

# AMSER Case of the Month

## November 2021

46-year-old male presents with increasing pain  
and swelling in hand



Alexander Conezio MS-3, Lake Erie College of Osteopathic Medicine



Sathya Ram PGY4, MD, Allegheny Health Network

William Peterson, MD, Allegheny Health Network

Jason Long, MD, Allegheny Health Network



# Patient Presentation

- HPI: 3 weeks prior, patient hit hand off bed rail. Pain continued even after immobilization, rest, and pain meds. He now presents with increasing pain and swelling.
- PMHx: Depression, Anxiety
- PSHx: Non-Recent Bilateral Carpal Tunnel Release
- Vitals: 134/81, 97.3 F, HR 80, SpO2 99%
- Physical Exam: Stiffness and swelling in right wrist and hand radiating to forearm

What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

## Variant 1:

**Acute blunt or penetrating trauma to the hand or wrist. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
Radiography area of interest	Usually Appropriate	Varies
CT area of interest with IV contrast	Usually Not Appropriate	Varies
CT area of interest without and with IV contrast	Usually Not Appropriate	Varies
CT area of interest without IV contrast	Usually Not Appropriate	Varies
MRI area of interest without and with IV contrast	Usually Not Appropriate	0
MRI area of interest without IV contrast	Usually Not Appropriate	0
Bone scan area of interest	Usually Not Appropriate	⊕⊕⊕
US area of interest	Usually Not Appropriate	0

This imaging modality was ordered by the physician



# X-rays 3/25/21



No abnormalities noted

# X-ray PA Unilateral 4/10/21 (unlabeled)



# X-ray PA Unilateral 4/10/21 (labeled)



Interval new diffuse soft tissue swelling  
throughout hand

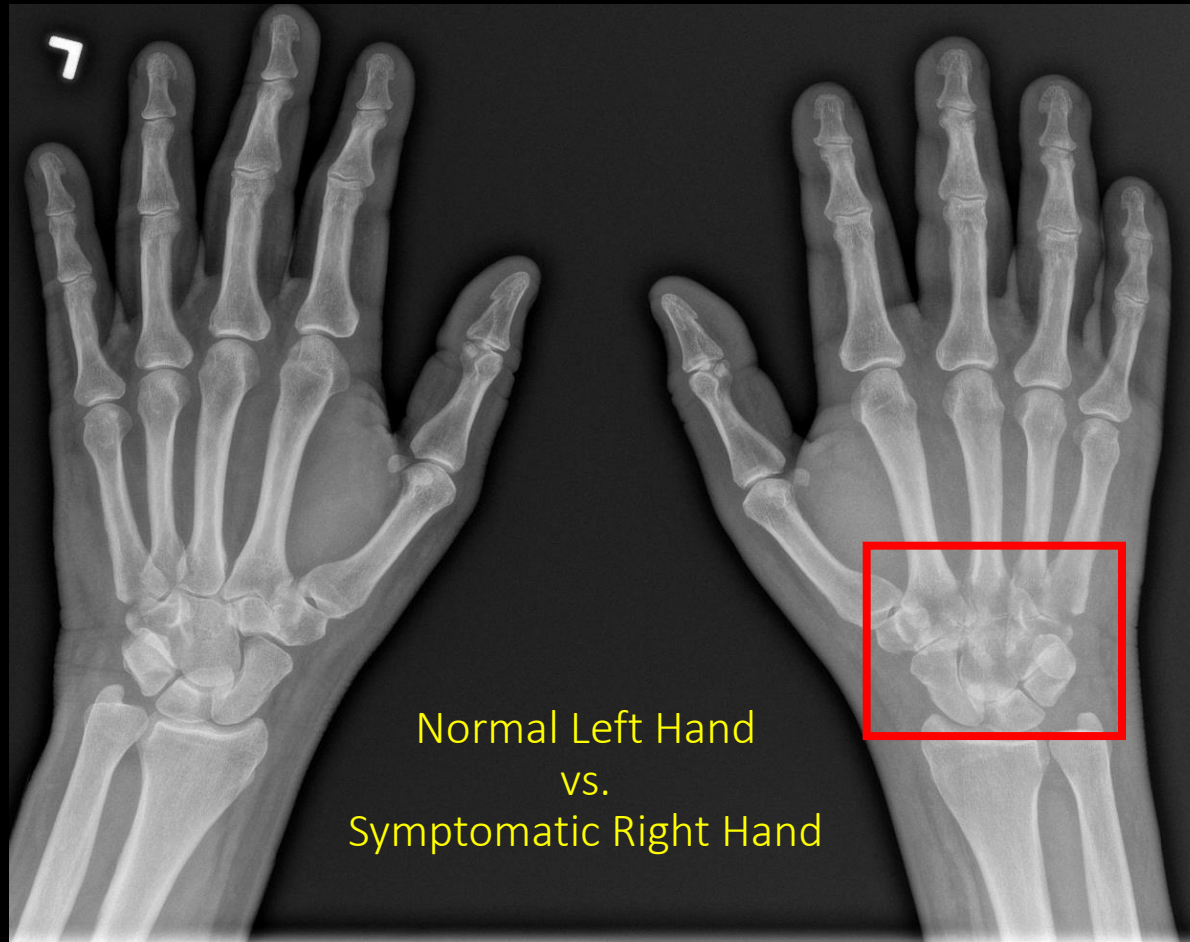
Interval new periarticular osteopenia

# X-ray Bilateral 4/10/21 (unlabeled)





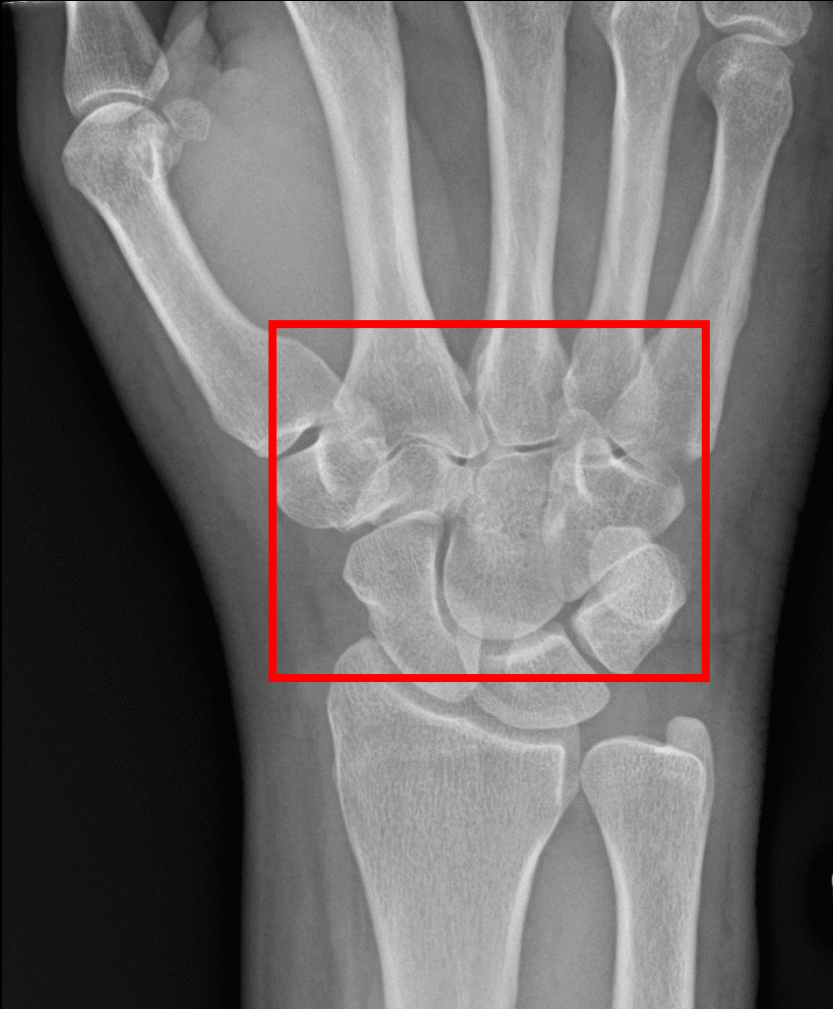
# X-ray Bilateral 4/10/21 (labeled)



# X-ray Comparison: 3/25/21 vs. 4/10/21 (unlabeled)



# X-ray Comparison: 3/25/21 vs. 4/10/21 (labeled)



Note the stark differences  
especially between the  
carpals/metacarpals



# Select the applicable ACR Appropriateness Criteria

**Variant 2:** Suspect acute hand or wrist trauma. Initial radiographs negative or equivocal. Next imaging study.

Procedure	Appropriateness Category	Relative Radiation Level
MRI area of interest without IV contrast	Usually Appropriate	0
Radiography area of interest repeat in 10-14 days	Usually Appropriate	Varies
CT area of interest without IV contrast	Usually Appropriate	Varies
CT area of interest with IV contrast	Usually Not Appropriate	Varies
CT area of interest without and with IV contrast	Usually Not Appropriate	Varies
MRI area of interest without and with IV contrast	Usually Not Appropriate	0
Bone scan area of interest	Usually Not Appropriate	☼☼☼
US area of interest	Usually Not Appropriate	0

This imaging modality was ordered by the physician



# CT Coronal MPR (unlabeled)



# CT Coronal MPR (labeled)



Widespread Periarticular Osteopenia and Subperiosteal Bone Resorption

## PA X-ray vs. CT Coronal MPR



Final Dx:

Complex Regional Pain Syndrome (CRPS)



# Case Discussion (1-3 slides)

- Epidemiology:
  - Typically females > males in their 40s-50s
  - Most commonly from trauma: crush injuries, fractures, sprains, surgery
    - Many cases are idiopathic, however
  - Associated with history of psychological factors such as anxiety
- Pathophysiology
  - Multi-factorial
    - Initial Inflammatory Response: Proinflammatory Neuropeptides & Cytokines
      - Warm edematous skin
    - Peripheral & Central Nociceptive Sensitization: Bradykinin & Substance P
      - Hyperalgesia & Allodynia
    - Altered Sympathetics: Catecholamine Hypersensitivity
      - Cool & clammy skin

# Case Discussion (1-3 slides)

- Classic Presentation
  - Seen 4-6 weeks post-trauma
  - “Warm” CRPS → Acute
  - “Cold” CRPS → Chronic
  - Can be Type 1 (no nerve lesion) or Type 2 (nerve lesion)
  - Symptoms:
    - Sensory: Hyperalgesia, Allodynia
    - Vasomotor: Tissue Texture & Color Changes
    - Sudomotor/Edema: Edema, Abnormal Sweating
    - Motor/Trophic: Decreased ROM, Motor Dysfunction

# Case Discussion

- **Diagnostics:**
  - **Budapest Criteria: MUST HAVE ALL 4**
    1. Persistent disproportionate pain to initial injury
    2. At least **1** symptom in **3** of the 4 categories reported by **PATIENT**: sensory, vasomotor, sudomotor/edema, motor/trophic
    3. At least **1** symptom in **2** of the 4 categories assessed by **PHYSICIAN**: sensory, vasomotor, sudomotor/edema, motor/trophic
    4. Exclusion of other differentials (infection, neuropathy, etc.)
  - **Imaging:**
    - X-ray: Patchy demineralization & subperiosteal bone resorption w/ joint space preserved
    - CT: “Focal areas of osteoporosis in a Swiss cheese-like appearance”
    - Bone Scintigraphy: ↑ radiotracer uptake during all 3 (especially mineralization) phases

# Case Discussion

- Treatment Modalities

- Therapy 1<sup>st</sup> line

- PT/OT

- Mirror Visual Feedback Therapy: describe limb with eyes closed and then observe in mirror
      - Graded exposure to problematic/feared activities
      - Range of Motion exercises

- Medical

- NSAIDs/Glucocorticoids
    - Bone Resorption Inhibitors

- Psychotherapy

- CBT

# References:

- American College of Radiology ACR Appropriateness Criteria Radiologic Management of Hand/Wrist Trauma. <https://acsearch.acr.org/list>
- Jamsek, Jan et al. “Complex Regional Pain Syndrome Reference Article.” <https://radiopaedia.org/articles/complex-regional-pain-syndrome?lang=us>
- Rand S, Rand BS, Rand KS, Rand. Complex Regional Pain Syndrome: Current Diagnostic and Treatment Considerations. (2019) Current sports medicine reports. [https://journals.lww.com/acsm-csmr/Fulltext/2019/09000/Complex\\_Regional\\_Pain\\_Syndrome\\_Current\\_Diagnostic.8.aspx](https://journals.lww.com/acsm-csmr/Fulltext/2019/09000/Complex_Regional_Pain_Syndrome_Current_Diagnostic.8.aspx)
- *UpToDate*. <https://www.uptodate.com/contents/complex-regional-pain-syndrome-in-adults-pathogenesis-clinical-manifestations-and-diagnosis>