

RADY 401 Case Presentation: Psoriatic Arthritis

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Focused patient history and workup

- 64-year-old female
- History of psoriasis, psoriatic arthritis (diagnosed about 20 yr prior) and stage III melanoma status post excision and interferon treatment
- Presenting to UNC Rheumatology Clinic for routine follow-up
- Her arthritis is currently well-controlled on etanercept (Enbrel) and she reports stable restricted range-of-motion and no new joint pain, swelling or stiffness
 - In the past, she has experienced significant joint pain, swelling and stiffness in both hands, esp. in the mornings

Focused patient history and workup



- Physical exam shows chronic arthritic changes in both hands without evidence of active joint inflammation (“synovitis”) & psoriatic plaques over bilateral elbows
- Previous workup: elevated ESR, CRP during flares; RF & CCP negative; dermatopathology confirmed psoriasis; hand x-rays in x3 over about 10 yrs

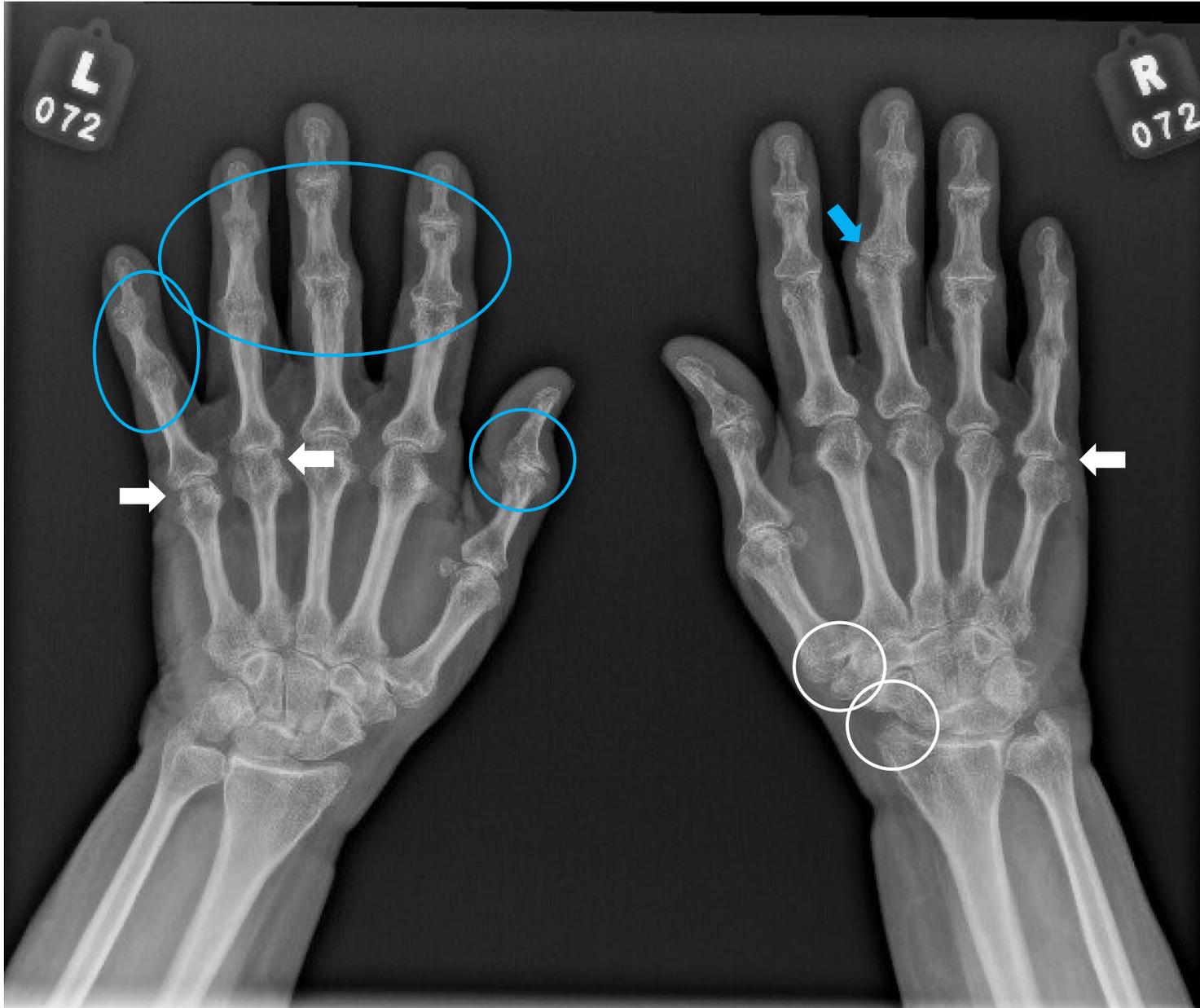
List of imaging studies

- Bilateral hand x-rays
 - Posteroanterior (PA) view
 - Posterior oblique view

Imaging studies: Bilateral hand x-rays (PA view)



Imaging studies: Bilateral hand x-rays (PA view)



Multifocal proximal and distal interphalangeal (PIP, DIP) joint narrowing & osseous overgrowth/fusion (blue circles)

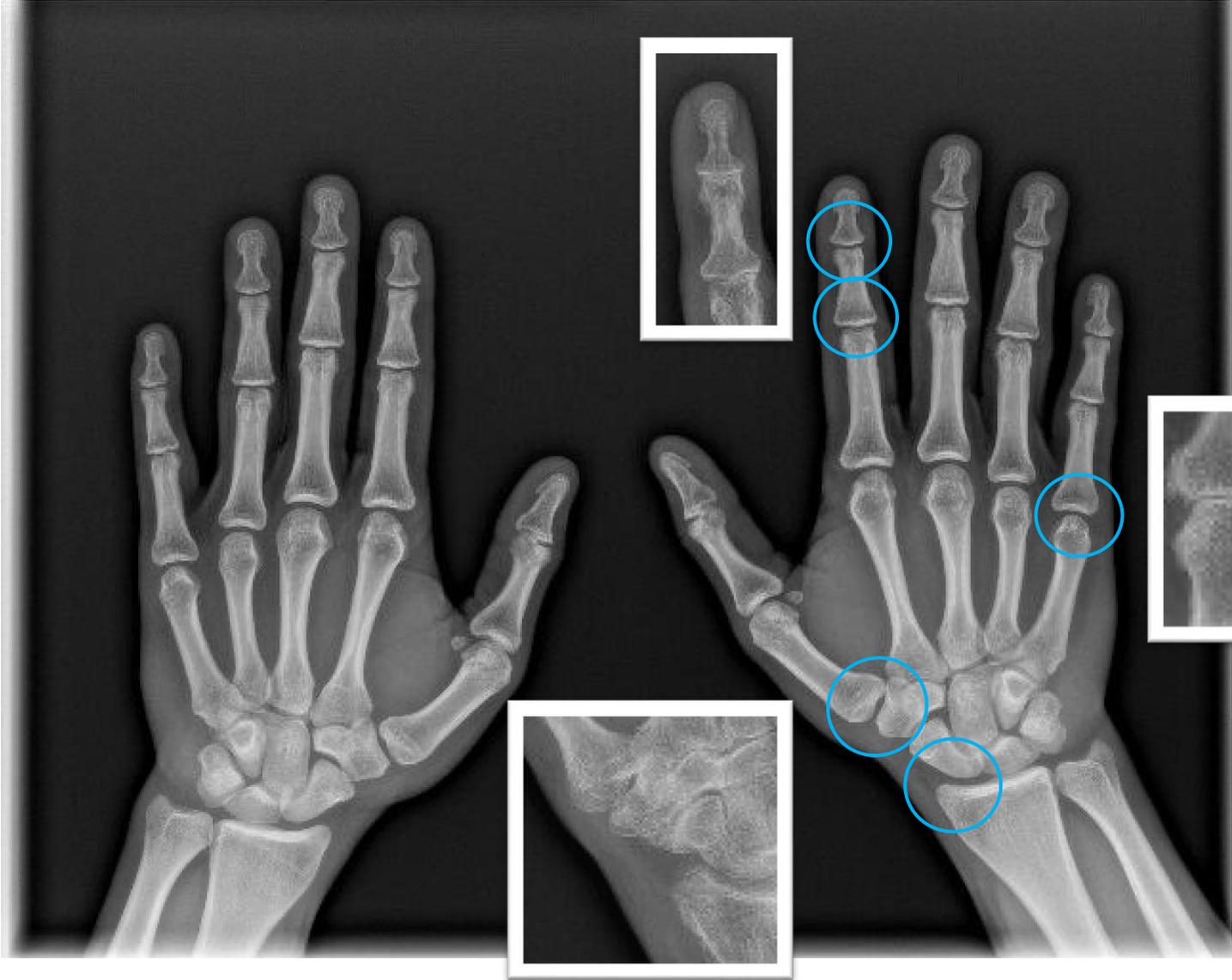
Medial subluxation of the right 3rd PIP joint (blue arrow)

Multifocal metacarpophalangeal (MCP) joint space narrowing and osseous overgrowth, especially at the right 5th and left 4th-5th MCPs (white arrows)

Intercarpal narrowing and new bone formation, especially at the right radial styloid process and right trapezium (white circles)

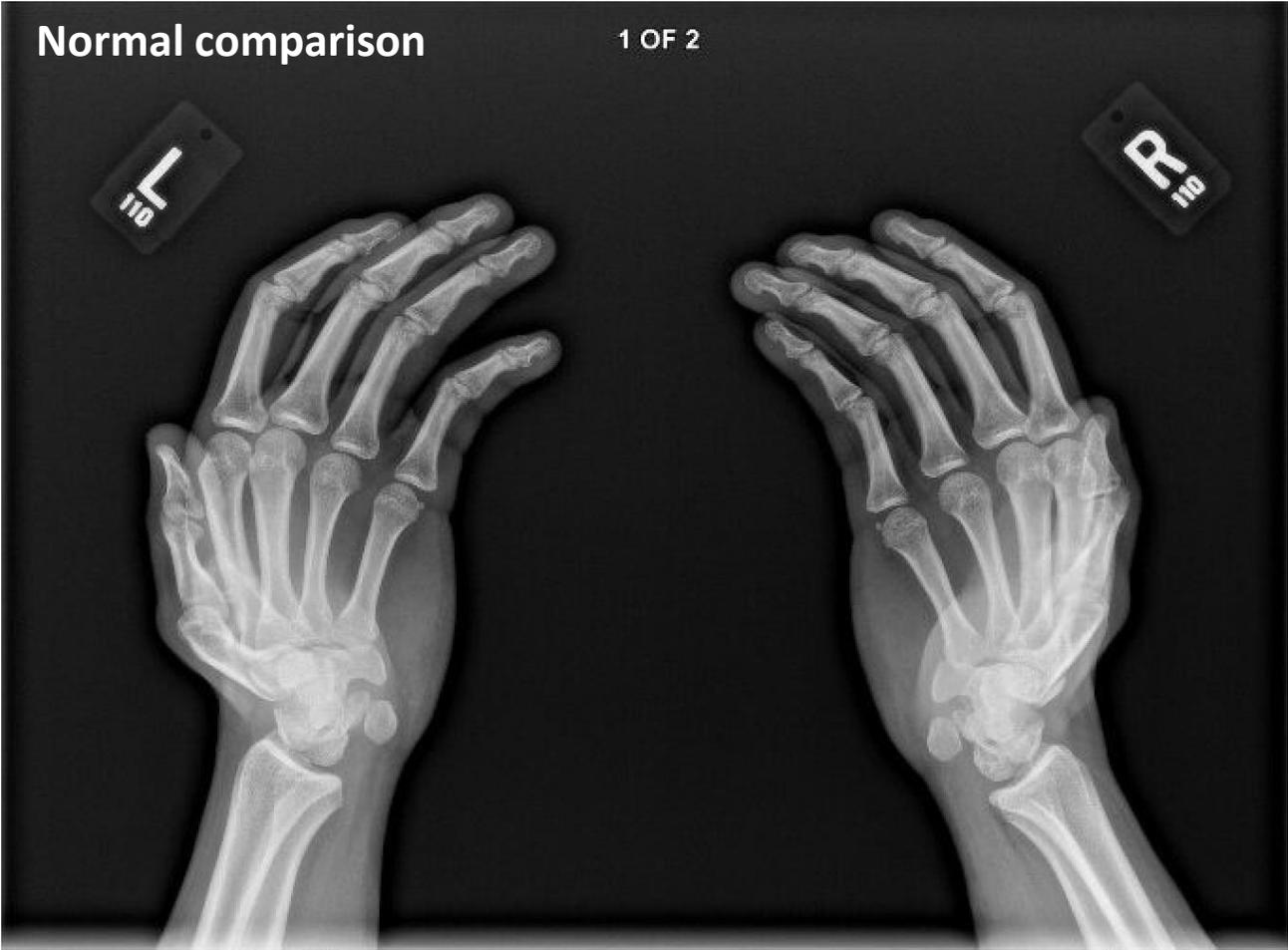
Multiple interphalangeal joint effusions

Imaging studies: Bilateral hand x-rays (PA view) normal compare



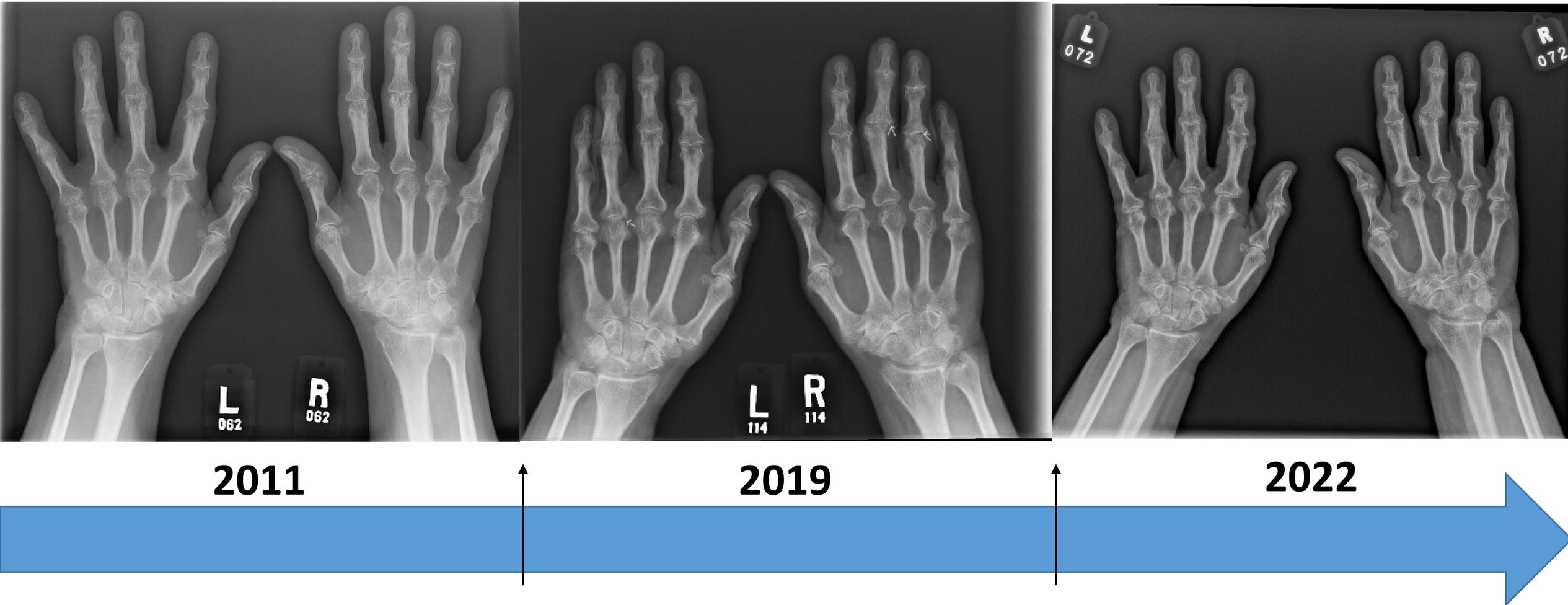
- Joint spaces are preserved
- No bone erosions, osseous overgrowth or joint fusions
- No joint effusions or soft tissue swelling

Imaging studies: Bilateral hand x-rays (Posterior oblique view)



Similar findings to PA view: multifocal joint narrowing and osseous overgrowth typical of psoriatic arthritis

Radiographic disease progression from 2011-Present



Radiographic disease progression from 2011-Present



2011

2019

2022

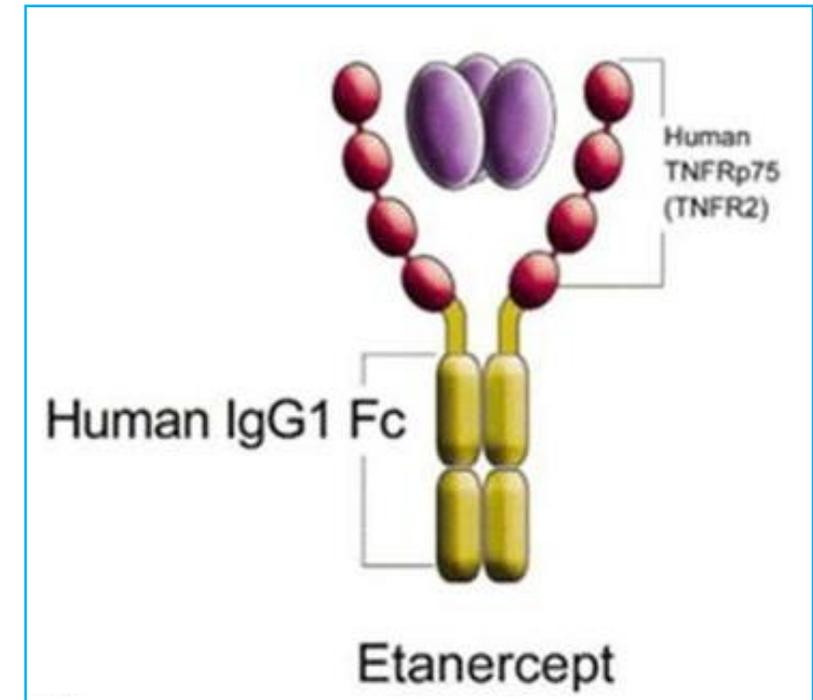
Progressive narrowing and erosions bilaterally, especially in the right 3rd and 4th digits – correlates with inconsistent biologic treatment due to melanoma diagnosis

No progressive joint space narrowing or erosions, suggesting minimal active inflammation

Patient treatment

- Treated with etanercept (Enbrel) since 2013 with significant symptom relief
- Recent hand radiographs (2022) show no progression of erosive disease compared to prior hand radiographs (2019)
- History and physical examination do not suggest active inflammation
- Plan is to continue etanercept, with routine Rheumatology and Dermatology follow-up

Biologic inhibitor of tumor necrosis factor (TNF)



Imaging discussion: Plain radiographs in psoriatic arthritis

- First line imaging study for psoriatic arthritis
 - Establish baseline (how much existing joint damage is present?)
 - Monitor progression of joint disease
- Standard hand views: PA & Norgaard/posterior oblique/ball-catcher (better at demonstrating joint erosions)
- Decent specificity, but low sensitivity for detecting structural bone damage (0.88 and 0.48, respectively)

Imaging discussion: Plain radiographs in psoriatic arthritis

- Not useful for identifying *active* inflammation in joints or soft tissues
 - May see non-specific soft tissue swelling or large joint effusions but not synovitis, enthesitis, etc.
 - Mostly shows chronic / irreversible changes from prior inflammation
- Fast, feasible, and relatively inexpensive (\$100-\$400)
- Minimal effective radiation dose, especially for extremity films
 - Extremity x-ray: 0.0001 mSv (3 hours natural background radiation)
 - Spinal x-ray 1.5 mSv (6 months natural background radiation)

Plain radiographs can demonstrate the heterogeneity of psoriatic joint disease

- Various psoriatic arthritis “phenotypes”:
 - Symmetric polyarthritis (“rheumatoid arthritis-like”)
 - Distal arthritis (predominately DIP joints)
 - Asymmetric oligo- or mono-arthritis
 - Arthritis mutilans (marked osteolysis)
 - Axial disease (sacroiliitis, “ankylosing spondylitis-like”)
- Bone/joint changes are characterized by erosions, osteolysis, and new bone formation
 - Osteolysis can lead to the classic “pencil-in-cup” deformity
- Psoriatic arthritis can also have an array of extra-articular manifestations (e.g., rash, enthesitis, plantar fasciitis, tendonitis, uveitis, fingernail disease, etc.)

Plain radiographs can demonstrate the heterogeneity of psoriatic joint disease

Arthritis Mutilans w/ "pencil-in-cup"



Polyarthrititis (case patient)



Sacroiliitis

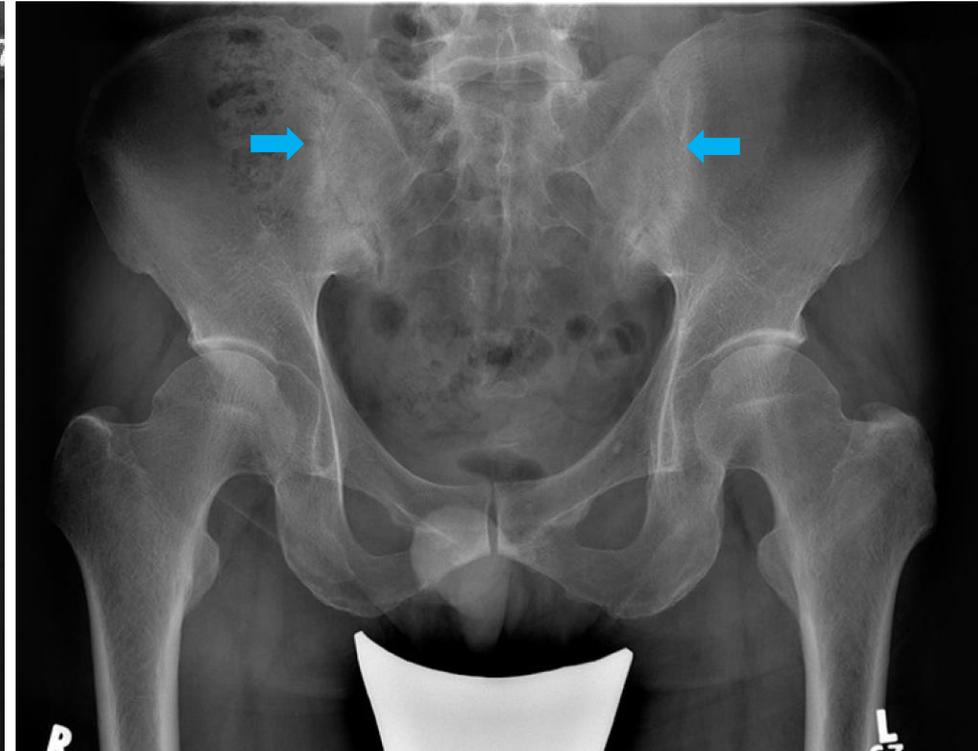


Image Sources (Left to Right): 1) Bell et al. (2011) *The Journal of Rheumatology*, 2) UNC Health Epic, 3) Dafna and Ritchlin (Updated 2022) *UpToDate*

**American College of Radiology
ACR Appropriateness Criteria®
Chronic Extremity Joint Pain–Suspected Inflammatory Arthritis**

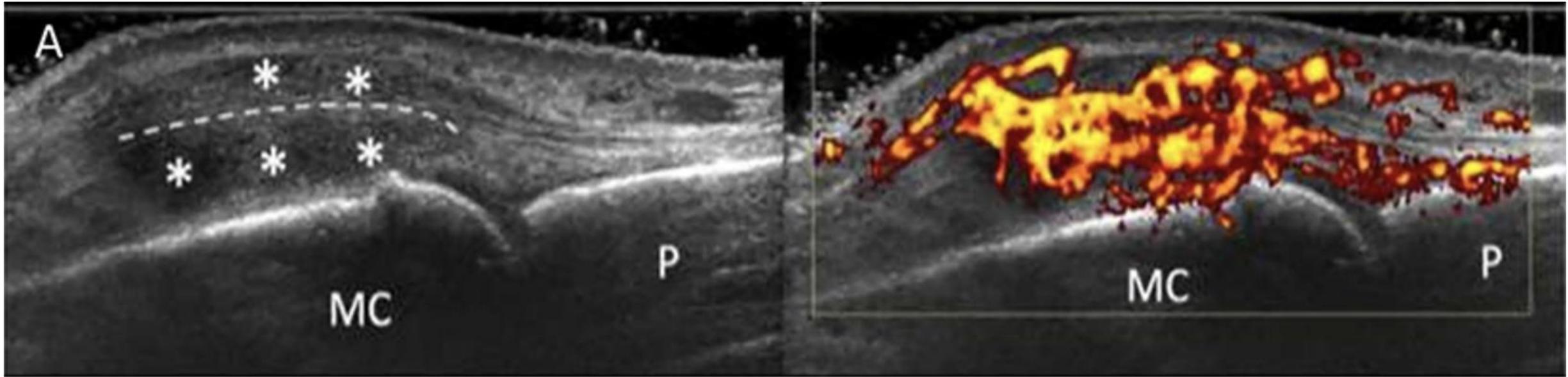
Variant 2: Chronic extremity joint pain. Suspect seronegative spondyloarthritis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray appendicular skeleton area of interest	9	This procedure is the initial imaging method.	⊕
MRI appendicular skeleton area of interest without and with IV contrast	7	This procedure complements x-ray.	○
US appendicular skeleton area of interest	7	This procedure complements x-ray.	○
MRI appendicular skeleton area of interest without IV contrast	6		○
CT appendicular skeleton area of interest without IV contrast	4		Varies
CT appendicular skeleton area of interest with IV contrast	3		Varies
FDG-PET/CT whole body	2		⊕⊕⊕⊕
CT appendicular skeleton area of interest without and with IV contrast	1		Varies
Bone scan whole body	1		⊕⊕⊕
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Ultrasonography for assessing psoriatic arthritis

- High sensitivity compared to radiography
- Especially useful for assessing *current joint inflammation* (i.e., synovitis)
 - 2x sensitivity of U/S vs. physical examination for detecting synovitis in the hands
 - Can identify “sub-clinical synovitis”
- Can also identify extra-articular manifestations (e.g., tendon thickening, tenosynovitis, enthesitis)
- Pros: No ionizing radiation, relatively inexpensive
- Cons: Highly operator-dependent, requires provider training in MSK U/S, scanning multiple small joints takes time

MSK Ultrasound - longitudinal view through a metacarpophalangeal joint with synovitis



- Left image: Gray scale thickening (*) between MCP joint and extensor tendon (dotted line)
- Right image: Increased power Doppler signal indicating hypervascularity, consistent with active synovitis
- Source: Dubash et al. (2020) “Ultrasound Imaging in Psoriatic Arthritis: What Have We Learnt in the Last Five Years?” *Frontiers in Medicine*, Vol 7.

Utility of MRI in psoriatic arthritis

- Demonstrates active inflammatory lesions *and* chronic structural damage
- Evaluates peripheral and axial joints as well as soft tissues (entheses, ligaments, tendons)
- Useful tool for detecting *early* inflammatory disease not visible on x-ray
 - Especially good for early sacroiliitis
- Pros: No ionizing radiation, highly sensitive
- Cons: Takes time, expensive (>\$2K)

Example MRI from a patient with 9 months of inflammatory back pain and elevated CRP



- Coronal T1 MRI of sacroiliac joints demonstrating early sacroiliitis
- Erosive changes in sacroiliac joints (arrowheads)
- Bone marrow edema indicative of inflammatory changes (arrows)

Source: Pedersen et al. "The diagnostic utility of MRI in spondyloarthritis." *Best Practice & Research Clinical Rheumatology*. 2012;26(6):751-766.

UNC Top Three: Psoriatic Arthritis Fill in the Gaps

1. Psoriatic arthritis is a

should be the **first line of imaging** for affected joints to evaluate for erosive changes and track progression

can be used as **adjuncts to radiography** in assessing for active inflammation, early disease, and/or soft tissue involvement

UNC Top Three: Psoriatic Arthritis



1. Psoriatic arthritis is a **heterogeneous, progressive disease** characterized by **diverse clinical features** (i.e., various patterns of joint involvement and extra-articular manifestations)
2. **Plain radiographs** should be the **first line of imaging** for affected joints to evaluate for erosive changes and track progression
3. **Ultrasonography** and **MRI** can be used as **adjuncts to radiography** in assessing for active inflammation, early disease, and/or soft tissue involvement

References

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