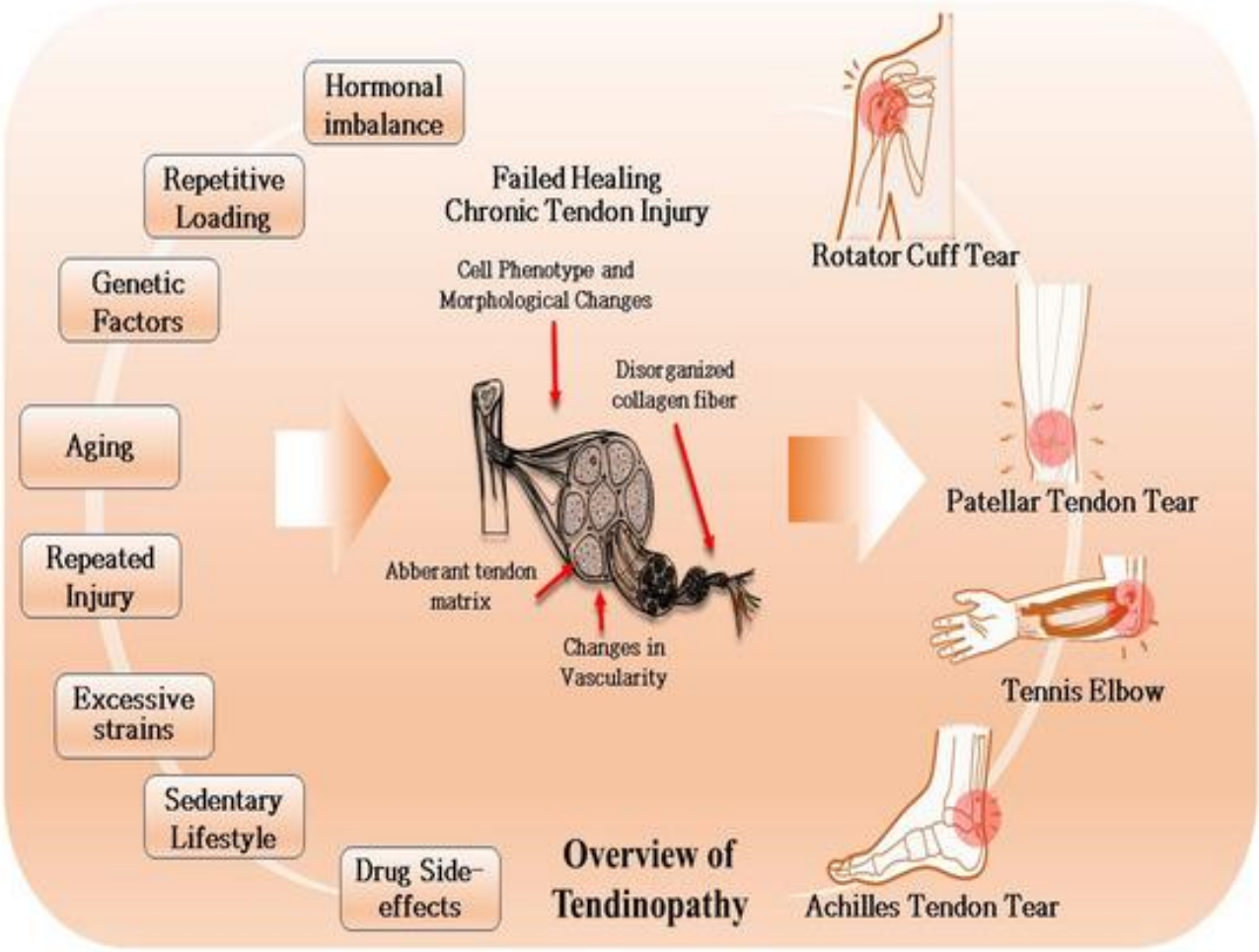
KNEE
Runner's / Jumper's Knee
2.5 MM PATIENTS / YEAR

ACHILLES
5.6 MM PATIENTS / YEAR

PLANTAR FASCIA
3.1 MM PATIENTS / YEAR

Tendinopathy

- Prevalence increasing worldwide
- Most common age 18 – 65 years old
- Predisposing Conditions
  - Training Errors
  - Genetic Predisposition
  - Trauma
  - Medication (Fluorquinolones, Statins, long term steroid use etc)
  - Smoking
  - Systemic Inflammation
  - Age
  - Metabolic Disorders



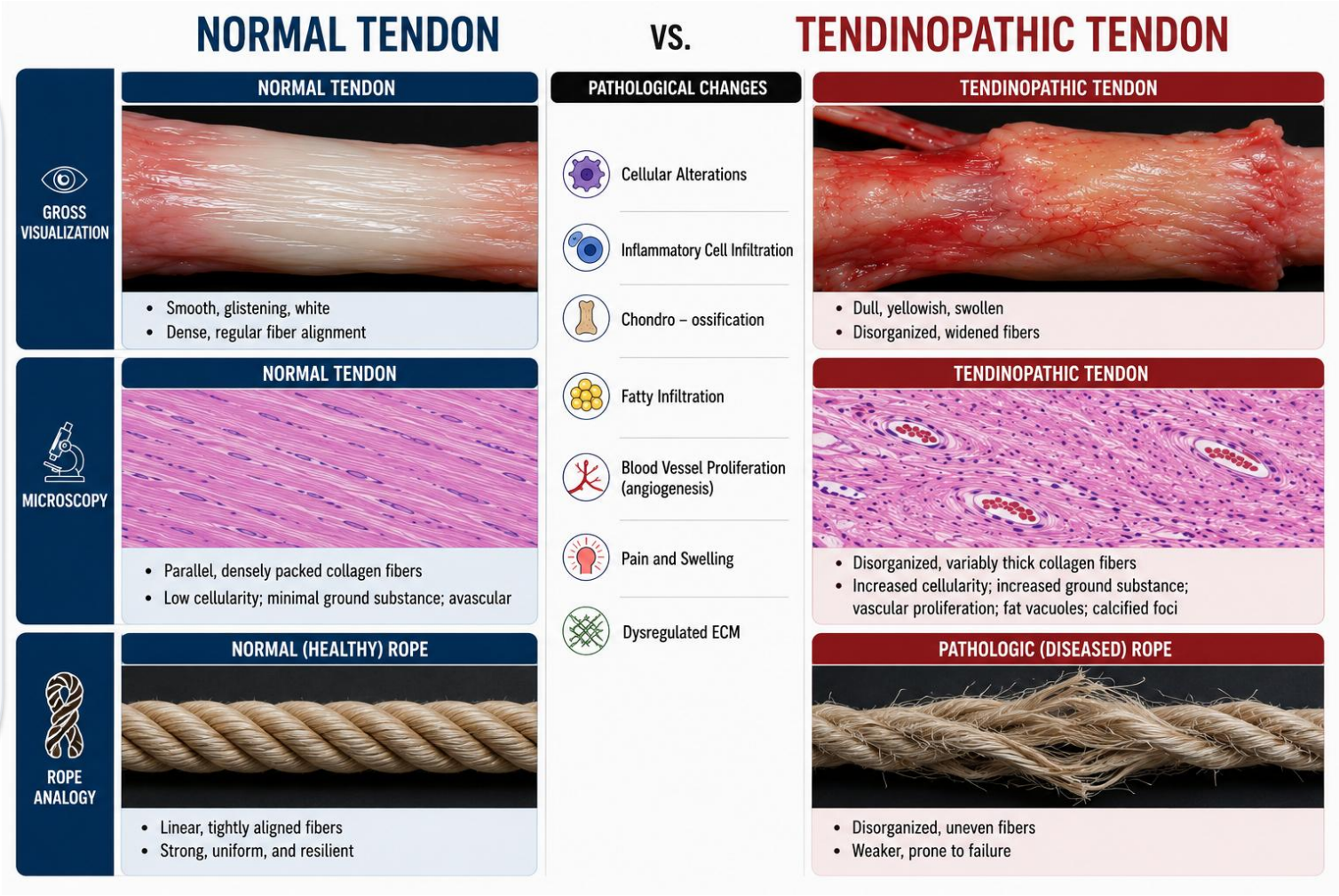
Tendinopathy: Definition

Histology

- Disorganized collagen fibers and extracellular matrix degradation
- Some tendons: fatty infiltration and hypercellular regions, increased presence of blood vessels, innervation, and immune cells
- Other tendons: calcifications within a largely avascular matrix

Exact origin of pain is <u>unknown</u>

- Nerve proliferation and release of neural mediators (glutamate; substance p)
- Not all tendinopathic tendons are associated with pain



Case 1: Shoulder Pain

Clinical presentation

Case

44-year-old pickleball player
Gradual lateral shoulder pain, worse with overhead play and reaching into back seat
Night pain lying on affected side; no true instability
Has tried NSAIDS w/o sustained relief

Typical history

Pain at anterolateral shoulder/deltoid region
Painful arc with abduction or lowering arm
Worse overhead, lifting away from body, push/pull
May have stiffness, scapular fatigue, or weakness

Differential to screen

Cervical radiculopathy: neck pain, dermatomal symptoms, Spurling
Adhesive capsulitis: loss of active and passive ROM
GH/AC OA: joint-line pain and restricted ROM
Full-thickness tear: traumatic onset, pseudoparalysis, external rotation lag/drop arm

References: Hegedus EJ et al. Br J Sports Med. 2008; Jain NB et al. J Bone Joint Surg Am. 2017; Burbank KM et al. Am Fam Physician. 2008.

Rotator cuff: pertinent physical exam

Stepwise exam that can quickly be performed

Inspection & motion

Observe posture, scapular winging/dyskinesis, atrophy of supraspinatus/infraspinatus fossae
Compare AROM vs PROM: cuff pain often active-limited; capsulitis limits both
Check painful arc: pain 60°–120° abduction; AC pain often near 170°–180°

Strength testing

Supraspinatus: Jobe/empty can or full can in scapular plane
Infraspinatus/teres minor: resisted external rotation at side; ER lag sign if weakness
Subscapularis: lift-off, belly-press, bear-hug if anterior shoulder pain or internal rotation weakness

Provocation + alternate sources

Hawkins-Kennedy and Neer reproduce subacromial pain but are not highly specific
Palpate AC joint/biceps groove; cross-body adduction if AC suspected
Cervical screen: ROM, Spurling, reflexes/sensation/myotomes when symptoms radiate

References: Hegedus EJ et al. Br J Sports Med. 2008; Jain NB et al. J Bone Joint Surg Am. 2017; Burbank KM et al. Am Fam Physician. 2008.

Rotator cuff: exam test accuracy

Sensitivity/specificity ranges are condition- and reference-standard dependent

Test / finding	Positive finding	Sensitivity	Specificity	Clinical use
Hawkins-Kennedy	Pain with passive internal rotation at 90° forward flexion	~79%	~59%	Sensitive screen for subacromial pain; low specificity
Neer impingement	Pain with passive forward elevation in internal rotation	~79%	~53%	Screen; false positives common
Painful arc	Pain from ~60°–120° abduction	~44–61%*	~96–100%*	Specific in one tendinitis cohort; not enough alone
Jobe / empty can	Pain or weakness with resisted elevation in scapular plane	~89%	~59%	Sensitive for supraspinatus tear/pathology
Full can	Pain or weakness in thumbs-up scapular-plane elevation	~70%	~81%	More specific than Jobe in ROW cohort
Drop arm	Cannot smoothly lower arm from abduction	~24%	~96%	Low sensitivity; positive test raises concern for tear
ER lag sign	Cannot maintain passive ER when examiner releases	Low (~10% reported)	~98%	Highly specific for infraspinatus/full-thickness tear

References: Hegedus EJ et al. Br J Sports Med. 2008; Jain NB et al. J Bone Joint Surg Am. 2017; Burbank KM et al. Am Fam Physician. 2008. *Doxey R et al. J Occup Environ Med. 2018.

Rotator cuff: rehab explanation for patients

Simple home program language

Phase 1: calm symptoms for 2 - 4 weeks

Avoid repeated overhead loading for 1–2 weeks, not complete rest
Pendulums and pain-free ROM daily
Scapular setting: 'gently pinch shoulder blades down and back' — 2 sets of 10
Isometric ER/IR at side against wall/towel: 5 x 30–45 sec

Phase 2: build capacity 2-12 weeks

Band external rotation with elbow tucked at side: 2–3 sets of 12–15
Rows and low trapezius work: 2–3 sets of 10–15
Wall slides/serratus punches; progress to dumbell raises below shoulder height
Pain rule: ≤3/10 during exercise and back to baseline by next morning

Pain options

Topical NSAID or short oral NSAID course if safe
Subacromial corticosteroid injection: short-term pain relief; avoid repeated injections and use to enable rehab
Avoid opioid therapy; PRP evidence remains mixed for rotator cuff tendinopathy

References: Kane SF et al. Am Fam Physician. 2019; Coombes BK et al. Lancet. 2015; AAOS Rotator Cuff Guideline.

Rotator cuff: MRI and orthopedic referral

Decision points

Order MRI / diagnostic US when

Traumatic onset with objective weakness
Positive drop arm, ER lag, pseudoparalysis, or suspected full-thickness tear
Failure of 6–12 weeks of high-quality rehab when imaging will change management
Persistent night pain/weakness or diagnostic uncertainty after x-ray/basic exam

Refer to orthopedics when

Acute traumatic full-thickness tear suspected, especially younger/active patient
Pseudoparalysis or progressive loss of strength
Large/retracted tear, significant atrophy, or failed rehab affecting work/sport/sleep
Concomitant instability, fracture, infection, tumor, or neurologic deficit

Common pitfall

Order MRI when the result will change treatment, not simply because pain persists for a short duration

Important to remember:>25% of asymptomatic individuals will have tendon abnormalities on imaging = imaging findings do not always correlate with symptoms

Risk of rotator cuff re-tearing based on meta-analysis range:
•~15–25% risk of retear for small/medium tears
•~30–50%+ for massive tears

References: Hegedus EJ et al. Br J Sports Med. 2008; Jain NB et al. J Bone Joint Surg Am. 2017; Burbank KM et al. Am Fam Physician. 2008.; Pompan DC. Am Fam Physician. 2011.

Case 2: Lateral elbow

Clinical presentation

Case

59-year-old carpenter / pickleball player
Lateral elbow pain for past 3 months
Pain worse after increased gripping and lifting
Pain lifting coffee cup, shaking hands, opening jars
Has tried NSAIDS without sustained relief

Typical history

Pain over lateral epicondyle/common extensor origin
Worse with resisted wrist extension, gripping, supination/pronation under load
Often chronic degenerative tendinosis of ECRB rather than acute inflammation

Differential to screen

Radial tunnel syndrome: more distal pain, pain with resisted supination, less focal epicondylar tenderness
Cervical radiculopathy: neck symptoms, neurologic findings
Posterolateral rotatory instability, radiocapitellar arthritis, stress injury in throwing athletes

References: Karanasios S et al. J Hand Ther. 2022; Saroja G et al. Int J Physiother Res. 2014; Coombes BK et al. Lancet. 2015.

Lateral elbow: Pertinent physical exam

Stepwise exam

Look and localize

Inspect for swelling, deformity, bruising, atrophy
Palpate lateral epicondyle and common extensor origin; compare contralateral side
Tenderness maximal at/just distal to lateral epicondyle supports LET

Load the tendon

Cozen: resisted wrist extension with elbow flexed and forearm pronated
Maudsley: resisted middle-finger extension
Pain-free grip strength: compare elbow flexed vs extended

Rule out mimics

Radial tunnel: tenderness 3–5 cm distal/anterior to epicondyle; pain with resisted supination
C-spine screen if paresthesia, weakness not pain-limited, or neck symptoms
Assess elbow ROM; loss of extension or mechanical symptoms suggests intra-articular pathology

References: Karanasios S et al. J Hand Ther. 2022; Saroja G et al. Int J Physiother Res. 2014; Coombes BK et al. Lancet. 2015.

Lateral elbow: exam test accuracy

Evidence base is smaller than for shoulder/Achilles

Test / finding	Positive finding	Sensitivity	Specificity	Clinical use
Cozen test	Lateral epicondyle pain with resisted wrist extension	~84–91%	Low/variable; poorly studied	Useful screen; pair with palpation and grip
Mill test	Pain with passive wrist flexion/pronation + elbow extension	~53–76%	Up to 100% in small US-based study	More rule-in value when clearly positive
Maudsley test	Pain with resisted middle-finger extension	~70–88%	Low/variable; poorly studied	Provokes extensor digitorum/ECRB region
Pain-free grip difference	Grip weaker/painful with elbow extended vs flexed	~78–83%	~80–90%	Good adjunct; easy outcome measure
Focal lateral epicondyle tenderness	Maximal tenderness at common extensor origin	Not well established	Not well established	High face validity; not validated as stand-alone test

References: Karanasios S et al. J Hand Ther. 2022; Saroja G et al. Int J Physiother Res. 2014; Coombes BK et al. Lancet. 2015.

Lateral elbow: rehab explanation for patients

Simple home program language

Start: unload and calm for 2-4 weeks

Temporarily reduce painful gripping, wrist extension, and repetitive lifting
Counterforce strap may reduce pain during work/sport
Wrist extensor stretch: elbow straight, forearm pronated, gently flex wrist 30 sec x 3

Progress: tendon loading 4-12 weeks

Eccentric wrist extension: lift with other hand, slowly lower 1–3 lb over 3–5 sec
2–3 sets of 10–15, 4–5 days/week; progress weight slowly
Add forearm pronation/supination and grip strengthening as pain improves

Pain options

Topical NSAID first-line if localized pain and low risk
Consider nitroglycerin patch or dextrose prolotherapy in select chronic cases; discuss adverse effects and evidence limits
Avoid repeated steroid injections; PRP evidence mixed and cost/availability vary

References: Kane SF et al. Am Fam Physician. 2019; Coombes BK et al. Lancet. 2015; Creech-Organ JA et al. Am Fam Physician. 2023.

Lateral elbow: MRI and orthopedic referral

Decision points

Imaging

Plain radiographs if trauma, loss of motion, arthritis, loose body, calcification, or atypical pain

US or MRI if refractory symptoms, diagnostic uncertainty, suspected tear, or procedure planning

Do not image early classic cases unless red flags or management will change

Refer to orthopedics when

Persistent symptoms despite 6–12 months of structured rehab and load modification
Significant functional limitation at work/sport despite adherence
Objective weakness, suspected tendon tear, instability, or intra-articular pathology
Diagnostic uncertainty after appropriate imaging

Evidence counseling

Corticosteroid injection can reduce short-term pain but is associated with worse intermediate/long-term outcomes and recurrence in trials; avoid repeated injections.

References: Karanasios S et al. J Hand Ther. 2022; Saroja G et al. Int J Physiother Res. 2014; Coombes BK et al. Lancet. 2015.; Coombes BK et al. Lancet. 2015.

Case 3: Gluteus medius tendinopathy / GTPS

Clinical presentation

Case

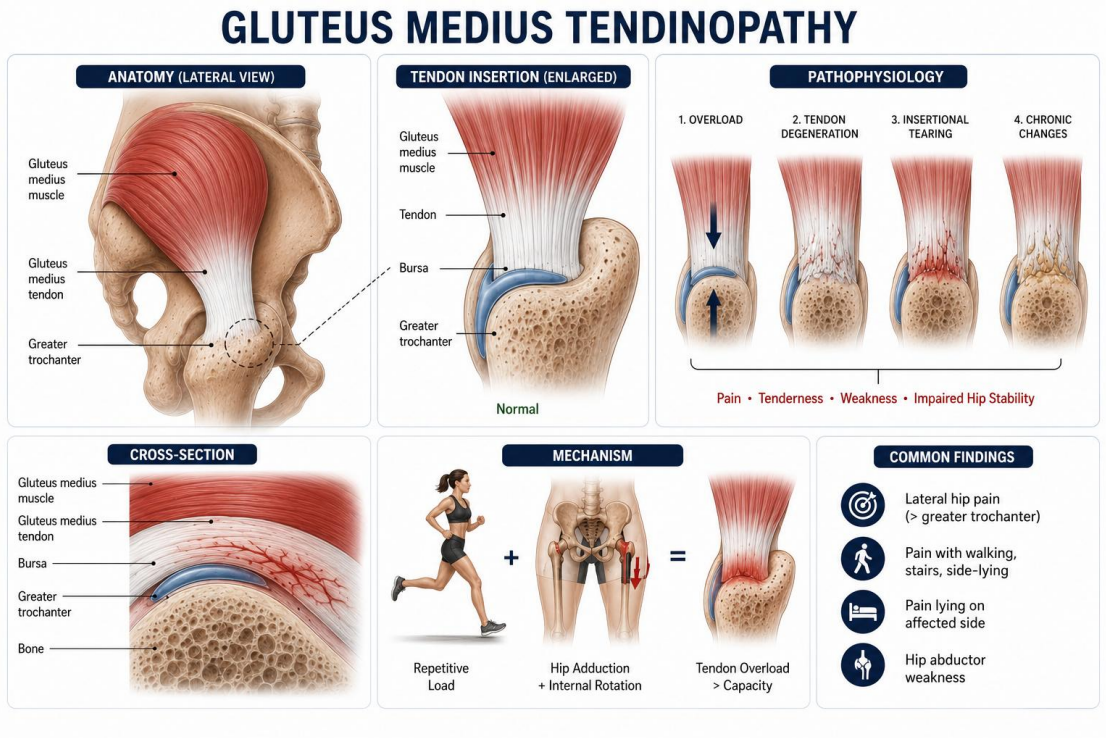
58-year-old runner with lateral hip pain
Pain lying on affected side and with hills/stairs
No groin pain; symptoms worsen after sudden mileage increase

Differential to screen

Hip OA/labral pathology: groin pain, limited internal rotation, positive FADIR
Lumbar radiculopathy/stenosis: neurologic symptoms or back-dominant pain
Femoral neck stress injury: deep anterior/groin pain, pain with hop, high-risk athlete

Typical history

Traditionally thought to be due to trochanteric bursitis. Surgical, histological, and imaging studies have shown that GTPS is attributable to tendinopathy of the gluteus medius and/or minimus with or without coexisting bursal pathology



References: Lequesne M et al. Arthritis Rheum. 2008; Fearon AM et al. Br J Sports Med. 2013; Speers CJB et al. Br J Gen Pract. 2017; Walker-Santiago R et al. J Hip Preserv Surg. 2019.; Chamberlain R. Am Fam Physician. 2021.

Gluteus medius: Pertinent physical exam

Stepwise exam

Observation & functional exam

Observe gait: Trendelenburg pelvic drop or compensatory trunk lean
Single-leg stance: reproduction of lateral hip pain within 30 sec
Single-leg squat/step-down: assess dynamic hip adduction, pelvic control, knee valgus

Palpation & strength

Palpate greater trochanter and gluteal tendon insertion; compare sides
Resisted hip abduction in side-lying or supine; note pain vs true weakness
Resisted external derotation: hip flexed 90°, return from ER/IR position against resistance

Screen alternate sources

Hip ROM: decreased internal rotation/groin pain suggests intra-articular pathology
Lumbar/SI screen: neuro exam, slump/SLR if radicular symptoms
Hop test or fulcrum test if stress fracture concern; avoid provocative overload when high-risk

References: Lequesne M et al. Arthritis Rheum. 2008; Fearon AM et al. Br J Sports Med. 2013; Speers CJB et al. Br J Gen Pract. 2017; Walker-Santiago R et al. J Hip Preserv Surg. 2019.

Gluteus medius / GTPS: exam test accuracy

Values differ by target: tendinopathy vs tendon tear

Test / finding	Positive finding	Sensitivity	Specificity	Clinical use
30-sec single-leg stance	Lateral hip pain within 30 sec	~38–100%	~97–100%	High specificity; variable sensitivity across studies
Resisted external derotation	Lateral hip pain/weakness with resisted derotation	~71–88%	~84–97%	Helpful GTPS/gluteal tendon test
Trendelenburg sign/gait	Pelvic drop or trunk lean on affected stance leg	~73%	~77%	Suggests abductor dysfunction/tear
Resisted internal rotation test	Pain/weakness during resisted IR in prone/supine variation	~92%	~85%	Proposed for gluteus medius tears
Greater trochanter palpation	Focal lateral tenderness	Not well established	Not well established	Sensitive clinically but nonspecific

References: Lequesne M et al. Arthritis Rheum. 2008; Fearon AM et al. Br J Sports Med. 2013; Speers CJB et al. Br J Gen Pract. 2017; Walker-Santiago R et al. J Hip Preserv Surg. 2019.

Gluteus medius: MRI and orthopedic referral

Decision points

Order MRI / diagnostic US when

Persistent lateral hip pain despite 8–12 weeks of targeted rehab
Objective abductor weakness, Trendelenburg gait, or concern for partial/full-thickness gluteal tendon tear
Atypical features: groin pain, severe night/rest pain, systemic symptoms, stress fracture concern
Pre-procedure or preoperative planning

Refer when

MRI/US shows high-grade partial or full-thickness gluteus medius/minimus tear
Trendelenburg gait or progressive abductor weakness
Refractory symptoms despite structured rehab, load modification, and appropriate injections/nonoperative care
Concern for femoral neck stress injury or intra-articular hip pathology needing specialist care

Common pitfall

Repeated corticosteroid injections may reduce pain short-term but do not correct tendon load intolerance; avoid using injections as a substitute for abductor strengthening and load management.

References: Lequesne M et al. Arthritis Rheum. 2008; Fearon AM et al. Br J Sports Med. 2013; Speers CJB et al. Br J Gen Pract. 2017; Walker-Santiago R et al. J Hip Preserv Surg. 2019.; Chamberlain R. Am Fam Physician. 2021.

Gluteus medius: rehab explanation for patients

Simple home program language

Start: reduce compression

Avoid lying directly on painful side; pillow between knees when side-sleeping
Avoid standing with hip 'hanging' in adduction; avoid crossing legs
Isometric hip abduction into wall or belt: 5 x 30–45 sec

Progress: strengthen abductors

Side-lying hip abduction: slow up/down, pelvis stacked; 2–3 sets of 8–12
Bridge progression → side plank from knees → banded lateral walks/monster walks
Step-downs: focus level pelvis and knee tracking over 2nd toe

Pain options

Topical/oral NSAIDs if safe; ice/heat for symptom modulation
Shockwave therapy has supportive evidence in chronic GTPS
Corticosteroid injection can help short-term but recurrence is common; discuss tendon risks with repeated injections

References: Kane SF et al. Am Fam Physician. 2019; Lequesne M et al. Arthritis Rheum. 2008; Speers CJB et al. Br J Gen Pract. 2017.

Case 4: Patellar tendinopathy

Clinical presentation

Case

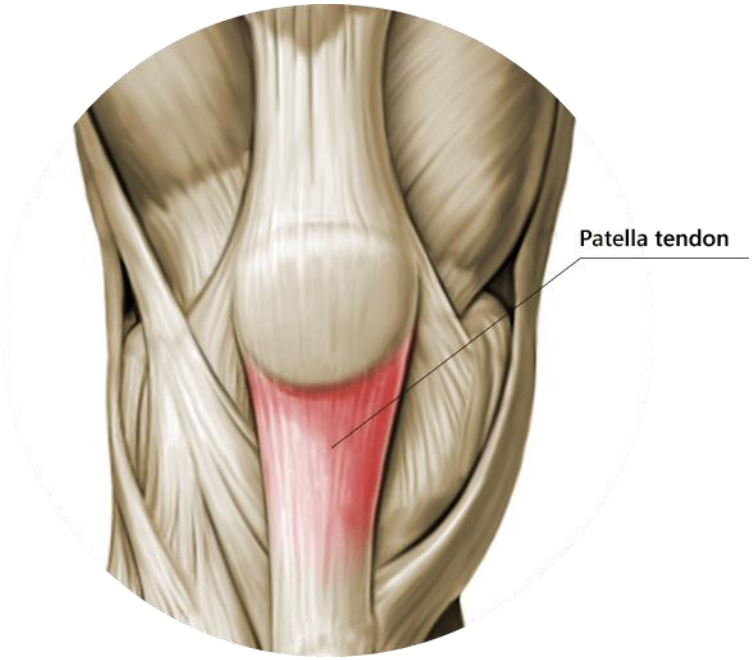
20-year-old volleyball player
Focal inferior pole pain after jump-volume increase
Pain during warm-up, improves briefly, then worsens after practice

Typical history

Anterior knee pain localized to inferior patellar pole or proximal patellar tendon
Worse with jumping, sprinting, deceleration, stairs, squats
Load-related pain; morning stiffness can occur

Differential to screen

Patellofemoral pain: diffuse retropatellar/peripatellar pain, prolonged sitting
Osgood-Schlatter/Sinding-Larsen-Johansson in younger athletes
Fat pad irritation, plica, meniscus, chondral injury, stress fracture



References: Mendonça LM et al. J Orthop Sports Phys Ther. 2016; Malliaras P et al. J Orthop Sports Phys Ther. 2015; Zwerver J et al. Br J Sports Med. 2007.; Santana JA. StatPearls. 2023.

Patellar tendon: Pertinent physical exam

Stepwise exam

Localize and compare

Palpate inferior pole of patella and proximal tendon with knee flexed/extended
Pain should be focal rather than diffuse anterior knee pain
Assess effusion, joint-line tenderness, ROM, and patellar tracking

Load the tendon

Single-leg decline squat on 25° decline board if available; pain location matters
If no board: single-leg squat, step-down, repeated jump/hop as tolerated
Document pain score, depth, reps, and 24-hour response

Kinetic-chain screen

Hip abductor/external rotator strength
Ankle dorsiflexion and calf strength
Landing mechanics: dynamic valgus, stiff landing, trunk control
Quadriceps/hamstring flexibility and asymmetry

References: Mendonça LM et al. J Orthop Sports Phys Ther. 2016; Malliaras P et al. J Orthop Sports Phys Ther. 2015; Zwerver J et al. Br J Sports Med. 2007.

Patellar tendon: exam test accuracy

Fewer validated special-test studies than shoulder/Achilles

Test / finding	Positive finding	Sensitivity	Specificity	Clinical use
Single-leg decline squat	Focal patellar tendon pain on decline squat	~62.5%	~85.1%	Useful load-provocation test; +LR ~4.2
History of patellar tendon pain	Prior/current focal tendon pain with sport load	~50%	~88.9%	Specific; +LR ~4.5
VISA-P <88	Lower symptom/function score	~77.8%	~62.5%	Severity/outcome tool; not diagnostic alone
Negative SLDS + negative pain history + VISA-P	All negative	Not single-test value	CART model AUC ~0.80	Helps identify absence of tendon abnormality
Inferior pole tenderness	Focal tenderness at inferior patellar pole	Not well established	Not well established	Classic but not validated alone

References: Mendonça LM et al. J Orthop Sports Phys Ther. 2016; Malliaras P et al. J Orthop Sports Phys Ther. 2015; Zwerver J et al. Br J Sports Med. 2007.

Patellar tendon: MRI and orthopedic referral

Decision points

Imaging

X-ray if bony pain, trauma, apophyseal injury, calcification, or alternate knee diagnosis suspected
US can show tendon thickening/neovascularity but imaging abnormalities may be asymptomatic
MRI if refractory symptoms, diagnostic uncertainty, suspected partial tear, or surgical planning

Refer when

Suspected rupture or high-grade partial tear
Failure of 3–6+ months of progressive tendon loading with persistent sport/work limitation
Mechanical symptoms, significant effusion, or alternate intra-articular pathology
Recurrent inability to progress despite adherence and appropriate load management

Counseling

MRI can confirm structural pathology but does not replace clinical load testing; many tendon imaging abnormalities occur without symptoms.

References: Mendonça LM et al. J Orthop Sports Phys Ther. 2016; Malliaras P et al. J Orthop Sports Phys Ther. 2015; Zwerver J et al. Br J Sports Med. 2007.; Kane SF et al. Am Fam Physician. 2019.

Patellar tendon: rehab explanation for patients

Simple home program language

Start: pain-modulating isometrics

Spanish squat or wall sit at ~70°–90° knee flexion: 5 x 30–45 sec
Knee extension isometric if equipment available: 5 x 45 sec
Use before activity if it reduces pain; monitor 24-hour response

Progress: heavy slow resistance

Leg press, squat, knee extension: slow 3 sec down / 3 sec up
2–3x weekly; start 3–4 sets of 8–15, progress load as tolerated
Add plyometrics/landing drills only after strength and pain response improve

Pain options

Patellar strap/taping may reduce sport symptoms but is not curative
NSAIDs may help short-term pain; avoid masking pain to continue overload
PRP evidence mixed; passive modalities alone are insufficient

References: Mendonça LM et al. J Orthop Sports Phys Ther. 2016; Malliaras P et al. J Orthop Sports Phys Ther. 2015; Zwerver J et al. Br J Sports Med. 2007.; Coombes BK et al. Lancet. 2015.

Case 5: Achilles tendinopathy

Clinical presentation

Case

46-year-old recreational runner
Posterior heel pain after hill/speed-work increase
Morning stiffness; pain warms up then returns after run

Typical history

Midsubstance: pain/thickening 2–6 cm proximal to calcaneal insertion
Insertional: pain at posterior calcaneus; worse hills/stairs/dorsiflexion
Risk factors: sudden load change, limited calf strength, obesity, diabetes, fluoroquinolone exposure

Differential to screen

Acute rupture: pop, gap, weak plantarflexion, abnormal Thompson test
Retrocalcaneal bursitis/Haglund deformity, insertional enthesopathy
Sural neuritis, posterior ankle impingement, calcaneal stress fracture, inflammatory enthesitis

References: Reiman MP et al. J Athl Train. 2014; Hutchison AM et al. Foot Ankle Surg. 2013; Martin RL et al. J Orthop Sports Phys Ther. 2018.

Achilles: Pertinent physical exam

Stepwise exam

Inspect and palpate

Inspect standing alignment, swelling, fusiform thickening, Haglund prominence
Palpate tendon from musculotendinous junction to insertion
Identify midsubstance vs insertional pain; note crepitus or nodularity

Load and function

Single-leg heel raise: reps, height, pain, endurance asymmetry
Hop test only if safe; assesses energy-storage function
Dorsiflexion ROM/knee-to-wall; calf flexibility and strength

Special tests

Royal London Hospital test: tenderness decreases/disappears with ankle dorsiflexion
Arc sign: swelling/tender nodule moves with ankle motion
Thompson/calf squeeze for suspected rupture; compare resting ankle tension

References: Reiman MP et al. J Athl Train. 2014; Hutchison AM et al. Foot Ankle Surg. 2013; Martin RL et al. J Orthop Sports Phys Ther. 2018.

Achilles: exam test accuracy

Most measures have greater rule-in than rule-out value

Test / finding	Positive finding	Sensitivity	Specificity	Clinical use
Pain on tendon palpation	Localized tendon pain to palpation	~84%	~73%	Best-supported clinical test in one review
Pain location 2–6 cm above insertion	Patient localizes pain to watershed region	~78%	~77%	Useful for midsubstance disease
Royal London Hospital test	Tenderness reduces with dorsiflexion	~54%	~86%	Rule-in adjunct; moderate sensitivity
Arc sign	Swelling moves with active PF/DF	~42%	~88%	Specific but insensitive
Palpation + arc + Royal London cluster	All used together	~58.6%	~83.3%	Supports clinical diagnosis
Thompson / calf squeeze	Absent plantarflexion with calf squeeze	High for rupture; not tendinopathy	High for rupture; not tendinopathy	Use to rule out rupture when acute pop/weakness

References: Reiman MP et al. J Athl Train. 2014; Hutchison AM et al. Foot Ankle Surg. 2013; Martin RL et al. J Orthop Sports Phys Ther. 2018.

Achilles: rehab explanation for patients

Simple home program language

Start: choose load by location

Midsubstance: heel raises on flat ground; progress to off-step eccentrics if tolerated
Insertional: avoid deep dorsiflexion early; do heel raises from floor, not off a step
Heel lift temporarily may reduce tendon strain

Progress: calf strength + energy storage

Straight-knee heel raises emphasize gastrocnemius; bent-knee heel raises emphasize soleus
3–4 sets of 8–15, 3x/week; progress to weighted backpack/dumbbells
Later add hopping, skipping, and graded return to run after strength improves

Pain options

Topical/oral NSAIDs if safe; avoid steroid injection into/around tendon
Nitroglycerin patches have mixed but sometimes supportive data; headaches/skin irritation common
Running progression: reduce hills/speed first; increase weekly volume gradually based on next-day pain

References: Reiman MP et al. J Athl Train. 2014; Hutchison AM et al. Foot Ankle Surg. 2013; Martin RL et al. J Orthop Sports Phys Ther. 2018.; Kane SF et al. Am Fam Physician. 2019.

Achilles: MRI and orthopedic referral

Decision points

Imaging

X-ray if insertional disease, calcification, Haglund deformity, stress fracture concern
US or MRI if atypical presentation, suspected partial tear/rupture, or failed 12 weeks rehab
MRI if surgery is being considered or diagnosis remains unclear

Refer when

Suspected acute rupture: urgent orthopedic/sports medicine pathway
High-grade partial tear or progressive weakness
Persistent symptoms after 3–6+ months of appropriate loading program
Insertional disease with refractory pain, large enthesophyte/Haglund, or failed nonoperative care

Medication risk screen

Ask about fluoroquinolone exposure and systemic steroid use; counsel on tendon rupture risk and avoid unnecessary tendon steroid injections.

References: Reiman MP et al. J Athl Train. 2014; Hutchison AM et al. Foot Ankle Surg. 2013; Martin RL et al. J Orthop Sports Phys Ther. 2018.; Deu RS et al. Am Fam Physician. 2022.

Take-home points for family physicians

1. Diagnose clinically first

Most tendinopathies are history + focal tenderness + load-provocation diagnoses
Imaging is most useful for atypical cases, complete tear suspicion, failed rehab, or surgical planning

2. Explain the rehab simply

Reduce provocative load for 2-4 weeks, then progressively reload tendon
Pain ≤3/10 during exercise and back to baseline within 24 hours is a practical rule

3. Use injections strategically

Steroid injections may provide short-term relief but can worsen long-term outcomes in some tendinopathies
Use pain interventions to enable rehab, not replace it

4. Refer for structure/function risk

Acute rupture or high-grade tear
Progressive weakness or major functional loss
Refractory symptoms despite structured rehab

References: Kane SF et al. Am Fam Physician. 2019; Wilson JJ et al. Am Fam Physician. 2005; Pompan DC. Am Fam Physician. 2011.

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References: Full bibliography condensed for slide format; use original articles/guidelines for detailed evidence appraisal.