Radiology Review of Neuromusculoskeletal Conditions
Upper Extremity

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Case 1 – 41F, shoulder pain

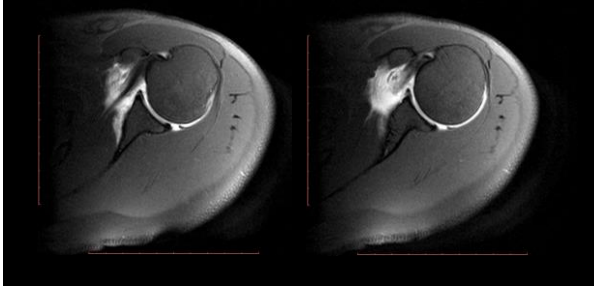
A 41-year-old female presents complaining of shoulder pain after lifting a somewhat heavy box. She was cleaning the garage and was trying to lift something overhead when she had to make a quick motion with her left arm.

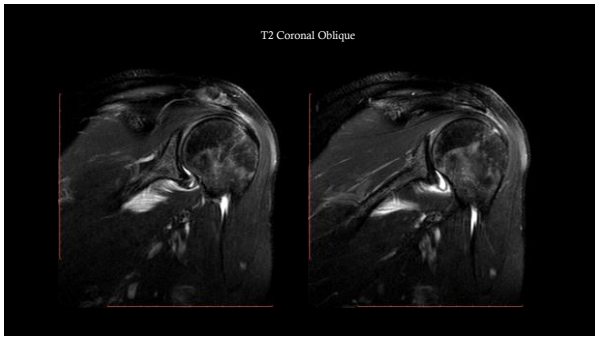
Neer's/Hawkin's, empty can, and drop arm tests were all positive. Shoulder range of motion was decreased and revealed pain in all motions, but especially in flexion and abduction.

Neurologic examination was unremarkable.

The patient was referred for a radiograph and an MRI arthrogram.

T1 FS Axial





Supraspinatus rim rent tear

- Partial thickness tear of the tendinous insertion of the supraspinatus tendon at the greater tuberosity of the humerus
  - Specifically the inferior fibers
  - Up to 70% of partial thickness tears (Vinson, Helms, and Higgins, 2007)
- Tears are a common injury to the shoulder
  - Chronic and degenerative tears are more common than acute ones
    - Often occurring at the "critical zone"
  - Impingement may contribute to development (of all types of tears)
- Assessment
  - Rotator cuff orthopedic tests

Supraspinatus rim rent tear – Radiographic findings

- Radiographs
  - With degenerative full thickness tears, there may be elevation of the humerus
- MRI
  - Full thickness tears (up to 100% sensitivity)
    - Disruption of the tendon with high signal fluid gap
    - With or without retraction
  - Partial thickness tears (35-92% sensitivity)
    - High signal within the tendon
      - Intermediate signal within the tendon often is myxoid degeneration
    - Rim-rent – progressive "peeling back" of the inferior fibers of the supraspinatus tendon insertion from the greater tuberosity

Supraspinatus rim rent tear

- Treatment
  - Conservative management (often in partial or degenerative tears)
    - Physiotherapy
      - ROM, strengthening exercises, stabilization exercises
    - Intra-articular corticosteroids injections
  - Surgical (in full tears or moderate-severe disability)
    - Debridement
    - Rotator cuff reattachment or repair

References

- Thorsness R, Romeo A. Massive rotator cuff tears: trends in surgical management. *Orthopedics*. 2016; 39(3): 145-51.
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Case 2 – 24M, finger pain and mass

A 24-year-old male presents complaining of mild finger pain and hard growth that is unresponsive to care.

The patient states that he hurt his finger playing hockey in college (>3y ago) but didn't notice any residual issues from it until now.

Palpation of the growth reveals mild discomfort of the bony-like mass.

The digit has mild reduction in flexion with mild pain.

Ossified growth – Heterotopic Ossification vs BPOP

- Heterotopic ossification (myositis ossificans) is the primary diagnosis in this case
  - Fits the history of trauma
- Bizarre parosteal osteochondromatous proliferation (Nora lesion) was a differential though it does not quite fit the imaging findings

Ossified growth – Heterotopic Ossification vs BPOP

- Heterotopic ossification (HO)
  - A self-limiting process of ossification of soft tissues (commonly muscle) with associated inflammation
  - Often as a result of trauma (acute or cumulative), surgery, burns, neurologic injury, or disease
    - The pathogenesis is poorly understood but involves endothelial mesenchymal transition in response to inflammation
  - Common location is the quadriceps musculature of the thigh
  - Clinical presentation
    - Pain and swelling, may reduce motion

Ossified growth – Heterotopic Ossification vs BPOP

- Heterotopic ossification (HO)
  - Treatment
    - Non-surgical – minimizing inflammation, maintaining range of motion
    - Surgical – resection (in lesions that have failed conservative management)
  - Differential
    - Early stage lesions resemble an abscess or soft tissue sarcoma
      - Early biopsy can show sarcoma-like appearance
    - Later stage lesions resemble an osteosarcoma
      - Imaging of HO may reveal outside-in ossification vs outside-in of osteosarcoma
    - Nora lesion
    - Melorheostosis

Ossified growth – Heterotopic Ossification vs BPOP

- Bizarre parosteal osteochondromatous proliferation (Nora lesion)
  - Rare benign parosteal osseous mass
    - No malignant potential
  - Often occurs in the small bones of the hands and feet
  - The lesion will be continuous with the cortex but not the medullary cavity
    - Unlike an osteochondroma
  - Because of bizarre imaging findings and histology, it may resemble a malignant tumor
  - Surgical treatment of symptomatic lesions have high rates of recurrence
    - Wide surgical margins and de-cortication of the parent bone help to reduce recurrence

References

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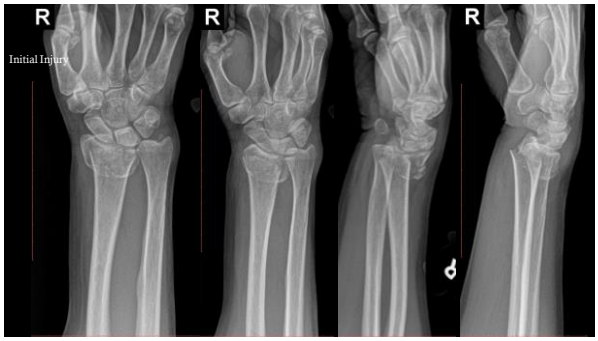
- Sferopoulos NK, Kotakidou R, Petropoulos AS. Myositis ossification in children: a review. *Eur J Orthop Surg Traumatol.* 2017; 27: 491-502.
- Simon T, et al. Myositis ossificans traumatica (circumscripta) and return to sport: A retrospective series of 19 cases. *Joint Bone Spine.* 2016; http://dx.doi.org/10.1016/j.jbspin.2015.07.013.
- Matsui Y, et al. Bizarre parosteal osteochondromatous proliferation (Nora's lesion) affecting the distal end of the ulna: a case report. *BMC Musculoskeletal Disorders.* 2016; 17:130.
- Pal JN, Kar M, Hazra S, Basu A. Differential diagnosis of BPOP arising in relation to patella. *Journal of Orthopaedic Case Reports.* 2015; 5(4): 3-6.
- Walczak BE, Johnson CN, Howe BM. Myositis ossificans. *J Am Acad Orthop Surg.* 2015; 23: 612-22.

Case 3 – 57F, slip and fall

A 57-year-old female presents with wrist pain after a slip and fall on ice. She landed on her outstretched right hand. There was clear volar angulation of her hand with a bulge in the dorsal aspect of the wrist.

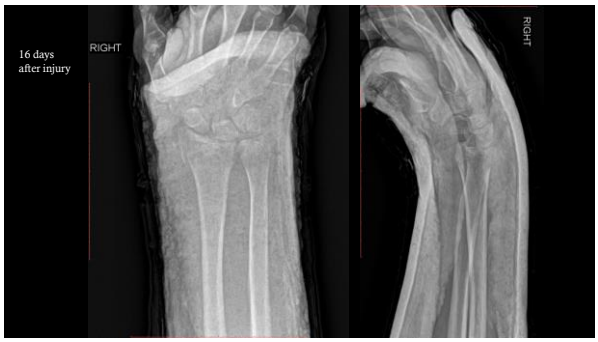
Radiographs were ordered to confirm fracture.



Case 3 – 57F, slip and fall

This patient was being co-managed with the orthopedist and still presented to her normal chiropractic appointment.

She brought in her new imaging performed between appointments.



Colles fracture

- Transverse metaphyseal fracture of the distal radius
  - With dorsal angulation of the distal fragment
  - May have an associate ulnar styloid process fracture (avulsion by the triangular fibrocartilage)
  - Often associated with osteoporosis (most commonly in >40y, F>M)
- Mechanism – fall on an outstretched hand

Colles fracture

- Treatment
  - Aimed at restoring normal anatomic relationship of the distal radius
    - If normal osseous morphology is not restored, functional deficits and accelerated degenerative changes may occur
      - Especially in nonunion
  - Conservative
    - Fracture reduction and casting stabilization
      - May have subsequent malunion (re-imaging in 7-14 day post cast application to assess for this complication)
  - Surgical options
    - Percutaneous pinning, external fixation

References

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- Kvernmo HD, Krukhaug Y. Treatment of distal radius fractures. *Tidsskr Nor Legeforen*. 2013; 133(4): 405-10.
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