



Joint Effort

Part II

Moving Beyond the Diagnosis

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Monument Health – Sports Medicine



Illustration by Smart-Servier Medical Art

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Objectives

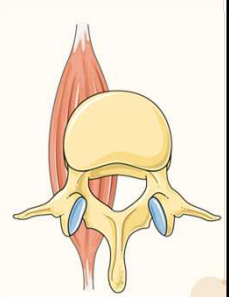
- Review the clinical presentations and key examination findings of common musculoskeletal conditions encountered in primary care, urgent care and sports medicine settings
- Compare evidence-based treatment options for common MSK disorders, including rehabilitation strategies, medications, injections, bracing, and activity modification
- Develop appropriate management plans and referral strategies by identifying indication for advanced imaging specialist consultation and surgical evaluation



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Today's Game Plan

- Review briefly the MSK exam
- Recognize common patterns
- Know what not to miss
- Choose the right work up
- Start evidence-based treatment
- Know when to refer



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Moving Through the Body

1. Recognize & Diagnose
2. Work up & Treat
3. Refer & Follow up (DON'T MISS)



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Moving Through the Body

1. Recognize & Diagnose
 - o Most Common diagnoses
 - o Key history/exam findings
 - o Useful special test
 - o Important differential
 - o Don't miss diagnoses/red flags



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Moving Through the Body

2. Workup & Treat

- | | |
|---------------------------------|-----------------------------------|
| o When no imaging is needed | o Medications |
| o When to get x-ray | o PT/Home Exercise |
| o When MRI/US/CT is appropriate | o Bracing/activity modification |
| o Labs when indicated | o Injection role when appropriate |
| o First line treatment | o Expected course |



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Moving Through the Body

3. Refer & Follow up (DON'T MISS)

- When to reassess
- What constitutes failure of conservative care
- When advanced imaging becomes appropriate
- Routine sports medicine/orthopedic referral
- Expedite referral
- ED/emergent referral
- One or two "Do/Don't" Clinical pearls



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Exams Matter

- **Accurate Diagnosis:** Mastering musculoskeletal exams improves diagnostic precision and differentiates benign from serious conditions effectively.
- **Clinical Confidence:** Proficiency in exam skills enhances decision-making and fosters interdisciplinary collaboration and teaching abilities.
- **Patient Trust and Satisfaction:** Thorough exams build patient trust, improve communication, and strengthen provider-patient relationships for better outcomes.
- **Cost-Effective Care:** Physical exams reduce need for costly imaging and referrals, supporting value-based and affordable healthcare delivery.

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Find Your Pattern

- **Inspection:** Observe for swelling, deformity, discoloration, asymmetry
- **Palpation:** Assess for tenderness, warmth, crepitus, effusion
- **Range of Motion (ROM):** Active: Patient moves joint, Passive: Provider moves joint
- **Strength testing:** Grade muscle strength (0-5)
- **Special tests:** Perform joint-specific maneuvers (e.g. Lachman, Phalen)
- **Functional Assessment:** Evaluate impact on activities of daily living (ADLs)



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Expanding our Knowledge

From Exam to Action

Step	Tasks
1 Screen	Mechanism, time course, function, systemic symptoms, neurovascular status, red flags
2 Localize	Bone, joint, tendon, muscle, nerve, referred/visceral pain
3 Examine	Inspection, palpation, ROM, Strength, neurovascular, targeted special tests
4 Act	Clinical treatment vs imaging/labs vs urgent referral Always give a follow-up contingency plan
Key Points	Special tests refine probability; most should not be interpreted as stand-alone diagnostic test



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MSK Imaging

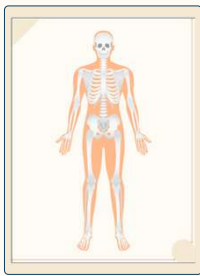
Choosing the Right Tool

Imaging	Think...	Best For/When to Use
X-ray	"Is it bone?"	Fracture/dislocation, alignment, arthritis, joint-space loss, calcification: usually first line after significant trauma
Ultrasound	"Is it superficial & dynamic?"	Tendons, bursae, effusions, cysts, some ligament/muscle injuries; dynamic exam and image-guided procedures
MRI	"What do I need to see in the soft tissues or marrow?"	Tendons/ligaments, meniscus/labrum, cartilage, bone marrow/stress injury, occult fracture, infection/tumor, spine/neurologic pathology. Masses (with and without contrast)
CT	"I need better bone detail."	Complex fractures, subtle cortical injury, fracture characterization/ surgical planning; useful when MRI isn't feasible for certain indications (metal in the body)
Bone Scan	"Where is the bone metabolically active?"	Much less commonly first line now, selected occult/stress injury, multifocal processes, infection/tumor evaluation when other imaging isn't appropriate
DEXA	"How strong is the bone?"	Bone mineral density/osteoporosis assessment – not evaluation of an acute MSK injury

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MSK Imaging

Take Away

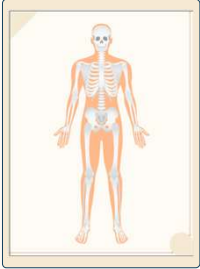


- **Before order imaging, ask:**
 - Will the result change what I do for this patient?
 - What tissue am I trying to evaluate?
 - Is there a cheaper/safer first line study?
 - Should I treat and reassess first?

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MSK Imaging

High Value Imaging



- Start with the clinical question, not the modality
 - Trauma/bone -> Xray first
 - Superficial/Dynamic -> US
 - Soft tissue/marrow/neural -> MRI
 - Detailed bone -> CT
- "What tissue am I trying to see?"

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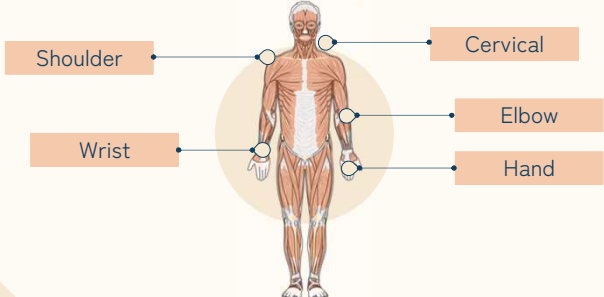
Referral Urgency

Make the Distinction Clear

ED/Emergent	EXPEDITED SPECIALTY	ROUTINE SPORTS MED/ORTHO
Septic joint/Severe deep infection concern	Acute Achilles rupture	Persistent disabling symptoms despite appropriate conservative care
Acute compartment syndrome	Major acute traumatic rotator-cuff weakness	Recurrent instability
Cauda Equina or Spinal cord compression	Locked knee/displaced meniscal concern	Diagnostic uncertainty
Neurovascular compromise	Suspected SCFE	Procedure/Injection consideration
Unstable fracture/dislocation	Significant tendon or nerve injury	Possible operative condition

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Lecture plan



Shoulder

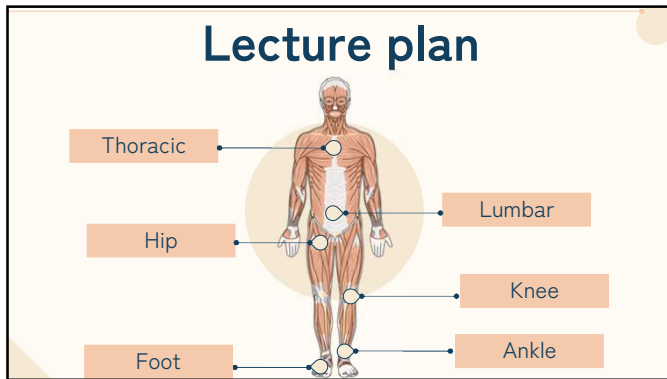
Wrist

Cervical

Elbow

Hand

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Cervical Spine

Physical Exam

- Posture and Alignment Evaluation
- Muscle Bulk and Skin Changes
- Palpation for tenderness
- Cervical Spine Range of Motion
- Muscle Strength Testing

Cervical Spine

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Cervical Spine

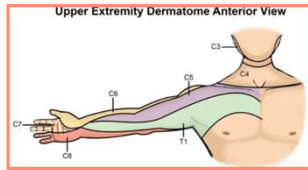
Strength Testing

Nerve Root	Associated Disc	Primary Muscles Innervated	Motor Function Tested	Sensory Area
C5	C4-C5	Deltoid, Biceps	Shoulder abduction, Elbow flexion (palm up)	Lateral arm below deltoid
C6	C5-C6	Biceps, Brachioradialis, ECRL	Elbow flexion (thumb up), Wrist extension	Thumb and radial forearm
C7	C6-7	Triceps, FCR, PL	Elbow extension, Wrist flexion	Index and middle fingers
C8	C7-T1	FDS, FDP, Thumb extensors	Finger flexion, Hand grip, Thumb extension	Ring and little fingers
T1	T1-T2	Interossei muscles	Finger abduction/adduction	Medial forearm and elbow

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Cervical Spine

Sensory Testing



Cervical Spine

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Cervical Spine

Special Tests and Diagnoses

Test	How to Perform	Positive Finding	Suggests
Spurling's Test	Extend, rotate, and laterally flex neck toward affected side; apply axial compression.	Radicular pain down arm	Cervical radiculopathy
Distraction Test	Apply gentle upward traction to the head while seated.	Relief of radicular symptoms	Cervical radiculopathy
Lhermitte's Sign	Passive neck flexion while seated.	Electric shock sensation down spine	Cervical myelopathy, MS
Hoffman's Sign	Flick distal phalanx of middle finger.	Thumb/index finger flexion	Upper motor neuron lesion (e.g., myelopathy)
Sharp-Purser Test	Stabilize C2, apply posterior force to forehead.	Clunk or symptom relief	Atlantoaxial instability (e.g., RA)
Shoulder Abduction Test	Patient places hand on top of head.	Symptom relief	Cervical radiculopathy (C5-C6)
Vertebral Artery Test	Extend, rotate, and side-bend neck; hold 30 sec.	Dizziness, nystagmus, nausea	Vertebrobasilar insufficiency

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Cervical Spine

1. Recognize & Diagnose

- **Mechanical neck pain/ strain**
 - Axial neck pain
 - Paraspinal tenderness
 - Pain with ROM
 - Normal neurologic examination
- **Cervical spondylosis / facet-mediated pain**
 - Older patient, stiffness/decreased ROM
 - Axial pain often worse with extension/rotation
 - May coexist with radicular symptoms



Cervical Spine

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Cervical Spine

1. Recognize & Diagnose

- **Cervical radiculopathy**
 - Neck + scapular pain radiating into arm
 - Dermatomal paresthesias/sensory change
 - Myotomal weakness or reflex asymmetry increases concern
 - Spurling helps **rule in**; consider adding **upper-limb tension testing** because it is useful when radiculopathy is suspected.
- **Cervical myelopathy** (affecting the spinal cord)
 - Think beyond the arm: gait/balance problems, hand dexterity changes, hyperreflexia, Hoffmann/Babinski/clonus, bowel/bladder symptoms
- **Important differential:**
 - Shoulder pathology, peripheral nerve entrapment, thoracic outlet syndrome, inflammatory disease, infection, malignancy, and vascular pathology

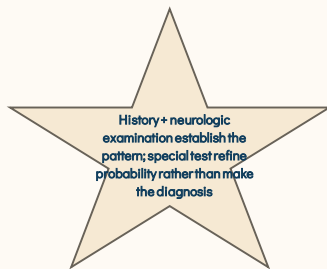


Cervical Spine

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Cervical Spine

1. Recognize & Diagnose



Cervical Spine

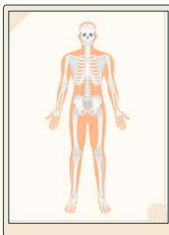
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Cervical Spine

2. Work up and treat

Does this patient need imaging?

- **No immediate imaging**
 - Typical atraumatic mechanical neck pain
 - Typical cervical radiculopathy
 - No red flags
 - Stable neurologic examination



Cervical Spine

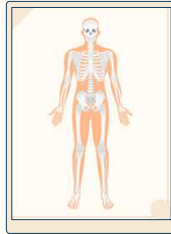
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Cervical Spine

2. *Work up and treat*

X-RAY

- **Consider when:**
 - Trauma when indicated by validated decision rules
 - Significant focal bony tenderness
 - Suspected structural/degenerative disease when imaging will alter management
 - Persistent symptoms despite initial treatment



Cervical Spine

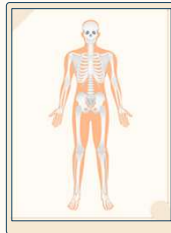
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Cervical Spine

2. *Work up and treat*

MRI without contrast

- **Think**
 - Progressive objective neurologic deficit
 - Suspected myelopathy
 - Persistent radiculopathy despite approximately **4–6 weeks** of appropriate conservative treatment
 - Persistent significant pain when results will change management
 - Pre-procedure/preoperative evaluation



Cervical Spine

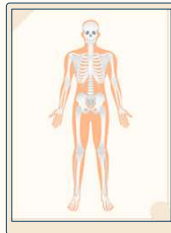
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Cervical Spine

2. *Work up and treat*

MRI ± contrast/labs

- **Consider when:**
 - Infection
 - Malignancy
 - Inflammatory disease – *Depending on the clinical scenario*



Cervical Spine

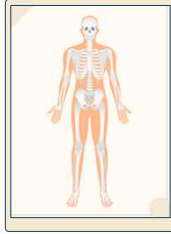
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Cervical Spine

2. Work up and treat

EMG/NCS

- Consider:
 - Not routinely necessary for straightforward radiculopathy
 - Helpful when localization is unclear or you're trying to distinguish **cervical radiculopathy vs peripheral entrapment neuropathy**



Cervical Spine

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Cervical Spine

2. Work up & Treat

- For **mechanical neck pain / cervical radiculopathy without red flags**:
 - Maintain activity as tolerated; avoid prolonged immobilization
 - Relative modification of provoking activities
 - NSAID if appropriate or acetaminophen for analgesia
 - Short course muscle relaxant may be reasonable in selected acute patients, although medication evidence is limited
 - Steroids? Short term benefit, often no long term improvement

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Cervical Spine

2. Work up & Treat

- For **mechanical neck pain / cervical radiculopathy without red flags**:
 - **PT**
 - Cervical ROM
 - Postural/scapular mechanics
 - Stretching
 - Progressive strengthening
 - Consider traction as part of PT in selected radicular patients

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Cervical Spine

2. Work up & Treat

- For **mechanical neck pain / cervical radiculopathy without red flags**:
 - **Cervical epidural steroid injection:**
 - Not first-line
 - Consider for persistent significant radicular symptoms after conservative treatment and concordant imaging
 - Requires discussion of benefits vs potentially serious procedural risks

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Cervical Spine

2. Work up & Treat

Most Cervical radiculopathy gets better.

80-90% in about 4 weeks with conservative therapies

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Cervical Spine

3. Refer & follow up

- **Reassess**
- For an uncomplicated patient:
 - **Recheck in ~4-6 weeks**, sooner for significant neurologic findings.
 - At follow-up reassess:
 - Pain/function
 - Strength
 - Sensation
 - Reflexes
 - Development of myelopathic symptoms
 - The **repeat neurologic examination** is particularly important.



Cervical Spine

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Cervical Spine

3. Refer & follow up

- Reassess
- Failure of conservative therapies
 - Persistent disabling symptoms despite approximately **4–6 weeks** of appropriate treatment → reconsider diagnosis and obtain MRI when appropriate.
 - Persistent radiculopathy with concordant MRI findings → sports medicine, PM&R, pain/spine, or surgical referral depending on local pathways and severity. Surgical referral or epidural injection is commonly considered after roughly **4–8 weeks** when meaningful improvement has not occurred



Cervical Spine

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Cervical Spine

3. Refer & follow up

- Reassess
 - Expedite spine referral
 - Progressive objective motor weakness
 - Persistent substantial motor deficit
 - Severe refractory radicular pain with concordant pathology
 - Suspected instability
 - MRI demonstrating significant nerve-root/cord compression correlating with symptoms



Progressive objective neurologic deficit should not simply complete another six weeks of PT. Progression should prompt MRI and specialist evaluation

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Cervical Spine

CAN'T MISS

- Cervical myelopathy → URGENT
 - Look for:
 - Gait/balance change
 - Hand clumsiness
 - Hyperreflexia
 - Hoffmann/Babinski/clonus
 - Bilateral or multilevel s
 - Progressive weakness
 - Bowel/bladder dysfunction
- Urgent (Emergent) MRI + spine/neurosurgical evaluation (know where you work)



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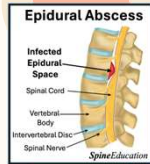
Cervical Spine

CAN'T MISS

- **Infection/epidural abscess** → URGENT

- Look for:

- Fever/systemic illness
- Immunosuppression
- IVDU or other infection risk
- Severe progressive/night pain
- Neurologic deficit



- → CBC/ESR/CRP as appropriate + **urgent MRI** typically with contrast when infection is suspected, and escalation of care

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Cervical Spine

CAN'T MISS

- **Infection/epidural abscess** → URGENT

- Look for:

- Fever/systemic illness
- Immunosuppression
- IVDU or other infection risk
- Severe progressive/night pain
- Neurologic deficit



- → CBC/ESR/CRP as appropriate + **urgent MRI** typically with contrast when infection is suspected, and escalation of care

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Cervical Spine

CAN'T MISS

- **Malignancy** → URGENT/Emergent

- Look for:

- History of cancer
- unexplained weight loss, unremitting/night pain
- Unremitting/night pain
- Significant bony tenderness



- → **MRI with and without contrast/ Expected workup/labs**

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Cervical Spine

CAN'T MISS

- Cervical arterial dissection / vascular emergency
- History:
 - Sudden unusual severe neck pain/headache ± diplopia
 - Vertigo
 - Ataxia
 - Focal neurologic symptoms
 - Syncope or other posterior-circulation symptoms.
- **ED + Vascular imaging, not routine MSK management**

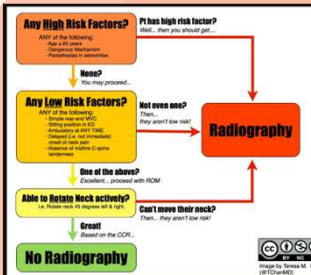


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Cervical Spine

CAN'T MISS

- **Traumatic instability fracture** → EMERGENT
- Look for:
 - Traumatic neck pain
- Assessment tools
 - Use Canadian C-spine/NEXUS principles
 - Always error on the side of safety

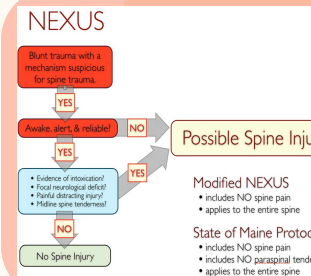


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Cervical Spine

CAN'T MISS

- **Traumatic instability fracture** → EMERGENT
- Look for:
 - Traumatic neck pain
- Assessment tools
 - Use Canadian C-spine/NEXUS principles
 - Always error on the side of safety



NEXUS

Burst trauma with a mechanism suspicious for spine trauma

YES

Awake, alert, & reliable?

NO

YES

Evidence of intoxication?
Painful distracting injury?
Midline spine tenderness?

YES

NO

Possible Spine Injury

Modified NEXUS

- includes NO spine pain
- applies to the entire spine

State of Maine Protocols

- includes NO spine pain
- includes NO paraspinal tenderness
- applies to the entire spine

No Spine Injury

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Shoulder

Examination



- Inspection
- Palpation
- Active and Passive range of motion
- Strength testing
 - *Know your anatomy*
 - *Remember it could be coming from your cervical region*

Think how each piece of the exam will affect your diagnosis and treatment

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Shoulder

Special Tests and Diagnoses

Test	Purpose	Positive Findings	Associated Diagnosis
Neer Impingement Test	Subacromial impingement	Pain with passive forward flexion	Rotator cuff tendinopathy, impingement syndrome
Hawkins Test	Impingement	Pain with internal rotation in 90° flexion	Subacromial impingement
Empty Can Test	Supraspinatus integrity	Weakness or pain	Supraspinatus tear
Drop Arm Test	Rotator cuff tear	Inability to lower arm slowly	Full-thickness rotator cuff tear
Apprehension Test	Shoulder instability	Apprehension with external rotation	Anterior shoulder instability
Speed's Test	Biceps tendon pathology	Pain in bicipital groove	Biceps tendinitis
O'Brien's Test	Labral tear	Pain with internal rotation relieved by external rotation	SLAP lesion

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Shoulder

1. Recognize & Diagnose



- Where is the problem?
 - **Rotator cuff**-related shoulder pain
 - Lateral/deltoid -region pain
 - Often worse with overhead activity
 - Night pain common
 - Painful arc
 - **Passive ROM preserved**
 - Pain and/or weakness with resisted cuff testing
 - Hawkins/Neer can support the diagnosis but are not specific

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Shoulder

1. Recognize & Diagnose

Where is the problem?



Rotator cuff tear

- Same pain pattern
- True weakness > Pain alone
- Weakness with abduction and/or external rotation
- **Drop arm or lag signs may increase suspicion**
- Acute traumatic onset + immediate weakness = much more concerning for significant tear

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Shoulder

1. Recognize & Diagnose

Where is the problem?



Adhesive capsulitis

- Classic pattern:
 - Gradual pain followed by progressive stiffness
 - Difficulty reaching overhead/behind back
 - **Both ACTIVE and PASSIVE ROM restricted**
 - External rotation is typically particularly limited
 - Often associated with diabetes or thyroid disease

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Shoulder

1. Recognize & Diagnose

Where is the problem?



Glenohumeral OA

- Older patient
- Deep joint pain/stiffness
- Crepitus
- Progressive ROM loss
- Active AND passive ROM decreased
- X-ray confirms diagnosis

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Shoulder

1. Recognize & Diagnose

• Where is the problem?

◦ AC joint pathology

- Pain directly over AC joint
- Focal AC tenderness
- Pain with cross-body adduction
- May follow trauma or be degenerative
- Don't confuse AC pain with rotator cuff pain



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Shoulder

1. Recognize & Diagnose

• Where is the problem?

◦ Instability

- Prior dislocation/subluxation
- Young/athletic population
- Feeling of slipping or "dead arm"
- Apprehension/relocation testing
- Ask about number of episodes and mechanism



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Shoulder

1. Recognize & Diagnose

• Where is the problem?

◦ Referred pain

- Shoulder exam relatively normal? Think outside the shoulder
 - Cervical radiculopathy
 - Brachial plexus/peripheral nerve
 - Cardiac
 - Pulmonary/diaphragmatic
 - Abdominal pathology depending on presentation



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Shoulder

2. Work up and treat



Imaging – “When do I actually need a picture?”

- **Acute trauma → X-ray first**
 - For acute shoulder pain, radiographs are the recommended initial imaging study.
 - Think:
 - Fracture
 - Dislocation
 - Significant trauma
 - Focal bony tenderness
 - Marked loss of function after trauma
- **Useful standard views:** AP + scapular Y + axillary/Valpeau as appropriate. (+/-) Grashey

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Shoulder

2. Work up and treat



Imaging – “When do I actually need a picture?”

- **Chronic/atraumatic shoulder pain**
 - If history/examination clearly suggests uncomplicated rotator cuff-related pain and there is no substantial weakness or red flag: **Treat first.**
 - **Don't MRI every painful shoulder.**
 - For chronic shoulder pain where imaging is warranted, **radiographs are generally the initial study**, with US or MRI selected afterward based on the suspected pathology.

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Shoulder

2. Work up and treat

“When is an ultrasound useful?”



- **US = “Is it superficial and dynamic?”**
 - Useful for:
 - Rotator cuff tendons
 - Biceps tendon
 - Subacromial-subdeltoid bursa
 - Effusion
 - Dynamic evaluation
 - Image-guided injection
- For suspected rotator cuff tear after negative/indeterminate radiographs, **US or noncontrast MRI are both considered appropriate**

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Shoulder

2. Work up and treat

"When does an MRI become appropriate"



- Consider MRI for:
 - Acute traumatic weakness/suspected full-thickness cuff tear
 - Persistent substantial weakness
 - Failure of appropriate conservative treatment when result will change management
 - Suspected labral pathology/instability when advanced imaging is needed
 - Surgical planning
 - Diagnostic uncertainty

MRI without contrast is generally appropriate for rotator cuff evaluation.

MR arthrogram is more selectively useful when labral pathology/instability is the specific clinical question.

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Rotator Cuff Tendinopathy/Subacromial

Treatment

- **First line**
- Activity modification—not complete rest
- Avoid/temporarily reduce provocative repetitive overhead loading
- NSAID if appropriate / acetaminophen for analgesia
- Ice/heat based on preference
- **PT or structured HEP**
 - Rotator cuff strengthening
 - Scapular stabilizers
 - Progressive loading
 - ROM/postural mechanics as appropriate

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Rotator Cuff Tendinopathy/Subacromial

Treatment

- **Corticosteroid injection?**
 - Reasonable option for short-term pain/function improvement, particularly when pain prevents meaningful rehabilitation.
 - But:
 - Not mandatory
 - Not curative
 - Avoid serial/repeated injections as the long-term strategy
 - Be cautious if a repairable tear is suspected and surgery may be contemplated
 - The 2025 AAOS rotator cuff guideline supports **a single corticosteroid/local anesthetic injection for short-term improvement in pain and function**, while noting concern about injections near the time of potential repair

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Adhesive Capsulitis

Treatment



- **Treatment**
 - Patient education: recovery can be prolonged
 - Maintain/use ROM within tolerance
 - PT/HEP emphasizing mobility
 - NSAID/acetaminophen for pain when appropriate
 - **Glenohumeral corticosteroid injection**
 - Particularly useful for short-term pain/function
 - Injection + PT may outperform PT alone
 - Consider hydrodilatation in selected refractory patients

PT plus corticosteroid injection may improve symptoms more than PT alone

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Adhesive Capsulitis

Treatment



- **Important pearls**
 - Do not aggressively force a very painful frozen shoulder.
 - Early treatment should facilitate tolerable ROM rather than repeatedly provoking severe pain.
 - Consider associated disease
 - Depending on history/risk factors, consider:
 - Diabetes screening
 - Thyroid testing

You don't need routine extensive laboratory testing for otherwise typical adhesive capsulitis

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Glenohumeral OA

Treatment & Referral



- **Firstline**
 - Activity modification
 - Maintain ROM
 - PT/HEP
 - NSAID/acetaminophen as appropriate
 - Consider glenohumeral corticosteroid injection for symptomatic relief
- **Refer when**
 - Progressive functional limitation
 - Persistent pain despite conservative care
 - Significant radiographic OA
 - Patient interested in surgical options

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AC joint OA

Treatment



- **Treatment**
 - Activity modification
 - NSAID/analgesic as appropriate
 - PT addressing surrounding mechanics
 - Consider diagnostic/therapeutic AC joint corticosteroid injection
 - Persistent focal symptoms → sports medicine/ortho

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Shoulder

Refer & Follow up



- **Reassess**
 - For most uncomplicated shoulder conditions:
 - **~4-6 weeks** is a reasonable initial reassessment window.
- **Ask:**
 - Is pain improving?
 - Is ROM improving?
 - Is strength improving?
 - Is function improving?
 - Is the patient actually doing the rehab?
 - Has the diagnosis changed?

For chronic shoulder disorders, persistent/worsening symptoms after roughly **6-12 weeks of directed conservative treatment** are a reasonable threshold for specialist evaluation, depending on diagnosis and severity.

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Shoulder

Refer & Follow up

- **Routine sports medicine/ortho referral**
 - Consider for:
 - Failure of appropriate PT/HEP
 - Persistent pain/function limitation
 - Diagnostic uncertainty
 - Recurrent instability
 - Injection/procedural consideration
 - Symptomatic OA despite conservative care
 - Adhesive capsulitis failing initial management

For adhesive capsulitis with minimal improvement after approximately **6-12 weeks** of nonsurgical treatment, procedural/surgical options such as manipulation or arthroscopic capsular release may be considered.

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Shoulder

Refer & Follow up

- Expedite Referral
 - **Acute traumatic rotator cuff tear**
 - Trauma + new significant weakness/inability to elevate arm
 - → X-ray to assess bone
 - → US/MRI if cuff tear suspected
 - → **Early orthopedic/sports medicine referral**, particularly in younger/active patients or suspected full-thickness tear.
 - Don't send this patient through months of generic PT before establishing whether they have a repairable traumatic tear.
 - **Recurrent traumatic instability**
 - Particularly:
 - Young athlete
 - Multiple episodes
 - Significant functional instability
 - Associated bony injury

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Shoulder

Can't Miss

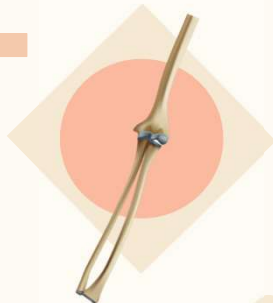
Diagnosis	Exam Findings	Workup	Referral
Septic Arthritis	Hot + Swollen + Severely painful joint + marked pain with passive ROM ± fever	<ul style="list-style-type: none"> • CBC • ESR • CRP • Joint aspiration 	Emergent orthopedic/ED pathway
Shoulder dislocation	<ul style="list-style-type: none"> • Visible deformity • Loss of normal contour • Severe ROM limitation • Mechanism consistent with dislocation • Document neurovascular before and after 	Obtain radiographs	Refer based on fracture/dislocation characteristics
Fracture	<ul style="list-style-type: none"> • Think: Proximal humerus, clavicle scapula, greater tuberosity 	X-ray first	Refer based on fracture characteristics
Posterior sternoclavicular dislocation	Rare → Potential mediastinal vascular compromise		Transport to ED/ Surgical evaluation
Referred Cardiac pain	Shoulder/arm discomfort with: <ul style="list-style-type: none"> • Chest pressure • Dyspnea • Diaphoresis • Exertional symptoms • Cardiac risk/context 	Cardiac work up	Send to the emergency department

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Elbow

Inspection and Palpation

- **Inspection**
 - Swelling, erythema, or ecchymosis
 - Deformity or asymmetry
 - Carrying angle abnormalities
 - Muscle atrophy in the forearm or around the elbow
 - Signs of trauma surgical scars
- **Palpation**
 - Bony landmarks
 - Medial and lateral epicondyles
 - Olecranon process
 - Radial head
 - Soft tissues
 - Common flexor and extensor tendon origins
 - Ulnar nerve in the cubital tunnel



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Elbow

Range of Motion and Strength Testing

- **Active and Passive ROM**
 - Flexion (~145°)
 - Extension (~0°)
 - Pronation (~90°)
 - Supination (~90°)
- **Strength Testing**
 - Elbow flexion: Biceps and brachialis (C5-C6)
 - Elbow Extension: Triceps (C7)
 - Pronation: Pronator teres and quadratus (C6-C7)
 - Supination: Biceps and supinator (C5-C6)



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Elbow

Special Tests and Diagnoses

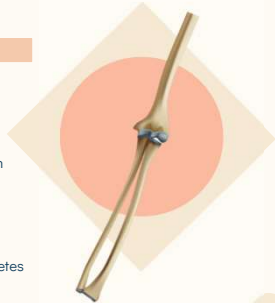
Test	Purpose	Positive Finding	Associated Diagnosis
Tennis Elbow Tests	- Resisted wrist extension - Resisted forearm supination	Pain at lateral epicondyle	Lateral epicondylitis (Tennis elbow)
Golfer's Elbow Tests	- Resisted wrist flexion - Resisted forearm pronation	Pain at medial epicondyle	Medial epicondylitis
Maudsley's Test	Resisted middle finger extension	Pain at lateral epicondyle	Lateral epicondylitis
Tinel's Sign at Elbow	Tapping over ulnar nerve	Tingling in ulnar distribution	Cubital tunnel syndrome
Valgus Stress Test	Apply valgus force	Medial joint laxity or pain	UCL injury
Varus Stress Test	Apply varus force	Lateral joint laxity or pain	Radial collateral ligament injury

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Elbow

1. Recognize & Diagnose

- **Elbow: Recognize the Pattern**
 - **Lateral Epicondylitis**
 - Lateral epicondyle pain/tenderness
 - Pain with gripping/resisted wrist extension
 - Usually overuse rather than acute injury
 - **Medial Epicondylitis**
 - Medial epicondyle pain/tenderness
 - Pain with resisted wrist flexion/pronation
 - Consider UCL/ulnar nerve in throwing athletes



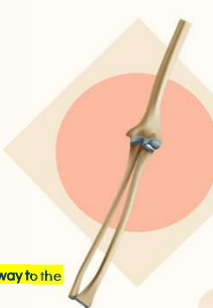
69

Elbow

1. Recognize & Diagnose

- **Elbow: Recognize the Pattern**
 - **Cubital Tunnel**
 - Numbness/tingling → 4th & 5th digits
 - Worse with prolonged elbow flexion
 - Tinel at cubital tunnel ±
 - Check intrinsic hand strength
 - **Olecranon Bursitis**
 - Focal posterior swelling
 - ROM generally preserved
 - Warm/erythematous? → consider infection

Location + provocative activity usually gets you most of the way to the diagnosis.

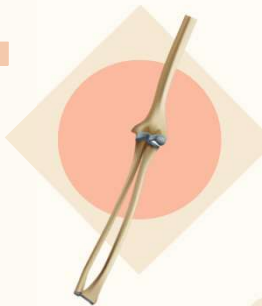


70

Elbow

2. Work up and treat

- **Elbow: Choosing the Workup**
 - **No Imaging Initially**
 - Classic atraumatic epicondylalgia
 - Typical mild cubital tunnel
 - Uncomplicated aseptic bursitis
 - **X-Ray First**
 - Acute trauma
 - Focal bony tenderness
 - Loss of ROM / mechanical block
 - Deformity
 - Chronic pain when imaging is indicated



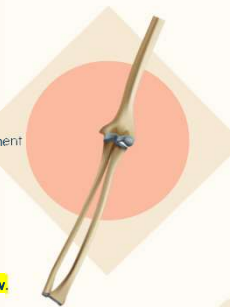
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Elbow

2. Work up and treat

- **Elbow: Choosing the Workup**
 - **US or MRI**
 - Suspected tendon tear
 - Suspected ligament/UCL injury
 - Persistent symptoms despite appropriate treatment
 - Diagnostic uncertainty
 - **EMG/NCSS**
 - Persistent/progressive ulnar neuropathy
 - Weakness or muscle atrophy
 - Uncertain localization

Don't Image classic tennis elbow just to prove it is tennis elbow.



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Elbow

2. Treat

- **LATERAL & MEDIAL EPICONDYLITIS**

- **First Line**

- Activity/load modification
 - Topical/oral NSAID if appropriate
 - Ice/heat for symptom control
 - **Progressive tendon loading**
 - Wrist extensor → lateral
 - Flexor/pronator → medial
 - PT or structured HEP

- **Bracing**

- Counterforce strap → during provoking activity
 - Wrist brace → short-term symptom reduction if needed

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Elbow

2. Treat

- **LATERAL & MEDIAL EPICONDYLITIS**

- **Injection?**

- Corticosteroid → may provide short term relief
 - **Higher recurrence/poorer long-term outcomes -**
→ **Not preferred routine treatment**
 - PRP evidence remains mixed

- **Expected Course**

- Improvement may take **weeks-months**
 - Encourage progressive loading rather than complete rest

Treat the tendon with LOAD—not prolonged REST.

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Elbow

2. Treat

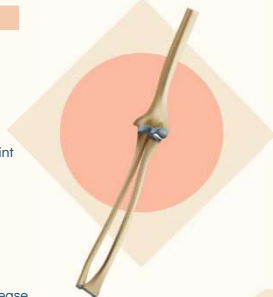
- **CUBITAL TUNNEL**

- **Initial**

- Avoid prolonged elbow flexion
 - Avoid leaning on elbow
 - Nighttime elbow extension positioning/splint
 - Ergonomic/activity modification

- **Escalate if**

- Persistent paresthesia
 - Progressive weakness
 - Intrinsic muscle atrophy
 - Abnormal electrodiagnostic testing
 - → Injection → Hand surgery referral for release



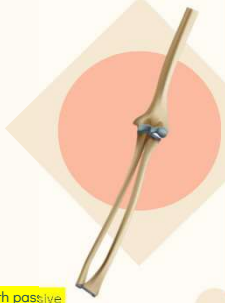
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Elbow

2. Treat

- OLECRANON BURSTITIS
 - Aseptic
 - Activity modification
 - Compression/padding
 - Ice
 - NSAID if appropriate
 - Suspected Septic
 - Warmth/erythema/tenderness ± fever
 - Consider aspiration for cell count/culture
 - Antibiotic treatment based on clinical severity
 - Escalate when systemic/deep infection suspected

Preserved painless elbow ROM favors bursitis; marked pain with passive ROM should raise concern for the joint.



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Elbow

3. Refer & follow up

- Elbow: When Is Conservative Care Not Enough?
 - Reassess ~4–6 Weeks
 - Pain/function improving?
 - Strength improving?
 - Following rehab/load modification?
 - Any new neurologic findings?
 - Routine Sports Med / Ortho
 - Persistent symptoms despite appropriate rehab
 - Diagnostic uncertainty
 - Recurrent bursitis
 - Injection/procedure consideration
 - Mechanical symptoms



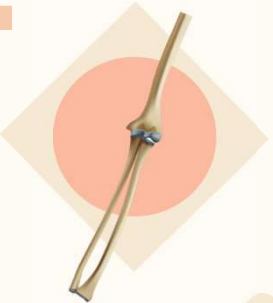
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Elbow

3. Refer & follow up

- Elbow: When Is Conservative Care Not Enough?
 - Expedited Referral
 - Distal biceps/triceps rupture
 - Significant UCL injury
 - Progressive ulnar motor weakness
 - Intrinsic hand atrophy
 - Unstable fracture/dislocation
 - ED / Emergent
 - Neurovascular compromise
 - Open fracture/dislocation
 - Compartment syndrome
 - Septic joint/deep infection concern

Progressive weakness is not a "give PT more time" finding.



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Elbow

DON'T MISS

Diagnosis	Think...	Action
Fracture/Dislocation	Trauma, deformity, focal bone pain, ROM loss	NV exam → X-ray → urgent management
Septic Joint	Hot, swollen, severe pain with passive ROM ± fever	Aspiration/workup → urgent treatment
Septic Bursitis	Warm erythematous bursa ± systemic symptoms	Aspiration/culture when indicated → antibiotics
Distal Biceps Rupture	Pop, bruising, supination weakness, abnormal Hook test	Early ortho
Triceps Rupture	Posterior pain/swelling + extension weakness	Expedited ortho
Compartment/NV Injury	Severe escalating pain or vascular/neuro deficit	ED

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Wrist

Inspection and Palpation



- **Inspection**
 - Swelling, erythema or deformity
 - Muscle atrophy (especially thenar/hypothenar eminence)
 - Scars or signs of trauma
 - Alignment of the wrist and hand
 - Resting posture (e.g. claw hand, wrist drop)
- **Palpation**
 - Bony Landmarks:
 - Distal radius and ulna
 - Carpal bones (especially scaphoid and lunate)
 - Soft tissues
 - Anatomical snuffbox (scaphoid tenderness)
 - Flexor and extensor tendons
 - Carpal tunnel region (over median nerve)
 - Assess for:
 - Tenderness, crepitus, masses, ganglion cysts

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Wrist

Range of Motion and Strength Testing



- **Active and Passive ROM**
 - Flexion (~80°)
 - Extension (~70°)
 - Radial deviation (~20°)
 - Ulnar deviation (~30°)
- **Strength Testing**
 - Wrist Flexion: Flexor carpi radialis and ulnaris (C6-C7)
 - Wrist extension: Extensor carpi radialis longus/brevis and ulnaris (C6-C8)
 - Grip strength: Overall hand and forearm strength
 - Thumb opposition: Median nerve function

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Wrist

Special Tests and Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Phalen's Test	Median nerve compression	Numbness/tingling in median distribution	Carpal tunnel syndrome
Tinel's Sign (Wrist)	Median nerve irritation	Tingling with tapping over carpal tunnel	Carpal tunnel syndrome
Finkelstein's Test	De Quervain's tenosynovitis	Pain with ulnar deviation and thumb flexion	De Quervain's
Watson's Test	Scapholunate instability	Pain or clunk with pressure on scaphoid during radial deviation	Scapholunate ligament injury
Allen's Test	Vascular patency	Delayed refill of palm	Inadequate ulnar or radial artery flow

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Wrist

1. Recognize & Diagnose

Wrist: Recognize the Pattern

- **Carpal Tunnel Syndrome**
 - Numbness/tingling → thumb, index, middle ± radial ½ ring finger
 - Nocturnal symptoms common
 - May improve by "shaking out" hand
 - Phalen/Tinel may support diagnosis
 - Thenar weakness/atrophy = advanced disease
- **De Quervain Tenosynovitis**
 - Radial styloid pain
 - Worse with thumb motion/gripping/lifting
 - Tender 1st dorsal compartment
 - Finkelstein/Eichhoff reproduces pain
 - Common postpartum/new-parent presentation



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Wrist

1. Recognize & Diagnose

Wrist: Recognize the Pattern

- **Ganglion Cyst**
 - Focal dorsal or volar wrist mass
 - Size may fluctuate
 - Often asymptomatic
 - Pain may occur with wrist loading/extension
- **Wrist Sprain / Ligament Injury**
 - Usually traumatic
 - Localized pain/swelling
 - Consider **scapholunate injury** with dorsal/radial pain, clicking or instability

Localize the pain: radial → ulnar → dorsal → volar → neurologic



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Wrist

2. Work up

Wrist: Choosing the Workup

No Imaging Initially

- Classic atraumatic carpal tunnel
- Classic De Quervain
- Typical asymptomatic ganglion cyst

X-Ray First

- Acute trauma
- Focal bony tenderness
- Swelling/deformity
- Significant ROM loss
- Persistent/chronic wrist pain when imaging is indicated
- For chronic wrist pain, radiographs are the recommended initial imaging study.



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Wrist

2. Work up

Wrist: Choosing the Workup

MRI / MR Arthrogram

- Persistent pain with normal X-rays
- Suspected occult fracture
- Suspected intrinsic ligament/TFCC injury
- Mechanical symptoms/instability
- Surgical planning

Ultrasound

- Tendon pathology
- Ganglion/mass
- Dynamic evaluation
- Image-guided procedure



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Wrist

2. Work up

Wrist: Choosing the Workup

EMG/NCS

- Atypical CTS presentation
- Diagnostic uncertainty
- Motor weakness/atrophy
- Preoperative/severity assessment when clinically useful

Image the clinical question—not just "wrist pain."



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Wrist

2. Treat



- **Carpal Tunnel Syndrome**
 - **Mild-Moderate**
 - Activity/ergonomic modification
 - **Neutral wrist splint at night**
 - Avoid prolonged wrist flexion/extension
 - Consider corticosteroid injection for short-term symptom relief
 - **Corticosteroid Injection**
 - Can improve symptoms short term
 - **Does not provide long-term disease modification**
 - Useful diagnostic/therapeutic option in selected patients

The updated 2024 AAOS guideline specifically concludes that corticosteroid injection does **not** provide long-term improvement in CTS

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Wrist

2. Treat



- **Carpal Tunnel Syndrome**
 - **Refer for Surgical Evaluation**
 - Thenar weakness/atrophy
 - Persistent sensory loss
 - Severe electrodiagnostic abnormalities
 - Progressive symptoms
 - Failure of appropriate conservative treatment

Numbness alone can wait; progressive motor loss should not.

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Wrist

2. Treat



- **De Quervain Tenosynovitis**
 - **Treatment**
 - Activity/load modification
 - Avoid repetitive painful thumb abduction/extension
 - Thumb-spica immobilization
 - Corticosteroid injection
 - A 2023 systematic review/network meta-analysis found that **corticosteroid injection + 3-4 weeks of thumb-spica immobilization** was associated with better outcomes than several alternatives and suggested this combination as **first-line treatment**.
 - **Persistent symptoms**
 - Confirm diagnosis
 - Consider US-guided injection
 - Hand referral if refractory

Don't just put De Quervain in a wrist brace—the thumb needs to be immobilized too.

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Wrist

2. Treat



- **Ganglion Cyst**
 - **Asymptomatic**
 - Reassurance / observation
 - **Symptomatic**
 - Activity modification
 - Consider aspiration depending on location
 - Counsel regarding recurrence
 - **Refer**
 - Persistent pain/function limitation
 - Recurrent cyst
 - Diagnostic uncertainty
 - Neurovascular symptoms

Be cautious with volar ganglion aspiration because of proximity to the radial artery.

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Wrist

2. Treat



- **Traumatic Wrist Pain**
 - **Start With**
 - Mechanism
 - Point tenderness
 - ROM
 - Neurovascular exam
 - **X-ray**
 - **Snuffbox Tenderness?**
 - Think **SCAPHOID**
 - If initial X-rays are negative but clinical suspicion remains:
 - Immobilize in appropriate thumb-spica/scaphoid protection
 - Repeat imaging or obtain MRI/CT depending on clinical scenario
 - Don't label it simply a "wrist sprain"

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Wrist

2. Treat



- **Persistent Pain After "Wrist Sprain"**
 - Think beyond sprain:
 - Scapholunate ligament injury
 - TFCC injury
 - Occult scaphoid fracture
 - Other occult carpal fracture
 - **Mechanical clicking/clunking/instability** → Investigate further.

A wrist sprain that isn't behaving like a wrist sprain deserves another diagnosis.

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Wrist

3. Refer & Follow up



Wrist: When Is Conservative Care Not Enough?

- Recessess ~4-6 Weeks**
 - Pain/function improving?
 - Neurologic symptoms improving?
 - Strength preserved?
 - Any mechanical symptoms?
- Routine Sports Med / Hand**
 - Persistent wrist pain despite appropriate treatment
 - Refractory De Quervain
 - Symptomatic/recurrent ganglion
 - Persistent CTS
 - Diagnostic uncertainty
 - Injection/procedure consideration

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Wrist

3. Refer & Follow up



Wrist: When Is Conservative Care Not Enough?

- Expedited Hand/Ortho**
 - Thenar weakness/atrophy
 - Progressive median nerve deficit
 - Suspected scapholunate instability
 - Displaced/unstable fracture
 - Scaphoid fracture with concerning characteristics
 - Significant tendon/ligament injury
- ED / Emergent**
 - Neurovascular compromise
 - Open fracture/dislocation
 - Compartment syndrome
 - Deep infection/septic joint

Progressive weakness, instability, or persistent focal bony pain changes the timeline.

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<div> <div>Wrist</div> <div>CAN'T MISS</div> </div>		
Diagnosis	Think...	Action
Scaphoid Fracture	FOOSH + snuffbox/scaphoid tenderness	X-ray → protect/immobilize; further imaging if still suspicious
Distal Radius Fracture	FOOSH, deformity, swelling, focal tenderness	NV exam → X-ray → manage stability/displacement
Scapholunate Injury	Trauma + dorsal pain/click/clunk/instability	X-ray ± advanced imaging → hand referral
Perilunate/Lunate Dislocation	High-energy trauma, severe pain/swelling ± median nerve symptoms	Urgent hand/ED
Compartment Syndrome	Escalating pain, tense swelling, pain with passive stretch	ED/emergent surgery
Neurovascular Injury	Motor/sensory deficit or poor perfusion	Urgent/emergent evaluation

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Hand

Inspection and Palpation

- **Inspection:**
 - Deformities (e.g. swan neck, boutonniere, ulnar deviation)
 - Muscle atrophy (thenar, hypothenar, interosseous)
 - Skin changes: rashes, nodules, scars, ulcers
 - Nail changes (e.g. clubbing, pitting)
 - Resting posture (e.g. Claw hand, ape hand)
- **Palpation**
 - Bony Landmarks
 - Metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints
 - Soft Tissue
 - Thenar and hypothenar eminences
 - Flexor tendons and palmar fascia
 - Dorsal compartments and extensor tendons
 - Assess for:
 - Tenderness, swelling or nodules (e.g. Heberden's, Bouchard's), crepitus or instability



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Hand

Range of Motion and Strength Testing

- **Range of Motion**
 - **Finger flexion/Extension:** Make a fist and fully extend fingers
 - **Thumb opposition:** Touch thumb to each fingertip
 - **Abduction/adduction:** Spread and bring fingers together
- **Strength Testing**
 - **Grip strength:** Squeeze examiner's fingers
 - **Pinch strength:** Thumb to index and thumb to little finger
 - **Thumb opposition:** Test median nerve function
 - **Finger abduction/adduction:** Interossei (ulnar nerve)
 - **Thumb extension:** EPL (radial nerve)



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Hand

Special Tests and Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Froment's Sign	Ulnar nerve palsy	Flexion of thumb IP joint during pinch	Ulnar nerve dysfunction
Jeanne's Sign	Ulnar nerve palsy	Hyperextension of thumb MCP during pinch	Ulnar nerve dysfunction
Tinel's Sign (Hand)	Nerve irritation	Tingling with tapping over nerve	Median or ulnar neuropathy
Phalen's Test	Median nerve compression	Numbness/tingling in median distribution	Carpal tunnel syndrome
Bunnell's Test	Intrinsic tightness	Inability to flex PIP with MCP extended	Intrinsic muscle contracture
Allen's Test	Vascular patency	Delayed refill of palm	Inadequate ulnar or radial artery flow
Digital cascade	Tendon rupture	Abnormal resting finger posture	Flexor/extensor tendon injury

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Hand

1. Recognize & Diagnose

- Hand: Recognize the Pattern
 - Osteoarthritis**
 - DIP/PIP $\neq$ 1st CMC pain/stiffness
 - Heberden $\rightarrow$ DIP
 - Bouchard $\rightarrow$ PIP
 - Bony enlargement, $\downarrow$ ROM
 - Usually minimal prolonged morning stiffness
 - Inflammatory Arthritis**
 - MCP/PIP $>$ DIP
 - Symmetric swelling
 - Prolonged morning stiffness
 - Consider RA/psoriatic disease/systemic clues



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Hand

1. Recognize & Diagnose

- Hand: Recognize the Pattern
 - Trigger Finger**
 - Painful clicking/catching/locking
 - Tender nodule at A1 pulley
 - May progress to fixed locking
 - Dupuytren Contracture**
 - Palmar nodule $\rightarrow$ cord $\rightarrow$ flexion contracture
 - Ring/small finger commonly affected
 - Usually painless

Joint? Tendon? Nerve? Trauma? Infection? – localize the structure first.



101

Hand

2. Work up and treat

Hand: Choosing the Workup

- No Imaging Usually Needed**
 - Classic trigger finger
 - Typical early Dupuytren
 - Clinically obvious uncomplicated OA
- X-Ray First**
 - Acute trauma
 - Focal bony tenderness/deformity
 - Significant swelling or ROM loss
 - Suspected OA/inflammatory arthritis when imaging will change management

For acute hand trauma, radiographs remain the appropriate initial imaging study.



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Hand

2. Work up and treat

Hand: Choosing the Workup

- **US / MRI**
 - Suspected tendon or ligament injury
 - Persistent symptoms with nondiagnostic X-ray
 - Soft-tissue mass
 - Diagnostic uncertainty

After a fracture with suspected associated tendon/ligament injury, both US and noncontrast MRI can be appropriate depending on the clinical question.

- **Labs – only when indicated**
 - Suspected inflammatory arthritis → ESR/CRP ± targeted rheumatologic evaluation
 - Suspected infection → CBC/CRP/ESR ± aspiration/culture

The diagnosis should determine the test—not the other way around.

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Hand

2. Treat

Treat: Hand OA

- | | |
|---|---|
| <ul style="list-style-type: none"> • First Line <ul style="list-style-type: none"> ◦ Education/activity modification ◦ Maintain ROM/function ◦ Topical NSAID ◦ Oral NSAID if appropriate ◦ Heat/paraffin may help symptoms • 1st CMC OA <ul style="list-style-type: none"> ◦ Thumb-spica/CMC orthosis ◦ Hand therapy/HEP ◦ Activity/joint-protection strategies | <ul style="list-style-type: none"> • Injection <ul style="list-style-type: none"> ◦ Consider corticosteroid selectively for symptomatic joints ◦ Benefit varies by joint/location ◦ Not a disease-modifying treatment • Refer <ul style="list-style-type: none"> ◦ Persistent pain/function limitation ◦ Significant deformity/instability ◦ Failure of conservative care ◦ Considering surgical options |
|---|---|

Treat function—not the X-ray.

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Hand

2. Treat

Treat: Trigger Finger

- | | |
|--|--|
| <ul style="list-style-type: none"> • Initial <ul style="list-style-type: none"> ◦ Activity modification ◦ Consider short-term splinting ◦ Corticosteroid Injection at A1 pulley • Refer <ul style="list-style-type: none"> ◦ Persistent/recurrent triggering ◦ Fixed locking ◦ Failure of injection/conservative treatment ◦ Consider surgical A1 pulley release | <h3>Treat: Dupuytren Contracture</h3> <ul style="list-style-type: none"> • Early nodule without functional contracture <ul style="list-style-type: none"> ◦ Observation ◦ Education • Progressive contracture <ul style="list-style-type: none"> ◦ Assess functional limitation Tabletop test: can patient place palm flat? • Refer to Hand <ul style="list-style-type: none"> ◦ Functional impairment ◦ Progressive MCP/PIP contracture ◦ Procedure consideration |
|--|--|

**Trigger finger = tendon isn't gliding.
Dupuytren = fascia is contracting.**

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Traumatic Hand

2 Recognize

Traumatic hand - Don't just call it a sprain

- **Always assess**
 - Mechanism
 - Rotation/alignment
 - Digital cascade
 - Active flexion AND extension
 - Joint stability
 - Neurovascular status
 - X-ray when fracture/dislocation suspected

Before diagnosing a "finger sprain," prove the tendons still work

Check the Tendons:

- **Mallet Finger**
 - Cannot actively extend DIP
 - Extensor tendon injury
- **Central Slip Injury**
 - PIP trauma
 - Risk → boutonnière deformity
- **Jersey Finger**
 - Cannot actively flex DIP
 - FDP avulsion
 - Often ring finger
- **UCL Thumb Injury**
 - Valgus injury at MCP
 - Instability → skier's/gamekeeper's thumb

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Traumatic Hand

2 Recognize

Traumatic hand - Don't just call it a sprain

- **Always assess**
 - Mechanism
 - Rotation/alignment
 - Digital cascade
 - Active flexion AND extension
 - Joint stability
 - Neurovascular status
 - X-ray when fracture/dislocation suspected

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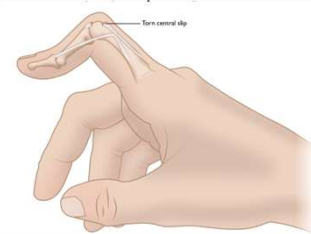


Mallet finger

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Traumatic Hand

2 Recognize



Check the Tendons:

- **Mallet Finger**
 - Cannot actively extend DIP
 - Extensor tendon injury
- **Central Slip Injury**
 - PIP trauma
 - Risk → boutonnière deformity
- **Jersey Finger**
 - Cannot actively flex DIP
 - FDP avulsion
 - Often ring finger
- **UCL Thumb Injury**
 - Valgus injury at MCP
 - Instability → skier's/gamekeeper's thumb

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Traumatic Hand

2 Recognize

Traumatic hand - Don't just call it a sprain

- **Always assess**
 - Mechanism
 - Rotation/alignment
 - Digital cascade
 - Active flexion AND extension



Tom Flexor Tendon

Check the Tendons:

- **Mallet Finger**
 - Cannot actively extend DIP
 - Extensor tendon injury
- **Central Slip Injury**
 - PIP trauma
 - Risk → boutonnière deformity
- **Jersey Finger**
 - Cannot actively flex DIP
 - FDP avulsion
 - Often ring finger
- **UCL Thumb Injury**
 - Valgus injury at MCP
 - Instability → skier's/gamekeeper's thumb

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Traumatic Hand

2 Recognize

Game Keeper's Thumb



Torn Ulnar Collateral Ligament

Check the Tendons:

- **Mallet Finger**
 - Cannot actively extend DIP
 - Extensor tendon injury
- **Central Slip Injury**
 - PIP trauma
 - Risk → boutonnière deformity
- **Jersey Finger**
 - Cannot actively flex DIP
 - FDP avulsion
 - Often ring finger
- **UCL Thumb Injury**
 - Valgus injury at MCP
 - Instability → skier's/gamekeeper's thumb

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Traumatic Hand

Treat

Hand Injuries: What Can I Treat?

- **Mallet Finger**
 - Continuous DIP extension splinting
 - Typically **6-8 weeks**
 - PIP remains free
 - Refer if large articular fracture, volar subluxation, open injury, or inability to maintain reduction

What can I treat?

- **Stable PIP Sprain**
 - Brief protection as needed
 - Buddy taping
 - Early ROM
 - Avoid prolonged immobilization → stiffness
- **Stable Nondisplaced Fracture**
 - Appropriate immobilization/buddy taping depending on fracture
 - Repeat assessment for alignment/rotation

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Traumatic Hand

Treat

Hand Injuries: Refer early

- **Jersey Finger**
 - FDP avulsion
 - Hand surgery referral
- **Unstable UCL Thumb Injury**
 - Concern for complete tear/Stener lesion
 - Hand referral
- **Rotational deformity**
 - Fingers cross/scissor with flexion
 - Needs reduction/referral

The hand gets stiff quickly—immobilize what needs protection, mobilize what doesn't.

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Hand

3. Refer & follow up

Hand: When Is Conservative Care Not Enough?

- **Reassess**
 - Pain/swelling improving?
 - ROM returning?
 - Tendon function intact?
 - Alignment/rotation maintained?
 - Neurovascular exam normal?
- **Routine Hand / Sports Med**
 - Refractory trigger finger
 - Symptomatic Dupuytren
 - Persistent OA despite conservative treatment
 - Diagnostic uncertainty
 - Procedure/injection consideration



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Hand

3. Refer & follow up

Hand: When Is Conservative Care Not Enough?

- **Expedited Hand Referral**
 - Jersey finger
 - Significant tendon laceration/rupture
 - Unstable ligament injury
 - Rotational fracture deformity
 - Progressive motor nerve deficit
 - Complex/intra-articular fracture
- **ED / Emergent**
 - Flexor tenosynovitis
 - Septic joint/deep-space infection
 - Neurovascular compromise
 - Compartment syndrome
 - Open fracture/dislocation

Tendon loss + rotation + infection + neurovascular compromise = change your referral timeline.



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Hand

CAN'T MISS

Diagnosis	Think...	Action
Flexor Tenosynovitis	Kanavel signs	ED / urgent hand surgery
Septic Joint/Deep Infection	Hot swollen painful joint/hand ± systemic symptoms	Urgent aspiration/workup + treatment
Jersey Finger	Cannot flex DIP after forced extension	Early hand surgery
Tendon Laceration	Loss of active flexion/extension after wound	Urgent hand evaluation
High-Grade Nerve Injury	Motor + sensory deficit	Expedited hand evaluation
Compartment Syndrome	Escalating pain, tense swelling, pain with passive stretch	Emergent surgical evaluation

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Thoracic Spine

Inspection and Palpation

- **Inspection**
 - Kyphosis or scoliosis
 - Asymmetry of shoulder height or scapular positioning
 - Skin changes
 - Rib cage deformities or prominence
 - Breathing Mechanics and posture
- **Palpation**
 - **Spinous processes:** Check for tenderness, step-offs, or deformity
 - **Paraspinal muscles:** Assess for spasm, tenderness or asymmetry
 - **Costovertebral joints:** palpate for pain or stiffness
 - **Thoracic ribs:** Evaluate for tenderness or crepitus

Thoracic Spine

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Thoracic Spine

Range of Motion and Strength Testing

- **Range of motion**
 - Flexion: Patient bends forward
 - Extension: Patient arches backward
 - Rotation: Patient rotates torso side to side
 - Lateral bending: Patient bends sideways
- **Strength Testing**
 - Trunk Extension: Paraspinal muscles
 - Trunk rotation and lateral flexion: Obliques and intercostals
 - Respiratory effort: Diaphragm and accessory muscles (observe during deep breathing)
 - Strength Testing is less emphasized in thoracic spine unless evaluated for neurologic deficits

Thoracic Spine

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Thoracic Spine

Special Tests and Associated Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Adam's Forward Bend Test	Screen for scoliosis	Rib hump or asymmetry	Idiopathic scoliosis
Chest Expansion Test	Assess thoracic mobility	Reduced expansion	Ankylosing spondylitis
Percussion over spinous processes	Detect vertebral tenderness	Pain with percussion	Compression fracture, osteomyelitis
Costovertebral angle tenderness	Assess renal or musculoskeletal pain	Pain with palpation	Pyelonephritis, musculoskeletal strain

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Thoracic Spine

1. Recognize & Diagnose

Thoracic Pain: Recognize the Pattern

- **Mechanical / Muscular**
 - Localized paraspinal pain/tenderness
 - Reproduced with movement or palpation
 - Often related to activity/posture
 - Neurologic exam normal
- **Facet / Costovertebral**
 - Focal unilateral pain
 - Worse with rotation/extension
 - Rib pain may worsen with deep breathing
 - Reproducible with palpation/movement

Thoracic Spine

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Thoracic Spine

1. Recognize & Diagnose

Thoracic Pain: Recognize the Pattern

- **Compression Fracture**
 - Acute/subacute focal pain
 - Midline vertebral tenderness
 - Older age/osteoporosis
 - Steroid use or significant trauma
- **Inflammatory**
 - Younger patient
 - Prolonged morning stiffness
 - Improves with activity
 - Night pain
 - Consider axial spondyloarthritis

Thoracic pain deserves a broader differential than lumbar pain.

Thoracic Spine

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Thoracic Spine

1. Recognize & Diagnose



Thoracic Pain: Think Outside the Spine

- **Cardiac**
 - Chest pressure
 - Exertional symptoms
 - Dyspnea/diaphoresis
 - Cardiovascular risk/context
- **Pulmonary**
 - Dyspnea
 - Pleuritic pain
 - Hypoxia/tachycardia
 - Cough/fever

Thoracic Spine

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Thoracic Spine

1. Recognize & Diagnose



Thoracic Pain: Think Outside the Spine

- **GI**
 - Epigastric/RUQ symptoms
 - Relation to meals
 - Nausea/vomiting
- **Renal**
 - Flank/CVA pain
 - Urinary symptoms
 - Fever
- **Aortic / Vascular**
 - Sudden severe chest/back pain
 - Syncope or neurologic symptoms
 - Pulse/BP discrepancy when present

Thoracic Spine

Pain that is not reproducible mechanically—or comes with systemic symptoms—should widen the differential quickly.

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Thoracic Spine

2. Work up and treat



Thoracic Spine: Choosing the Workup

- **Usually No Imaging Initially**
 - Acute uncomplicated mechanical pain
 - No trauma
 - Normal neurologic exam
 - No red flags
- **X-Ray**
 - Trauma
 - Suspected compression fracture
 - Osteoporosis/steroid risk
 - Structural deformity
 - Persistent pain when imaging is indicated

Thoracic Spine

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Thoracic Spine

2. Work up and treat

Thoracic Spine: Choosing the Workup

- **MRI**
 - Myelopathy or neurologic deficit
 - Concern for spinal cord compression
 - Suspected infection
 - Suspected malignancy
 - Persistent concerning pain with nondiagnostic initial evaluation

Thoracic Spine

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Thoracic Spine

2. Work up and treat

Thoracic Spine: Choosing the Workup

- **CT**
 - Detailed fracture/bony assessment
 - Trauma when clinically indicated
 - When MRI unavailable/contraindicated for certain bony questions
 - For uncomplicated acute thoracic pain without myelopathy or red flags, ACR considers initial thoracic imaging generally inappropriate; imaging becomes much more appropriate when there is neurologic involvement, trauma/fracture risk, or concern for infection/malignancy.

Thoracic Spine

Red flags determine imaging more than pain intensity.

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Thoracic Spine

2. Work up and treat

Treat: Mechanical Thoracic Pain

- **First Line**
 - Stay active as tolerated
 - Avoid prolonged bed rest
 - Heat/ice for symptoms
 - NSAID or acetaminophen when appropriate
 - Address provoking activity/posture
- **PT / HEP**
 - Thoracic mobility
 - Scapular stabilization
 - Postural endurance
 - Trunk/core strengthening
 - Gradual return to activity

Thoracic Spine

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Thoracic Spine

2. Work up and treat



Treat: Mechanical Thoracic Pain

- **Costovertebral/Rib Dysfunction**
 - Mobility exercises
 - PT/manual therapy when appropriate
 - Treat contributing thoracic/scapular mechanics
- **Expected Course**
 - Most uncomplicated mechanical presentations improve with conservative treatment
 - Reassess if trajectory is not improving

Movement is usually part of the treatment—not something the patient needs to avoid.

Thoracic Spine

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Thoracic Spine

2. Work up and treat



Suspected Vertebral Compression Fracture

- **Think About It With**
 - Older patient
 - Known osteoporosis
 - Chronic glucocorticoid use
 - Minor trauma or lifting event
 - Focal midline tenderness
 - Sudden thoracic pain
- **Workup**
 - X-ray initially
 - Consider CT → fracture characterization
 - MRI → neurologic findings, acuity uncertain, malignancy/infection concern

Thoracic Spine

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Thoracic Spine

2. Work up and treat



Suspected Vertebral Compression Fracture

- **Initial Treatment**
 - Analgesia
 - Encourage mobility as tolerated
 - Short-term bracing selectively
 - Avoid prolonged bed rest
 - Don't Stop at the Fracture
- **Ask WHY it fractured**
 - Osteoporosis evaluation
 - Medication review
 - Calcium/vitamin D adequacy
 - Fall risk
 - Consider secondary causes when appropriate

A fragility vertebral fracture is also an osteoporosis diagnosis until proven otherwise.

Thoracic Spine

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Thoracic Spine

2. Work up and treat



Could this be inflammatory

- **Think Axial Spondyloarthritis**
 - Onset <45 years
 - Insidious symptoms
 - Morning stiffness
 - Improves with exercise
 - Not improved by rest
 - Night pain
- **Look for Associated Features**
 - Psoriasis
 - Uveitis
 - Inflammatory bowel disease
 - Enthesitis
 - Family history

Thoracic Spine

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Thoracic Spine

2. Work up and treat



Could this be inflammatory

- **Workup**
 - ESR/CRP when clinically indicated
 - HLA-B27 selectively—not a screening test for everyone
 - SI joint imaging rather than simply imaging the painful thoracic level when axSpA is suspected
- **Refer Rheumatology**
 - Clinical pattern suggests inflammatory disease
 - Associated systemic features
 - Persistent diagnostic uncertainty

Thoracic Spine

Inflammatory back pain is a clinical pattern—not a positive HLA-B27.

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Thoracic Spine

2. Refer and follow up



Thoracic Spine: When Do I Escalate?

- **Reassess ~4–6 Weeks**
 - Improving function?
 - Pain trajectory improving?
 - Neurologic exam unchanged?
 - Any evolving systemic symptoms?
- **Routine sports med/spine/PT**
 - Persistent mechanical symptoms
 - Diagnostic uncertainty
 - Failure of appropriate conservative treatment
 - Significant postural/biomechanical dysfunction

Thoracic Spine

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Thoracic Spine

2. Refer and follow up



Thoracic Spine: When Do I Escalate?

- **Expedited Specialty Evaluation**
 - Compression fracture with concerning features
 - Progressive neurologic symptoms
 - Suspected inflammatory disease
 - Persistent unexplained focal pain
 - Concern for malignancy/infection
- **ED / Emergent**
 - Acute/progressive myelopathy
 - Spinal cord compression
 - Significant neurologic deficit
 - Suspected epidural abscess/deep infection with neurologic findings
 - Concerning cardiopulmonary/aortic presentation

New neurologic findings + thoracic pain = don't just prescribe PT.

Thoracic Spine

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Thoracic Spine

CAN'T MISS

Diagnosis	Think...	Action
Cord Compression / Myelopathy	Gait change, hyperreflexia, weakness, sensory changes	Urgent MRI / spine evaluation
Spinal Infection	Fever, focal pain, immunosuppression, IVU, recent infection/procedure	Labs + urgent MRI
Malignancy	Cancer history, unexplained weight loss, progressive/night pain	Advanced imaging/workup
Compression Fracture	Focal midline pain + trauma/osteoporosis/steroids	Image + fracture/osteoporosis management
Visceral Referred Pain	Nonmechanical pain ± cardiopulmonary/GI/renal symptoms	Evaluate underlying system
Aortic Emergency	Abrupt severe chest/back pain ± syncope/neuro findings	ED

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Lumbar Spine

Inspection and Palpation

- **Inspection**
 - Lordosis, scoliosis, or flattening of the lumbar curve
 - Pelvic tilt or leg length discrepancy
 - Muscle asymmetry or atrophy (especially paraspinals and gluteals)
 - Skin changes: surgical scars, birthmarks, or signs of trauma
 - Gait abnormalities (e.g. antalgic, Trendelenburg)
- **Palpation**
 - Spinous processes: Check for tenderness, step-offs, or deformity
 - Paraspinal muscles: assess for spasm, tenderness or asymmetry
 - Sacroiliac joints: Palpate for localized pain
 - Sciatic notch: Evaluate for tenderness (sciatic)



Lumbar Spine

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Lumbar Spine

Range of Motion and Strength Testing

- Range of Motion**
 - Flexion: Patient bends forward (~60°)
 - Extension: Patient arches backward (~25°)
 - Lateral bending: Side-to-side (~25°)
 - Rotation: Twist torso (~30°)
- Strength Testing**
 - Hip Flexion: Iliopsoas (L2-L3)
 - Knee extension: Quadriceps (L3-L4)
 - Ankle dorsiflexion: Tibialis anterior (L4-L5)
 - Great toe extension: Extensor hallucis Longus (L5)
 - Ankle plantarflexion: Gastrocnemius/soleus (S1)



Lumbar Spine

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Lumbar Spine

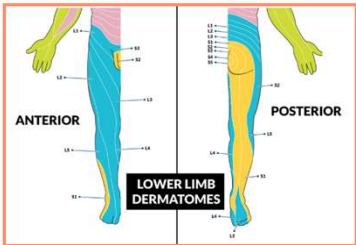
Special Tests and Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Straight Leg Raise (SLR)	Nerve root tension	Radicular pain down leg	Lumbar radiculopathy (L5/S1)
Crossed SLR	Contralateral nerve tension	Pain in opposite leg	Large disc herniation
Slump Test	Neural tension	Radicular symptoms with spinal flexion	Lumbar radiculopathy
Patrick's (FABER) Test	SI joint or hip pathology	Pain in SI joint or groin	Sacroiliitis or hip arthritis
Thomas Test	Hip flexor tightness	Inability to fully extend opposite leg	Iliopsoas contracture
Trendelenburg Test	Gluteus medius weakness	Pelvic drop on contralateral side	L5 radiculopathy or gluteal weakness

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Lumbar Spine

Clinical Pearls



ANTERIOR

POSTERIOR

LOWER LIMB DERMATOMES

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Lumbar Spine

Recognize & Diagnose

- **Mechanical / Strain:** axial pain, paraspinal tenderness, pain with movement; neurologic exam normal.
- **Radiculopathy:** leg pain in a dermatomal pattern $\pm$ sensory loss, weakness, or reflex change.
- **Facet-Mediated Pattern:** axial pain often worse with extension/rotation; no true neurologic deficit.

Clinical Pearl: First separate axial mechanical pain from radicular pain.



Lumbar Spine

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Lumbar Spine

Recognize the Mimics

- **Hip / SI:** groin pain, restricted hip ROM, or provocative hip/SI findings.
- **Inflammatory:** younger onset, prolonged morning stiffness, night pain, improves with activity.
- **Systemic / Visceral:** nonmechanical pain or associated GU, GI, vascular, infectious, or constitutional symptoms.

Clinical Pearl: If the history does not behave mechanically, widen the differential.



Lumbar Spine

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Lumbar Spine

Workup: When Do I Image?

- **No Imaging Initially:** uncomplicated acute/subacute low back pain $\pm$ radiculopathy without red flags.
- **X-Ray:** trauma/fracture risk, structural deformity, or persistent symptoms when results will change management.
- **MRI:** progressive neurologic deficit, cauda equina, infection/malignancy concern, or persistent disabling radiculopathy.
- **Labs:** targeted when infection, inflammatory disease, or malignancy is suspected.

Clinical Pearl: Red flags—not pain intensity—should drive early imaging.



Lumbar Spine

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Lumbar Spine

Treat: Mechanical Low Back Pain

- **Stay Active:** normal activity as tolerated; avoid prolonged bed rest.
- **Symptom Control:** heat; NSAID when appropriate; other analgesics selectively.
- **PT / HEP:** mobility, trunk/core and hip strength, graded return to activity.
- **Avoid Routine:** opioids, systemic steroids, and unnecessary imaging for uncomplicated mechanical pain.



Lumbar Spine

Clinical Pearl: Movement is part of treatment—not something the patient needs to avoid.

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Lumbar Spine

Treat: Lumbar Radiculopathy

- **Initial Care:** remain active; NSAID if appropriate; targeted PT/HEP; modify provoking activity.
- **Recheck Neuro Exam:** strength, sensation, reflexes, gait, and functional trajectory.
- **Escalate:** MRI for progressive deficit or persistent disabling symptoms when it will change treatment.
- **Consider ESI / Surgery:** selectively for persistent radicular pain; surgery for progressive deficit, cauda equina, or refractory concordant compression.



Lumbar Spine

Clinical Pearl: Pain can often wait; progressive motor loss should not.

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Lumbar Spine

Refer & Follow Up

- **Reassess ~4-6 Weeks:** pain/function improving? neurologic exam stable? activity progressing?
- **Routine Sports Med / Spine:** persistent disabling symptoms, diagnostic uncertainty, procedure consideration, or failed conservative care.
- **Expedited Referral:** progressive motor weakness, significant neurologic deficit, or concerning structural lesion.
- **ED / Emergent:** cauda equina, epidural abscess with neurologic findings, unstable fracture, or other neurologic emergency.



Lumbar Spine

Clinical Pearl: A changing neurologic exam changes the timeline.

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Lumbar Spine

DON'T MISS

Diagnosis	Think...	Action
Cauda Equina Syndrome	Saddle anesthesia • urinary retention/incontinence • bowel dysfunction • bilateral/progressive weakness	ED → urgent MRI + spine surgery
Spinal Epidural Abscess	Severe focal back pain ± fever • infection risk • evolving neurologic deficit	CBC/ESR/CRP + urgent MRI → ED/spine
Vertebral Fracture	Trauma • osteoporosis/steroid use • focal midline tenderness	X-ray/CT as indicated → assess stability
Malignancy / Metastasis	Cancer history • unexplained weight loss • progressive/night or nonmechanical pain	MRI/workup → expedited referral

Clinical Pearl: New bowel/bladder dysfunction, saddle anesthesia, or progressive weakness is an emergency.

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Hip

Inspection and Palpation

Inspection

- Asymmetry in pelvic height or leg length
- Gait abnormalities (e.g. antalgic, Trendelenburg)
- Muscle atrophy (gluteals, quadriceps)
- Skin changes: scars, rashes, or surgical incisions
- Posture and alignment of lower extremities



Palpation

- Bony landmarks
 - Anterior superior iliac spine (ASIS)
 - Greater trochanter
 - Iliac crest
 - Pubic symphysis (if indicated)
- Soft tissues
 - Gluteal muscles
 - Tensor fasciae latae
 - Iliopsoas tendon

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Hip

Range of Motion and Strength Testing

Range of Motion

- Flexion: (~120°)
- Extension: (~30°)
- Abduction: (~45°)
- Adduction: (~30°)
- Internal rotation: (~40°)

Strength Testing

- Hip flexion: iliopsoas (L2-L3)
- Hip Extension: gluteus maximus (L5-S1)
- Hip abduction: Gluteus medius/minimus (L4-S1)
- Hip adduction: Adductor group (L2-L4)
- Internal/external rotation: Obturator piriformis, gluteals



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<div>Hip</div> <div>Special Tests and Diagnoses</div>			
Test	Purpose	Positive Finding	Associated Diagnoses
FABER (Patrick's) Test	SI joint or hip pathology	Pain in groin or SI joint	Hip OA, sacroillitis
FADIR Test	Impingement or labral tear	Pain with flexion, adduction, internal rotation	Femoroacetabular impingement (FAI), labral tear
Thomas Test	Hip flexor tightness	Opposite leg lifts off table	Iliopsoas contracture
Trendelenburg Test	Gluteus medius weakness	Pelvic drop on contralateral side	L5 radiculopathy, gluteal weakness
Log Roll Test	Intra-articular pathology	Pain or clicking with passive external rotation	Labral tear
Scour Test	Hip joint pathology	Pain or crepitus with axial load and rotation	OA, labral tear

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Hip

1. Recognize & Diagnose



- **Intra-articular:** groin/anterior pain, ↓ internal rotation, pain with FADIR/FABER → OA, FAI/labral pathology.
- **Lateral hip:** greater trochanter tenderness, pain with side-lying → gluteal tendinopathy / GTPS.
- **Posterior / referred:** buttock pain → consider lumbar spine, SI joint, hamstring or deep gluteal sources.
- **Traumatic / high-risk:** inability to bear weight, focal bony pain, or severe ROM limitation changes the workup.

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Hip

Workup: When do I image?



- **No Imaging Initially:** typical atraumatic GTPS or mild mechanical symptoms without red flags.
- **X-Ray First:** acute trauma, inability to bear weight, suspected OA/structural disease, or persistent hip pain when imaging will change management.
- **MRI:** suspected occult fracture, AVN, femoral neck stress injury, or persistent unexplained intra-articular symptoms.
- **US:** useful for superficial tendon/bursal pathology and image-guided procedures.

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Hip

Treat: Hip Osteoarthritis



- **Stay Active:** exercise/PT emphasizing strength, mobility and aerobic activity; modify aggravating loads.
- **Symptom Control:** NSAID when appropriate; acetaminophen selectively; heat/ice based on preference.
- **Injection:** intra-articular corticosteroid can provide short-term symptom relief and facilitate function/rehab.
- **Refer:** persistent pain or functional loss despite appropriate conservative care; progressive disability or arthroplasty consideration.

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Hip

Treat: Greater Trochanteric Pain syndrome



- **Recognize:** lateral hip pain, focal greater trochanter tenderness, pain with side-lying, stairs or prolonged walking.
- **Load Modification:** reduce compressive positions and provoking activity without prolonged rest.
- **Rehab:** progressive gluteal/hip abductor strengthening and movement retraining.
- **Injection:** corticosteroid may help short-term symptoms; rehab remains the foundation.

Clinical Pearl: Think gluteal tendon—not simply "bursitis."

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Hip

Treat: FAI & Labral Type Symptoms



- **Recognize:** groin pain with flexion/rotation ± clicking/catching; FADIR may reproduce familiar pain.
- **Initial Care:** modify repeated deep-flexion/impingement positions; NSAID if appropriate.
- **PT / HEP:** hip/core strength, movement control and mobility as appropriate.
- **Escalate:** persistent mechanical symptoms despite directed rehab → consider advanced imaging and sports med/ortho referral

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Hip

The painful hip after trauma



- **Start With:** mechanism, ability to bear weight, gait, ROM and neurovascular exam.
- **X-Ray First:** suspected fracture/dislocation or significant traumatic hip pain.
- **Negative X-Ray + Done:** if occult femoral neck fracture remains concerning, obtain advanced imaging.
- **Athletes:** progressive groin pain with impact loading should raise concern for femoral neck stress injury.

A negative X-ray does not exclude an occult femoral neck fracture.

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Hip

3. Refer & follow up



- **Reassess ~4-6 Weeks:** pain/function, gait, ROM/strength and response to directed rehab.
- **Routine Sports Med / Ortho:** persistent OA, GTPS or FAI-type symptoms; diagnostic uncertainty; procedure consideration.
- **Expedited:** suspected AVN, femoral neck stress injury, progressive mechanical symptoms or significant functional loss.
- **Adolescent SCFE:** limp + hip/thigh/knee pain + loss of internal rotation → non-weight-bearing and urgent orthopedics.
- **ED / Emergent:** septic joint, displaced hip fracture/dislocation or neurovascular compromise.

Inability to bear weight plus severe hip pain changes the timeline.

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Hip

CAN'T MISS

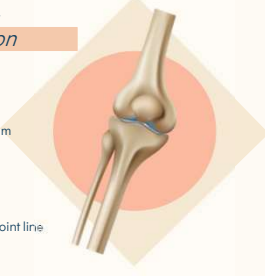
Diagnosis	Think...	Action
Septic Arthritis	Severe atraumatic pain • fever/systemic illness • painful ROM • inability to bear weight	ED → aspiration/workup • urgent treatment
Hip Fracture	Fall/trauma • groin pain • inability to bear weight ± shortened/external rotation	X-ray → urgent ortho; advanced imaging if occult fracture suspected
SCFE	Adolescent limp • hip/thigh/knee pain • loss of internal rotation	Non-weight-bearing → urgent ortho
AVN / Stress Injury	Risk factors or progressive groin pain • pain with weight bearing/internal rotation	MRI → expedited specialty evaluation

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Knee

Inspection and Palpation

- **Inspection**
 - Swelling, effusion or deformity
 - Muscle atrophy (especially quadriceps)
 - Gait abnormalities (antalgic, stiff-legged)
 - Alignment: genu valgum (knock-knees), genu varum (bowlegs), recurvatum
 - Scars, bruising or signs of trauma
- **Palpation**
 - Bony Landmarks
 - Patella, tibial tuberosity, femoral condyles, joint line
 - Soft Tissues
 - Quadriceps and patellar tendons
 - Medial and lateral joint lines (menisci)
 - Pes anserine bursa, popliteal fossa

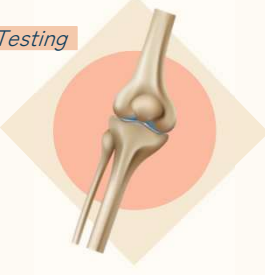


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Knee

Range of Motion and Strength Testing

- **Range of Motion**
 - Flexion (~135 °)
 - Extension: (~0 °)
- **Strength Testing**
 - Knee extension: Quadriceps (L3-L4)
 - Knee flexion: Hamstrings (L5-S1)
 - Compare bilaterally and assess for weakness or compensation



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Knee

Special Tests and Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Ballottement Test	Detect effusion	Patella rebounds after compression	Knee effusion
Bulge Sign	Detect small effusion	Fluid wave medially	Knee effusion
McMurray's Test	Meniscal tear	Click or pain with rotation	Medial or lateral meniscus tear
Apley's Compression Test	Meniscal tear	Pain with compression and rotation	Meniscal pathology
Lachman Test	ACL integrity	Increased anterior translation	ACL tear
Anterior Drawer Test	ACL integrity	Excessive anterior movement	ACL tear
Posterior Drawer Test	PCL integrity	Excessive posterior movement	PCL tear
Varus/Valgus Stress Tests	LCL/MCL integrity	Laxity or pain	Collateral ligament injury
Patellar Apprehension Test	Patellar instability	Apprehension or guarding	Patellar subluxation/dislocation

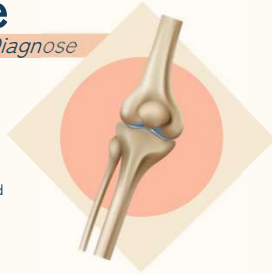
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Knee

1. Recognize & Diagnose

- **Acute traumatic:** mechanism + timing of effusion + instability guide the differential.
- **Meniscal:** joint-line pain, twisting mechanism, catching/locking; true locked knee matters.
- **Ligament:** ACL—pivot/pop/rapid effusion; MCL/LCL—pain or laxity with stress; PCL—dashboard/fall onto flexed knee.
- **Anterior knee:** patellofemoral pain is activity-related; patellar instability often follows lateral displacement.

Clinical Pearl: Mechanism + effusion timing + location usually narrow the diagnosis quickly.



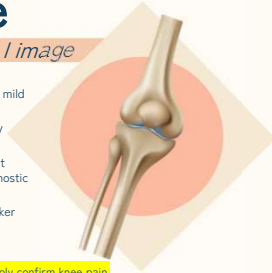
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Knee

2. Work up when do I image

- **No Imaging Initially:** typical atraumatic patellofemoral pain or mild soft-tissue symptoms without red flags.
- **X-Ray First:** acute trauma, inability to bear weight, focal bony tenderness, deformity, or suspected OA.
- **MRI:** suspected ACL/PCL or repairable meniscal injury when it changes management; persistent mechanical symptoms or diagnostic uncertainty.
- **Ultrasound:** effusion, superficial tendon/bursal pathology, Baker cyst, or image-guided procedures.

Clinical Pearl: MRI should answer a management question—not simply confirm knee pain.



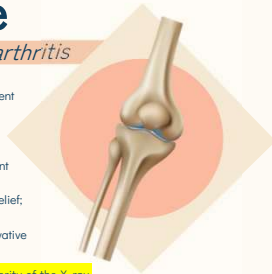
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Knee

Treat: Knee Osteoarthritis

- **Exercise First:** strengthening, aerobic activity, weight management when applicable; and activity modification.
- **Medications:** topical NSAID; oral NSAID when appropriate; acetaminophen selectively.
- **Support:** brace or cane selectively based on symptoms/alignment and function.
- **Injection:** intra-articular corticosteroid may provide short-term relief; use to facilitate function and rehab.
- **Refer:** persistent pain/function loss despite appropriate conservative care or arthroplasty consideration.

Clinical Pearl: Treat the patient's pain and function—not the severity of the X-ray.



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Knee

Treat: Patellofemoral Pain

- **Load Modification:** temporarily reduce provoking volume—stairs, squats, running hills, jumping—without complete rest.
- **Rehab:** progressive quadriceps + hip strengthening; address movement control and training errors.
- **Adjuncts:** patellar taping may help short-term symptoms; foot orthoses selectively.
- **Imaging:** usually unnecessary initially when the presentation is classic; reconsider if persistent or atypical.



Clinical Pearl: Patellofemoral pain is primarily a load-management + strengthening problem.

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Knee

Treat: Meniscal injury

- **Degenerative / Non-Locked:** activity modification, NSAID if appropriate, PT/HEP, progressive return to activity.
- **Mechanical Symptoms:** clarify catching/clicking versus a truly locked knee with loss of extension.
- **MRI / Referral:** persistent symptoms after directed care, diagnostic uncertainty, or concern for a repairable traumatic tear.
- **Expedite:** true locked knee or displaced tear concern → early orthopedic evaluation.



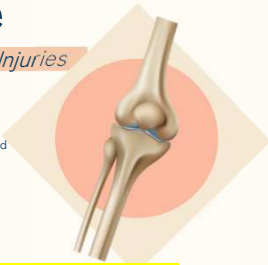
Clinical Pearl: A meniscal tear on MRI does not automatically mean surgery. Treat the patient, not the MRI.

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Knee

Treat: ACL & Collateral Ligament Injuries

- **ACL:** protect initially, control swelling, restore ROM—especially extension—and begin quadriceps activation.
- **MRI / Ortho:** confirm suspected ACL injury when needed for treatment planning; referral depends on instability, activity goals and associated injury.
- **MCL:** most isolated grade I–II injuries are treated nonoperatively with early ROM, rehab ± hinged brace.
- **LCL / Multiligament:** lower threshold for expedited orthopedic evaluation, especially with instability or neurovascular concern.



Clinical Pearl: Before focusing on the ligament, document the neurovascular exam and associated injuries.

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Knee

The Acutely Swollen Knee

- **Rapid Effusion After Trauma:** think ACL tear, patellar dislocation, intra-articular fracture or significant osteochondral injury.
- **Hot / Atraumatic Effusion:** consider septic arthritis and crystal disease—do not assume OA flare.
- **Arthrocentesis:** appropriate when infection or crystal arthritis is suspected; send cell count/differential, Gram stain/culture and crystals as indicated.
- **Calf Swelling:** consider DVT based on clinical probability; Homan's sign is not a reliable diagnostic test.

Clinical Pearl: Atraumatic hot swollen knee + painful ROM = septic arthritis until proven otherwise.



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Knee

3. Refer & Follow up

- **Reassess ~4-6 Weeks:** pain/function, effusion, ROM, strength, stability and response to rehab.
- **Routine Sports Med / Ortho:** persistent OA/PPP/meniscal symptoms, recurrent patellar instability, diagnostic uncertainty, or procedure consideration.
- **Expedited:** true locked knee, unstable ligament injury, extensor mechanism rupture, significant osteochondral injury, or displaced fracture.
- **ED / Emergent:** septic joint, knee dislocation/neurovascular compromise, open fracture, or compartment syndrome

Clinical Pearl: Progressive instability, true locking, or extensor mechanism failure changes the timeline.



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Knee

CAN'T MISS

Diagnosis	Think...	Action
Septic Arthritis	Hot swollen knee + severe painful ROM ± fever/systemic illness	ED → aspiration/workup + urgent treatment
Knee Dislocation	High-energy injury or gross instability ± reduced spontaneously	NV exam → ABI/vascular evaluation → emergent ortho
Tibial Plateau Fx	Trauma + effusion + focal tenderness + inability to bear weight	X-ray ± CT → ortho based on stability
Extensor Rupture	Unable straight-leg raise / actively extend knee	Immobilize → expedited ortho
DVT	Calf swelling/tenderness + compatible risk/context	Use clinical probability → ultrasound/workup

Clinical Pearl: A knee dislocation may look reduced—vascular injury can still be present.



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Ankle

Inspection and Palpation



- **Inspection**
 - Swelling, bruising or deformity
 - Asymmetry in ankle or foot alignment
 - Gait abnormalities (e.g. antalgic, toe walking, foot drop)
 - Skin changes: scars, ulcers, calluses, or rashes
 - Footwear patterns (may indicate biomechanical issues)
- **Palpation**
 - **Bony landmarks:**
 - Medial and lateral malleoli
 - Talus, calcaneus, navicular, cuboid
 - **Soft tissues**
 - Anterior talofibular ligament (ATFL), calcaneofibular ligament (CFL), deltoid ligament
 - Achilles tendon
 - Peroneal tendons, tibialis posterior

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Ankle

Range of Motion and Strength Testing



- **Range of Motion**
 - Dorsiflexion (~20°)
 - Plantarflexion (~50°)
 - Inversion (~35°)
 - Eversion (~25°)
- **Strength Testing**
 - Dorsiflexion: Tibialis anterior (L4-L5)
 - Plantarflexion: Gastrocnemius/soleus (S1-S2)
 - Inversion: Tibialis posterior
 - Eversion: Peroneal muscles
 - Toe flexion/extension: Flexor/extensor hallucis longus and digitorum

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Ankle

Special Tests and Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Anterior Drawer Test (Ankle)	ATFL integrity	Excessive anterior movement	Lateral ankle sprain
Talar Tilt Test	CFL integrity	Increased inversion laxity	Lateral ligament injury
Squeeze Test	Syndesmosis injury	Pain at distal tib-fib joint	High ankle sprain
Thompson Test	Achilles tendon rupture	No plantarflexion with calf squeeze	Achilles rupture
External Rotation Stress Test	Syndesmosis injury	Pain with external rotation	High ankle sprain
Homan's Sign	DVT screening (limited use)	Calf pain with dorsiflexion	Possible DVT (not diagnostic)

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Ankle

1. Recognize & Diagnose



- **Lateral Sprain:** inversion injury; ATFL ± CFL tenderness, swelling and pain with weight bearing.
- **Syndesmosis:** external-rotation mechanism or pain above the ankle mortise; squeeze/external-rotation testing may reproduce pain.
- **Achilles:** tendinopathy causes load-related posterior pain; rupture causes sudden pop, weakness and abnormal Thompson test.
- **Medial / Tendon:** consider deltoid injury, posterior tibial tendon or peroneal tendon pathology based on location and resisted testing.

Clinical Pearl: Mechanism + exact pain location usually separates ligament, tendon and fracture patterns.

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Ankle

2. Work up: When do I Image?



- **Ottawa Ankle Rules:** use for acute traumatic ankle pain to determine when radiographs are indicated.
- **X-Ray First:** malleolar bony tenderness, inability to bear weight, deformity, or other fracture concern.
- **MRI:** persistent pain, suspected osteochondral lesion, syndesmosis injury, occult fracture or tendon pathology when it changes management.
- **Ultrasound:** useful for Achilles/peroneal/posterior tibial tendon pathology and dynamic assessment.

Clinical Pearl: Do not image every ankle sprain—but do not miss the fracture pattern.

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Ankle

2. Treat: Lateral Ankle Sprain



- **Early Protection:** brace/tape as needed, compression and symptom-guided weight bearing; crutches briefly if necessary.
- **Early Motion:** restore dorsiflexion and ankle ROM rather than prolonged immobilization.
- **Rehab:** progressive strengthening, balance/proprioception and sport-specific loading.
- **Return to Sport:** base progression on pain, ROM, strength, balance and functional testing—not time alone.
- **Prevention:** brace/tape and neuromuscular training can reduce recurrence in higher-risk athletes.

Clinical Pearl: Functional rehab beats prolonged immobilization for most uncomplicated lateral sprains.

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Ankle

2. Treat: High Ankle Sprain



- **Recognize:** pain above the malleoli, external-rotation mechanism, pain with squeeze or external-rotation stress.
- **Initial Care:** protect weight bearing based on severity; brace/boot when needed; begin controlled ROM and rehab.
- **Recovery:** typically slower than a routine lateral ankle sprain—set expectations early.
- **Escalate:** instability, widening/diastasis, fracture, inability to progress or high-level athlete with significant injury → sports med/ortho.

Clinical Pearl: A "sprain" that hurts above the ankle and is slow to improve may be syndesmotic.

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Ankle

2. Treat: Achilles Tendinopathy



- **Load Management:** reduce provocative volume temporarily without complete rest.
- **Rehab:** progressive calf loading—eccentric or heavy-slow resistance based on tolerance and program.
- **Insertional Disease:** avoid aggressive dorsiflexion/compression early if it clearly aggravates symptoms.
- **Adjuncts:** heel lift or footwear modification selectively; avoid intratendinous corticosteroid injection.
- **Refer:** persistent symptoms despite structured loading or diagnostic uncertainty.

Clinical Pearl: The treatment is progressive tendon loading—not simply stretching and rest.

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Ankle

2. Treat: Achilles Rupture



- **Recognize:** sudden posterior ankle pain/pop, weakness with push-off, palpable defect ± abnormal Thompson test.
- **Do Now:** immobilize in plantarflexion/equinus and protect weight bearing.
- **Imaging:** often a clinical diagnosis; ultrasound/MRI selectively if examination is equivocal or planning requires it.
- **Refer Early:** prompt orthopedic/sports medicine evaluation to discuss operative versus functional nonoperative treatment.

Clinical Pearl: A patient may still plantarflex with a ruptured Achilles—do the Thompson test.

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Ankle

3. Treat: Posterior Tibial & Peroneal Tendons



- **Posterior Tibial:** medial ankle pain, progressive flatfoot, weakness/pain with inversion or single-leg heel raise.
- **Peroneal:** posterolateral pain, pain with resisted eversion; consider subluxation after inversion injury.
- **Initial Care:** activity/load modification, supportive footwear or brace/orthotic when appropriate, progressive strengthening.
- **Escalate:** progressive deformity, tendon subluxation, suspected tear or persistent functional weakness → imaging/referral.

Clinical Pearl: Persistent tendon weakness or progressive deformity is different from uncomplicated tendinopathy.

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Ankle

3. Refer & follow up



- **Reassess:** pain, swelling, ROM, strength, gait, stability and ability to progress functional loading.
- **Routine Sports Med / Ortho:** persistent instability, refractory tendinopathy, recurrent sprains, diagnostic uncertainty or procedure consideration.
- **Expedited:** Achilles rupture, unstable syndesmotic injury, tendon subluxation/tear, displaced or unstable fracture.
- **ED / Emergent:** open fracture/dislocation, neurovascular compromise, compartment syndrome or threatened skin.

Clinical Pearl: Failure to regain function should trigger reassessment of the diagnosis and treatment.

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Ankle

CAN'T MISS



Diagnosis	Think...	Action
Achilles Rupture	Sudden pop • push-off weakness • abnormal Thompson test	Plantarflexed immobilization → early ortho
Syndesmotic Injury	Pain above malleoli • external-rotation/squeeze pain ± instability	Protect → X-ray/advanced imaging as indicated → ortho if unstable
Ankle Fracture	Bony tenderness • swelling/deformity • inability to bear weight	Ottawa rules/X-ray → manage stability/displacement
Compartment Syndrome	Escalating pain • tense swelling • pain with passive stretch	ED → emergent surgical evaluation
NV / Open Injury	Poor perfusion, motor/sensory deficit, open fracture/dislocation	Immediate ED/orthopedic management

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Foot

Inspection and Palpation

- **Inspection**
 - Deformities (hallux valgus, hammer toes, pes planus/cavus)
 - Skin changes: ulcers, calluses, rashes, nail abnormalities
 - Swelling or asymmetry
 - Arch height and alignment
 - Footwear patterns and fit
- **Palpation**
 - Bony landmarks
 - Metatarsal heads, phalanges, calcaneus, navicular cuboid
 - Soft tissues
 - Plantar fascia
 - Achilles tendon insertion
 - Tarsal Tunnel (posterior to medial malleolus)
 - Dorsalis pedis and posterior tibial pulses



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Foot

Range of Motion and Strength Testing

- **Range of Motion**
 - Toe flexion/extension
 - Midfoot and forefoot mobility
 - Subtalar joint inversion/eversion
- **Strength Testing**
 - Toe flexion/extension: Flexor/extensor hallucis and digitorum
 - Foot inversion: tibialis posterior
 - Foot eversion: Peroneal muscles
 - Plantar flexion: Gastrocnemius/soleus



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Foot

Special Test and Diagnoses

Test	Purpose	Positive Finding	Associated Diagnosis
Windlass Test	Plantar fasciitis	Pain with passive toe dorsiflexion	Plantar fasciitis
Tarsal Tunnel Test (Tinel's)	Tibial nerve entrapment	Tingling with tapping over tunnel	Tarsal tunnel syndrome
Morton's Test	Neuroma detection	Pain between metatarsal heads	Morton's neuroma
Single Heel Raise Test	Posterior tibial tendon function	Inability to raise heel	Posterior tibial tendon dysfunction
Toe Grasp Test	Intrinsic foot muscle strength	Weak grip or imbalance	Neuropathy or intrinsic weakness
Monofilament Test	Sensory screening	Reduced sensation	Diabetic neuropathy

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Foot

1. Recognize & Diagnose

- **Plantar Heel Pain:** plantar fasciopathy → medial plantar heel pain, worst with first steps after rest, tenderness at medial calcaneal tubercle.
- **Forefoot Pain:** Morton neuroma causes burning/tingling between metatarsal heads; metatarsalgia is load-related plantar forefoot pain.
- **Arch / Alignment:** pes planus or cavus may alter loading; assess flexibility, footwear and posterior tibial tendon function.
- **Traumatic / Focal Bone Pain:** consider fracture, Lisfranc injury or stress injury rather than labeling symptoms as a simple sprain.



Clinical Pearl: Location + load pattern usually separates plantar fascia, nerve, tendon and bone.

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Foot

2. Work up: When Do I Image?

- **No Imaging Initially:** classic plantar fasciopathy, uncomplicated Morton neuroma or mild mechanical foot pain without red flags.
- **X-Ray First:** acute trauma, focal bony tenderness, deformity, persistent pain, or suspected arthritis/structural abnormality.
- **Weight-Bearing Views:** important when evaluating alignment or suspected Lisfranc/midfoot instability when tolerated.
- **MRI:** suspected stress fracture, osteomyelitis, occult injury, plantar fascia/tendon pathology or persistent unexplained symptoms.
- **Ultrasound:** useful for plantar fascia, neuroma, tendon pathology and image-guided procedures.



Clinical Pearl: Image the structure you are worried about—not simply "foot pain."

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Foot

2. Treat: Plantar Fasciopathy

- **Load Modification:** reduce provoking standing/running volume temporarily without complete rest.
- **Stretching:** plantar fascia-specific and calf stretching; address ankle dorsiflexion limitations.
- **Strength / Rehab:** progressive foot intrinsic and calf strengthening with gradual return to load.
- **Support:** supportive footwear, heel cup or prefabricated orthotic selectively; avoid barefoot aggravating surfaces early.
- **Persistent Symptoms:** reassess diagnosis; consider night splint or additional sports medicine/podiatry options.



Clinical Pearl: First-step pain is classic; progressive loading is part of treatment.

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Foot

2. Treat: Morton Neuroma & Metatarsalgia

- **Recognize:** burning/tingling forefoot pain, often 3rd web space, worse in narrow shoes or with forefoot compression.
- **Footwear First:** wide toe box, lower heel and reduced forefoot compression.
- **Offload:** metatarsal pad placed proximal to the painful metatarsal heads; modify provoking activity.
- **Injection / Referral:** corticosteroid injection can be considered for persistent neuroma symptoms; refer if refractory or diagnosis is uncertain.



Clinical Pearl: A metatarsal pad works best proximal to—not directly under—the painful metatarsal heads.

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Foot

2. Treat: Hallux Valgus & Mechanical Forefoot Pain

- **Initial Care:** wide toe-box footwear, shoe modification and padding to reduce pressure over the medial eminence.
- **Pain Control:** NSAID/analgesia when appropriate; activity modification during flares.
- **Orthoses:** may improve symptoms in selected patients but do not reliably correct the deformity.
- **Refer:** persistent pain, progressive deformity, difficulty with footwear or significant functional limitation.



Clinical Pearl: Treat symptoms and shoe conflict—not the X-ray angle alone.

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Foot

2. Treat: Stress Injury & Focal Bone Pain

- **Think Stress Injury:** progressive focal pain with running/jumping, pain with weight bearing and focal bony tenderness.
- **High-Risk Sites:** navicular, proximal 5th metatarsal and selected sesamoid injuries deserve a lower threshold for advanced imaging/referral.
- **Imaging:** early radiographs may be normal; MRI is useful when suspicion remains high.
- **Protect:** reduce or stop impact loading; immobilize/protect weight bearing based on site and severity.



Clinical Pearl: A normal early X-ray does not rule out a stress fracture.

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Foot

2. Treat: The Traumatic Midfoot

- **Lisfranc Clues:** midfoot pain/swelling, plantar ecchymosis, pain with forefoot stress or inability to bear weight.
- **Imaging:** obtain weight-bearing radiographs when feasible; CT/MRI if suspicion remains despite nondiagnostic films.
- **Protect:** keep non-weight-bearing when instability or significant Lisfranc injury is suspected.
- **Refer Early:** diastasis, instability, fracture-dislocation or persistent high clinical suspicion → orthopedic/foot-ankle evaluation.

Clinical Pearl: Plantar midfoot ecchymosis after trauma should make you think Lisfranc.



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Foot

3. Refer & Follow up

- **Reassess ~4-6 Weeks:** pain location, gait, swelling, focal tenderness, strength and response to load modification/rehab.
- **Routine Sports Med / Podiatry / Ortho:** persistent plantar fasciopathy, refractory neuroma, symptomatic deformity, or diagnostic uncertainty.
- **Expedited:** suspected Lisfranc instability, high-risk stress fracture, progressive Charcot changes, tendon rupture or displaced fracture.
- **ED / Emergent:** open fracture/dislocation, neurovascular compromise, compartment syndrome or severe/deep diabetic foot infection.

Clinical Pearl: Persistent focal bony pain deserves reassessment even when the first X-ray was normal.



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Foot

CAN'T MISS

Diagnosis	Think...	Action
Diabetic Foot Infection	Ulcer + erythema/swelling + drainage ± exposed (probe to bone or systemic illness)	Assess severity → imaging/abs → urgent treatment if deep/systemic
Charcot Arthropathy	Warm swollen foot + neuropathy + minimal pain & evolving deformity	Immediate offloading → urgent foot/ankle specialty care
Lisfranc Injury	Midfoot trauma + plantar ecchymosis + pain with stress/weight-bearing	Non-weight bearing → weight-bearing X-ray/CT/MRI → ortho
Calcaneal Fracture	Axial-load injury/fall + severe heel pain/swelling	X-ray/CT → assess associated injuries → ortho
High-Risk Stress Fx	Focal bone pain + impact athlete + early X-ray may be normal	Protect weight bearing → MRI → expedited referral as indicated



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