PainWeek®

Painful Conditions of the Upper Limb

An overview of the evaluation of common and not-so-common painful syndromes affecting the arm

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MUSCLES OF THE UPPER LIMB
The upper limb consists of the shoulder, arm, elbow, forearm, wrist, and hand. They move the joints in different directions. The deltoid moves the arm outwards, forwards, and backwards. The biceps flexes the forearm. The triceps extends the forearm. Some muscles combine to rotate the forearm, as in the act of turning a screw driver.

Disclosures

- Will present adapted materials from my book “Painful Conditions of the Upper Limb” published in April 2021-OUP
- I work for the Department of Veterans Affairs and my presentation does not represent the views of the VA or the US Federal Government

- No conflicts of interest to disclose with ineligible companies

Learning Objectives

- Compare various peripheral neurological syndromes affecting the arm using case studies
- Identify various common musculoskeletal conditions affecting the arm
- Using a case study, outline a differential diagnosis for painful arm symptoms to guide a quick physical exam and discriminatory ancillary test

So Let's Play "Clue"

Case #1

66 y/o R-handed male - progressive painful R shoulder “clicking and grinding”

Plays recreational tennis (doubles - knees also bother him)

Pain affecting his game mostly is generally minimal to absent when resting; AM stiffness and a “clicking” sensation with certain movements

ROS – no SOB, palpitations, abdominal pain, neck pain or tingling or numbness sensation in the arm

PMH: HTN, PUD, and BPH

PSH: cholecystectomy and abdominal hernia repair

Tx: PRN APAP and ibuprofen - minimal improvement

PE: no gross deformity, mild limitation in AROM, palpable crepitus, no tenderness, - impingement signs. Good distal strength / normal sensation

So What Do You Do Now?

- Are these patient's symptoms related to an intrinsic or extrinsic shoulder pain generators?
- If intrinsic, is the problem at the GH joint or extra-GH structures?
- What additional history details should I seek and what additional workup should I perform at this time?

The Shoulder

- 4 articular surfaces (glenohumeral [GH], acromioclavicular [AC], sternoclavicular, and scapulothoracic)
- Complex array of soft tissues, allowing for a very large degree of mobility but making it susceptible to instability
- Potential referral patterns

First Order of Business

- Trauma: time course and lack of trauma effectively rules out acute traumatic causes of shoulder pain
- Extrinsic: no neuro complaints / not vague or at rest

Possible Causes

Traumatic (imaging mandatory)

- Fractures – clavicle, proximal humerus, scapula
- Dislocations/Sprain – GH, AC, SC

Extrinsic

- Cervical – radiculopathy, zoster, zygoapophyseal joint arthropathy
- Plexus and focal nerve lesions (i.e. suprascapular/axillary nerve palsy, TOS)
- Visceral – diaphragmatic irritation (liver, spleen, gallbladder), cardiac

Intrinsic

Extra-glenohumeral

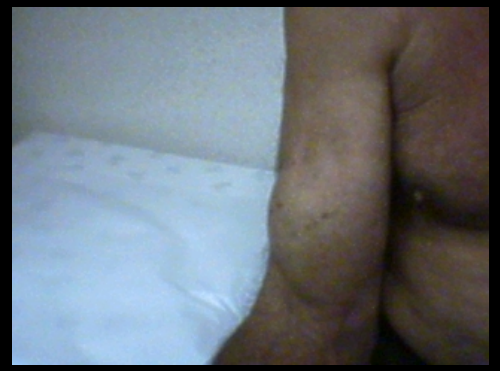
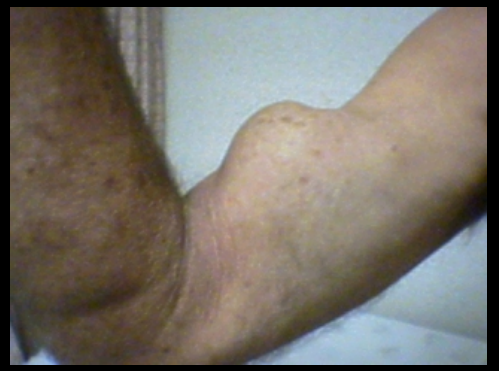
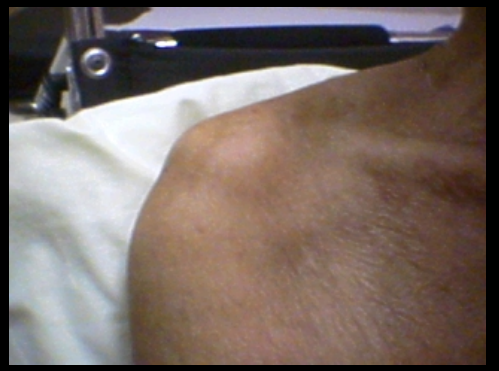
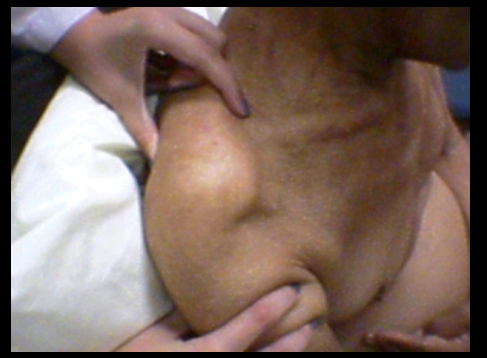
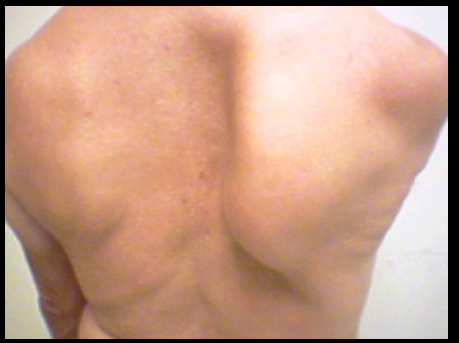
- AC arthritis
- Scapulothoracic ailments
- Biceps tendonitis / tears

Glenohumeral

- GH instability
- Rotator cuff (tears, impingement, tendinopathy)
- GH arthritis (OA, osteonecrosis, crystal-induced, RA)

Intrinsic causes

- Extra-GH causes: tendinopathy/tear of the biceps tendon and AC joint arthritis/sprain. No tenderness or deformity (Popeye Sign, scapular winging, or step deformity of AC joint) does not support these diagnoses, pointing to possible glenohumeral causes
- GH causes: rotator cuff pathology (impingement, tear, tendinopathy), adhesive capsulitis, labral tear, GH instability, and GH arthritis

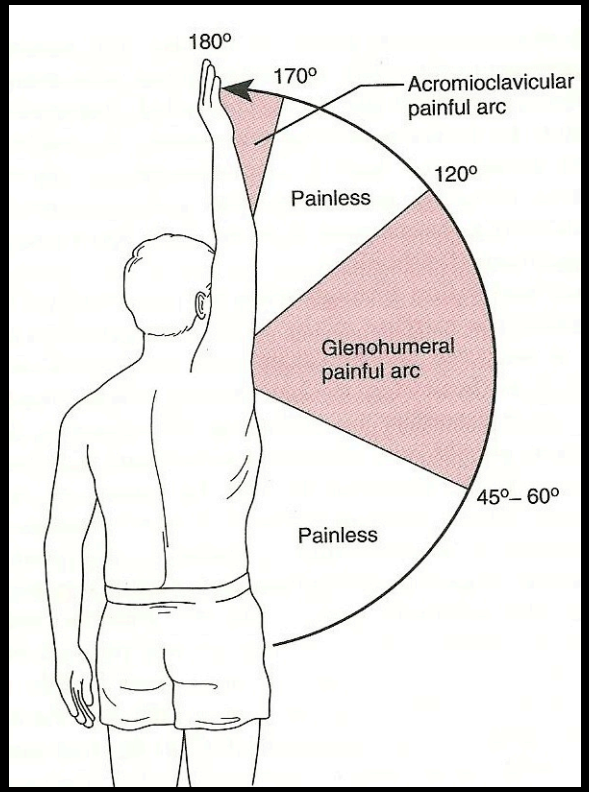






So Where Are We?

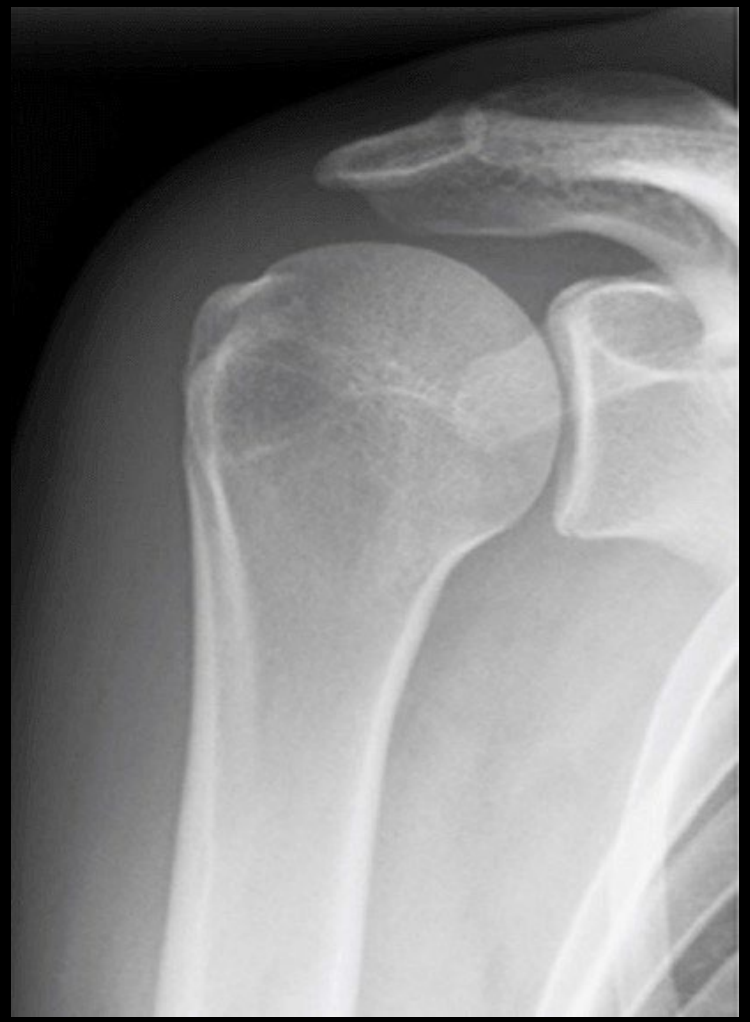
- Information provided:
  - doesn't suggest rotator cuff pathology (no anterolateral pain, point tenderness, impingement signs (Neer and Hawkins Tests) and other abnormalities on exam (drop arm, specific painful arc, empty can test)
  - Adhesive capsulitis - more prevalent in diabetics / tends to affect ROM in all directions (ABduction and ER profoundly)
  - Clicking, catching, or locking sensation - most common type of labral tear (SLAP lesion) generally requires performing an MRI
    - Should we do an MRI at this point?

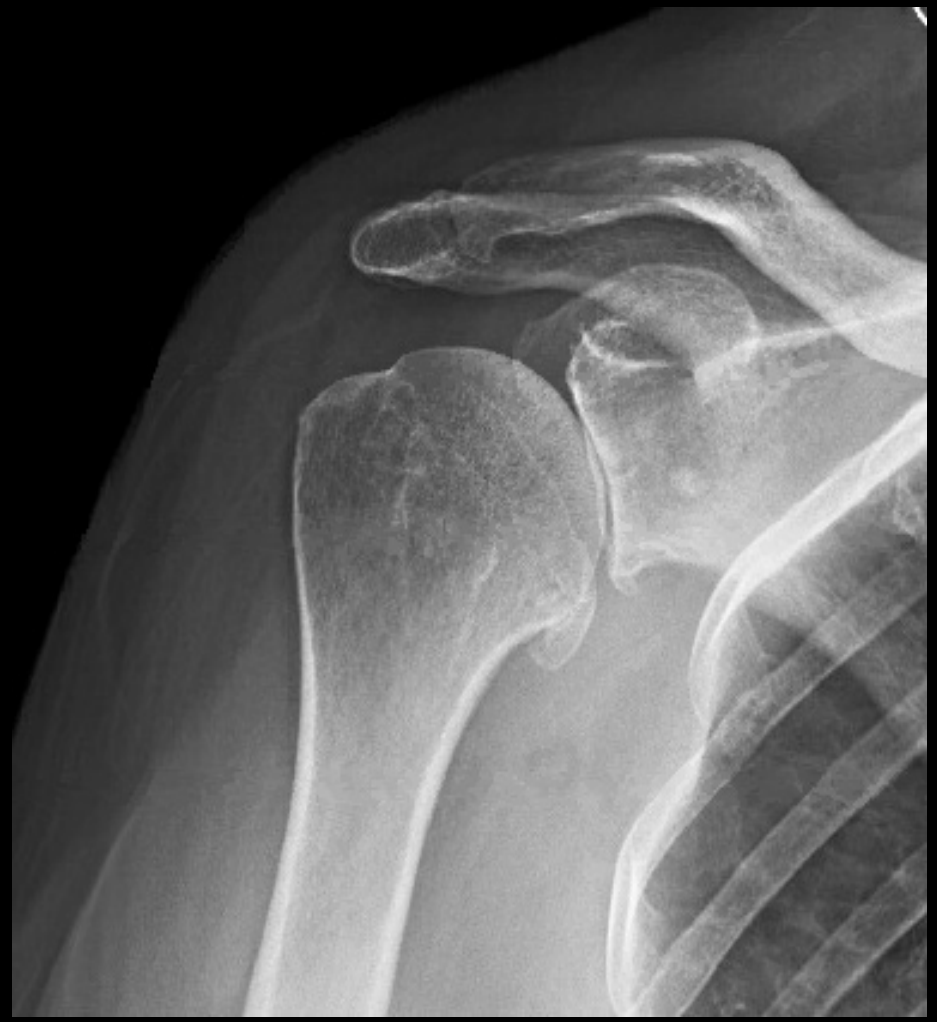
Not Yet…. A Couple of Additional Steps

- Additional exam – no clicking or locking, negative O'Brien's test, no instability, apprehension or sulcus sign
- Limited ROM - passive and active, mid-range in ABduction and ER



So We Order Plain Films Instead…





Key Points

- Prevalence of OA: higher in whites, males > 45 // females > 55 , overweight and inactive persons
- Use systematic approach:
  - first separate extrinsic (referred pain) and intrinsic (pain from the shoulder girdle structures) causes
  - followed by evaluation of GH vs extra-GH causes
- Evaluation of acute traumatic injury mandates imaging
- Non-traumatic history: imaging should be carefully guided by the patient's Hx and exam findings
- Management should follow a stepwise approach, from conservative to minimally invasive and lastly surgical

Case #2

47 y/o female - gradually worsening pain in wrists for about 3 months

Denies trauma or precipitating event

Occasional hand paresthesias and some numbness affecting the whole hand, worse at night, occasionally waking her up; intermittent pain in the whole arm

Homemaker / slightly overweight (has gained about 8 lbs over last year)

PMH: hypothyroidism

PRN APAP and OTC ibuprofen - generally help; relieve some of the pain

Hands inspection: symmetric normal appearance

Grip strength and gross sensation to light touch NL B

So What Do You Do Now?

- Is this a neurological problem or a soft-tissue/musculoskeletal problems with some vague neurological symptoms?
- Could this be a focal manifestation of a systemic condition?
- What additional history details should I seek and what additional workup should I perform?

What comes to mind first?

- CTS
  - Why?

    gender, age, comorbidities, sensory symptoms, it's a horse…
  - Why not?

    No atrophy, NL grip and sensation (signs)…

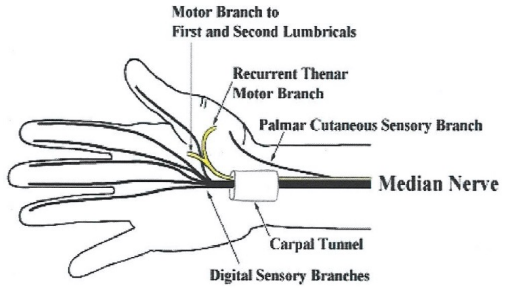
    Whole arm painful?
- If not, what could it be?
  - Some kind of arthritis?
  - Other overuse condition? Referred (neck/elbow) / another focal nerve or plexus problem?

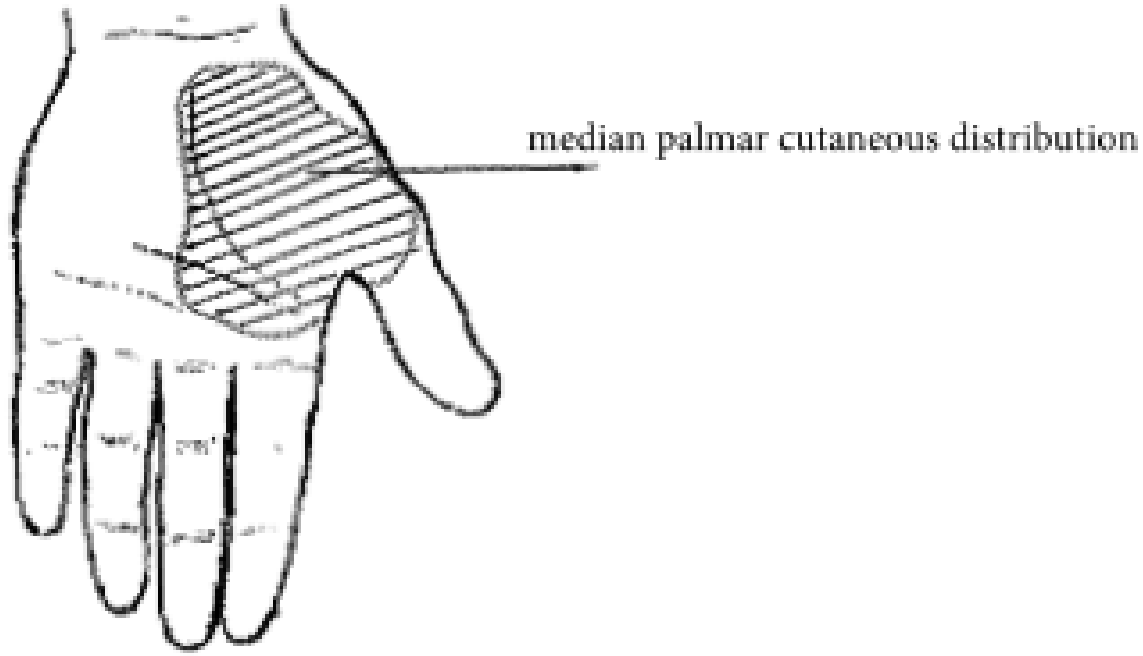
What next?

- Palpate
- Tinel / Phalen / Carpal Compression
- Reflexes / Light touch

- Any additional studies?

An Important Pearl….





Key Points about CTS

- Most common entrapment neuropathy in adults; females > males
- Conditions that cause systemic neuropathies (DM, hypothyroidism) or edema (pregnancy, CRI) are risk factors. Obesity also a risk factor
- Occupations with repetitive wrist motion (secretarial work) and use of vibrating tools (some construction jobs) are considered occupational risk factors
- Mild CTS - usually symptoms with no or minor signs
- Proximal pain NOT uncommon
- EDX - only useful ancillary test to confirm; also helps to guide Tx
- Conservative followed by more invasive management methods may be used for management in a stepwise fashion

Case #3

54 y/o female - diffuse pain/swelling L forearm and hand
Started about 2 months ago-gradually worsened; denies trauma
Pain described as deep ache and burning involving the “whole arm”

PMH: GAD, PUD, mild obesity and prediabetes
PSH: hysterectomy; L middle trigger finger release (3 months ago)

Edema in dorsum of hand / erythema of hand and forearm
L hand feels warmer to the touch when compared to the R
Very guarded when you attempt to touch her hand. Well-healed surgical scar in the palm w/o signs of infection

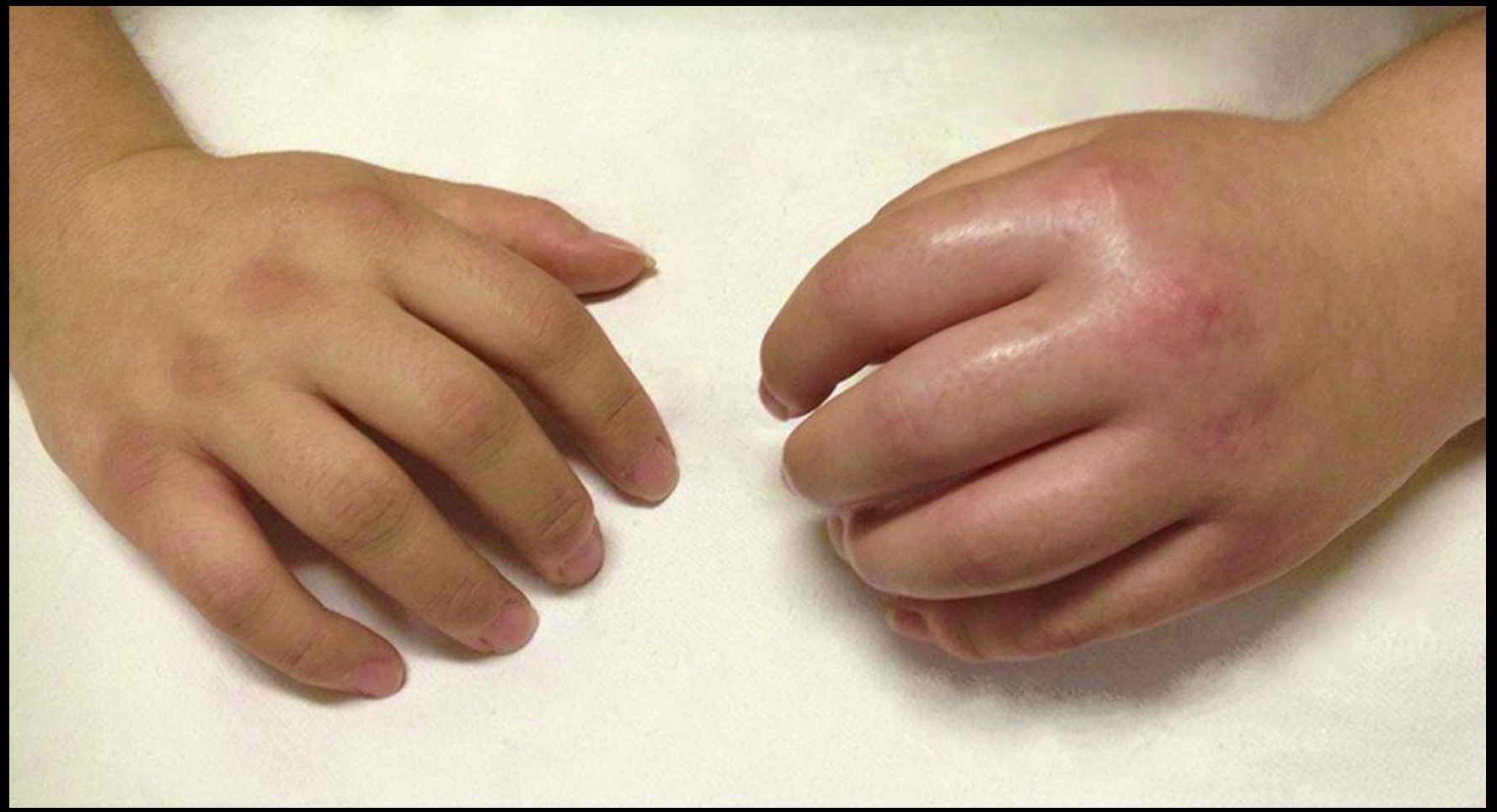
So What Do You Do Now?

- What could this be?
  - Cellulitis
  - DVT
  - Lymphedema
  - CRPS type 1 or 2 (complex regional pain syndrome)
  - Delayed surgical infection / osteomyelitis
  - Arthritic flare (i.e. gout, septic, other)

Next Steps

- Imaging?
- Blood work?
- Additional physical exam?

This is how the hands look like….



The Budapest Criteria[1]

Continuous pain, which is disproportionate to any inciting event

At least 1 symptom in 3 of the following 4 categories:

- **Sensory:** Reports of hyperesthesia and/or allodynia
- **Vasomotor:** Reports of temperature asymmetry and/or skin color changes and/or skin color asymmetry
- **Sudomotor/Edema:** Reports of edema and/or sweating changes and/or sweating asymmetry
- **Motor/Trophic:** Reports of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)

The Budapest Criteria[1] (cont'd)

At least 1 sign at time of evaluation in 2 of the following 4 categories:

- **Sensory:** Evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or temperature sensation and/or deep somatic pressure and/or joint movement)
- **Vasomotor:** Evidence of temperature asymmetry (>1 °C) and/or skin color changes and/or asymmetry
- **Sudomotor/Edema:** Evidence of edema and/or sweating changes and/or sweating asymmetry
- **Motor/Trophic:** Evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)

- There is no other diagnosis that better explains the signs and symptoms

1. Harden et al. *Pain Med* 2007

Now What?

- You are likely dealing with a very complex problem
- Referral to a pain management specialist with access to multidisciplinary / multimodality tx options desirable
- Aim is to maintain mobility, not immobilization

Key Points about CRPS

- CRPS requires a multidisciplinary approach for successful management
- Pharmacologic management and interventional procedures are used on an as-needed, individualized basis and using a stepwise approach
- Main goal of these therapies is to provide some degree of analgesia that will allow the patient to tolerate graded activity and mobilization of the affected limb
- Pharmacologic management: may include NSAID's, adjuvants (anticonvulsants, antidepressants, bisphosphonates), topical analgesics, alpha-adrenergic antagonist and corticosteroids
- Prognosis is quite variable - many patients develop long-term dysfunction and long-term disability

Case #4

58 y/o male - pain in the R hand associated with locking of the ring finger for the last 4-5 months
Denies any trauma or redness / hand has swollen occasionally

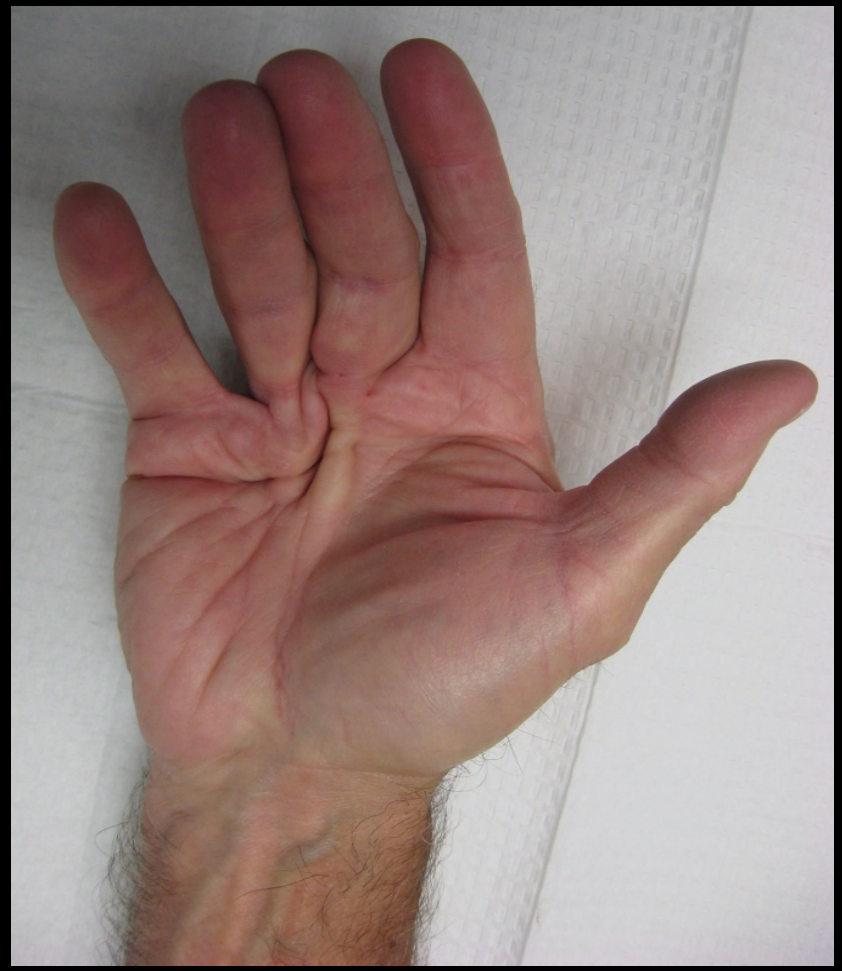
- PMH: DM type 2, HTN, mild obesity
- Inspection – calluses along several MCP joints (palmar surface)
- No open wounds / no signs of inflammation
- Sensation is normal / able to make a strong fist B: full AROM
- Slight tenderness at the base of R ring finger (over the MCP joint)
- You ask him to actively make a fist and open the hand while you palpate the tender area - slight snapping and feel a small nodule

So What Do You Do Now?

What could this be?

- Trigger Finger
- Dupuytren's Disease
- Diabetic Cheiroarthropathy
- MCP joint sprain or arthritis
- Non-infectious tenosynovitis

He shows you the hand and it looks like this..

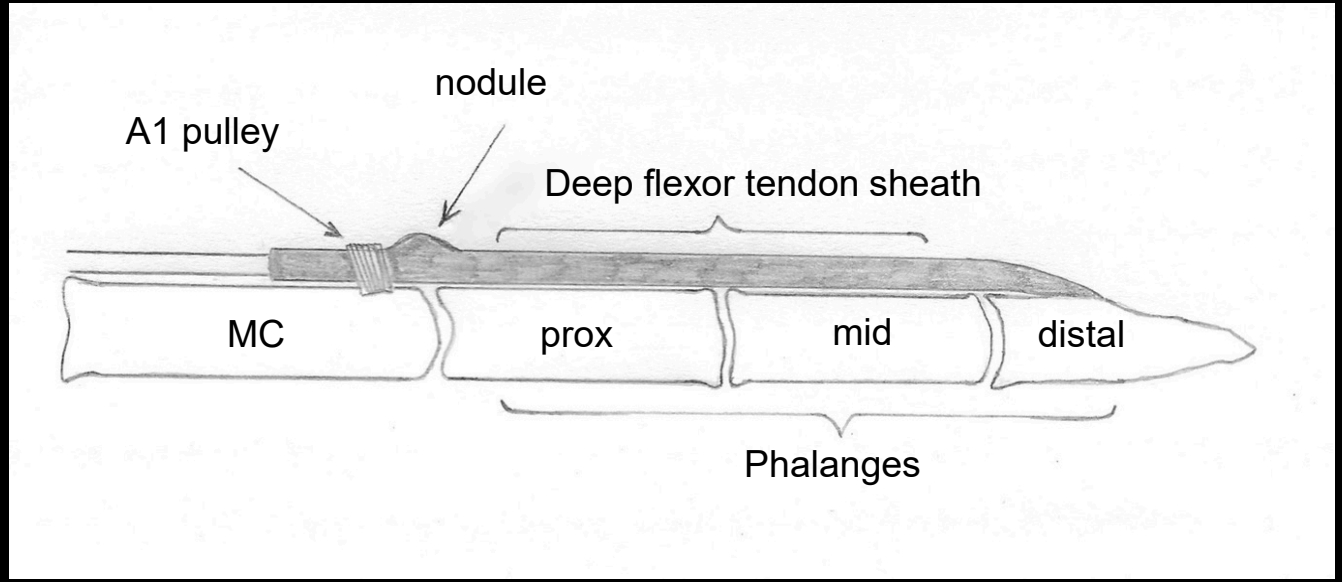


but that would be too easy….

So Let's Think This Through…

So why not:

- Diabetic Cheiroarthropathy
  - Diabetic + but type 2; no numbness, localized, unilateral, pain, fingers not swollen
- MCP joint sprain or arthritis
  - Tender over MCP +; no trauma
- Non-infectious tenosynovitis
  - no signs of inflammation/no redness
- Dupuytren's Disease
  - DM+; EtOH?; pain; may start as tender palpable nodule
- Trigger Finger
  - Sounds like it; dynamic snapping contracture; common/+painful


nodule
A1 pulley
Deep flexor tendon sheath
MC
prox
mid
distal
Phalanges

Key Points

- Trigger finger:
  - one of the most common adult hand painful conditions
  - may cause a finger flexion “contracture” that is dynamic and corrected versus Dupuytren’s Disease that causes a true flexion contracture that cannot be manually corrected
- Conservative care tends to be beneficial for trigger finger but less so for Dupuytren’s disease. Both conditions may require invasive and surgical management for correction

Case #5

- 27 y/o female - reports episodic hand discoloration and pain in the fingers for the last 6-8 weeks; getting progressively worse
- describes that her fingers get very white for 15 to 30 minutes followed by turning beefy red, throbbing and swelling
- PMH: occasional knee swelling but otherwise unremarkable; Uses no medications except birth control pills

So What Do You Do Now?

- Does the patient have systemic problem causing all her symptoms?
- Is there a vascular problem possibly causing intermittent circulatory impairment to the hands?
- What additional physical exam tests could we perform in order to formulate a presumptive diagnosis?
- Should we order any imaging or laboratory tests to better evaluate this patient?

Exam

- Hands have normal color but the tips of her left middle and index fingers are very dry and slightly pitted
- Ulnar and radial pulses are normal
- Capillary refill in all fingers (except thumbs) is very sluggish
- Some of her MCP and PIP joints are tender to palpation
- Hand sensation appears to be intact
- Grip strength is good but reports some pain at some MCP's when gripping
- Knees appear slightly swollen and warm to the touch

So now what?

- Sluggish cap refill – vascular problem?
- Fingertips dry and pitted – something chronic?
- Tender/painful/inflamed joints in young female-rheumatological?
- NL neuro – less likely neurological

Dead giveaway if hands looked like this….

…… but they don’t

Most likely scenario…

- Patient may be suffering from an underlying connective tissue disorder and that the Raynaud's seen in her case could be secondary to such disorder
- Pattern of joint complaints and findings on exam suggest the possible presence of RA.
- Therefore, imaging studies and laboratory tests (Rheumatoid Factor, ESR, ANA, etc.) along with a referral to a rheumatologist appear to be in order

Key Points

- Raynaud's is a vascular condition that may be idiopathic (primary) or a manifestation of a systemic disease (secondary)
- Secondary Raynaud's - primarily managed by treating the underlying cause and avoiding triggers
- Raynaud's can be very disabling and painful, leading to finger and toe amputations in extreme/severe cases

Lightspring/Shutterstock

Case #6

- 67 y/o woman with insidious-onset deep ache and burning with weakness of her right shoulder over the last 2 weeks
- Rest, ice and acetaminophen have not helped
- Also noticed difficulty lifting her arm and occasional “twitching “ over the deltoid
- Denies other neurological symptom except burning of her thumb
- PMH: right mastectomy and radiation therapy 6 years ago

So What Do You Do Now?

- Examine her:
  - mastectomy scar looks intact with mild hyperpigmentation of skin over her right axilla
  - very mild R arm edema (she reports as chronic/unchanged since shortly after her mastectomy)
  - Spurling's test: negative // negative impingement maneuvers
  - PROM of shoulders is normal; no focal tenderness
  - Strength is 4/5 in shoulder ABduction, elbow flexion, and wrist extension but otherwise intact
  - Decreased sensation to light touch over the deltoid region, lateral forearm, and thumb. Right brachioradialis reflex – absent; other reflexes are normal

And now what?

- Here are the facts:
  - No trauma reported (only remote surgery)
  - No improvement with rest and initial measures
  - "patchy" neurological deficits
    - Burning finger – C6 / median/radial N
    - Decreased sensation over deltoid region, lateral forearm, and thumb
      - Axillary, Lat antebrachial cut, C5-6
    - Absent BR reflex – C6 / radial
    - Decreased strength in shoulder Abduction (C5-6), elbow flexion (C5-6/musculocutaneous, radial), and wrist extension (radial)

So, is there a common theme?

Other Factors

- Denies neck pain and Spurling's test for cervical compression is negative
- Important consideration here:
  - Pain with objective patchy neurological complaints
- Sounds like a neuropathic condition?
  - Compression neuropathy like CTS/axillary?
  - How about a brachial plexopathy?
    - idiopathic, radiation-induced, compression from local mass effect (neoplastic)

What would you do now?

- Plain Films
- PET/CT
- MRI
- EMG/NCS

Differentiating Brachial Plexopathies

	Radiation-Induced	Idiopathic	Neoplastic
Plexus trunk affected	Upper	Upper	Lower
Presenting symptom	Dysesthesia + weakness	Severe pain	Severe pain
Best diagnostic modality	EMG	Exclusion	MRI/PET
Causes	Radiation for breast CA	Physical/emotional stressor	Metastatic breast / lung CA

Key Points

- Radiation-Induced and Idiopathic Brachial Plexitis usually affect the upper trunk
- Neoplastic usually affects the lower trunk
- Radiation-Induced usually presents with dysesthesias and weakness
- Idiopathic and Neoplastic usually presents with intense pain followed by weakness
- Symptoms of Radiation-Induced may not be present for several years (average 6) after the last dose of radiation
- EMG studies may show myokymic discharges, an abnormal spontaneous activity, which can differentiate radiation-induced brachial plexopathy from neoplastic and idiopathic plexopathies

So, what was the point of this exercise?

- Think rationally and algorithmically
- Use a good Hx and focused PE as your main tools
- Look for horses, not zebras
- Testing is only secondary and to confirm / rule out – not to screen and diagnose

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Thanks!