AMSER Case of the Month
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10 y/o female with intermittent bilateral ulnar wrist pain

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History of Present Illness: 10 y/o female presents with 4 months of bilateral ulnar wrist pain described as stabbing and intermittent. The pain is aggravated with overuse of the hands such as holding a pencil and relieved with rest.

Past Medical History: No past medical history. No prior upper extremity surgery or injury. No medications.

Focused Physical Exam: Bony deformities noted on both ulnar wrists, which are tender to palpation over the ulnar styloid. Able to make fist, okay sign, thumbs up, perform thumb opposition and crossover maneuver of the index and middle finger. 5/5 APB and intrinsic muscle strength testing. Brisk capillary refill and sensation intact to all digits distally and bilaterally. Wrist extension/flexion, forearm pronation, and ulnar/radial deviation are intact. Supination limited.
What Imaging Should We Order?
Initially evaluated with wrist radiographs.

Subsequently evaluated with non-contrast CT for surgical planning.

### ACR Appropriateness Criteria

#### Variant 1:

**Chronic wrist pain. With or without prior injury. Best initial study.**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
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<tbody>
<tr>
<td>Radiography wrist</td>
<td>Usually Appropriate</td>
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<tr>
<td>MRI wrist without IV contrast</td>
<td>Usually Not Appropriate</td>
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<td>MRI wrist without and with IV contrast</td>
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<td>MR arthrography wrist</td>
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<td>US wrist</td>
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<td>CT wrist without IV contrast</td>
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<td>Radiographic arthrography wrist</td>
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<td>Bone scan wrist</td>
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Right Wrist Imaging Findings (Unlabelled)

PA X-Ray  Lateral X-Ray  Coronal CT through distal radioulnar joint  Sagittal CT through distal ulna
Left Wrist Imaging Findings (Unlabelled)

- PA X-Ray
- Lateral X-Ray
- Coronal CT through distal radioulnar joint
- Sagittal CT through distal radius
Right Wrist Radiographic Findings (Labelled)

- Dorsal subluxation of distal ulna.
- Palmar displacement of the carpus.
Left Wrist Radiographic Findings (Labelled)

Dorsal subluxation of distal ulna.

Moderate widening of distal radioulnar joint. Ulnar and palmar curvature of distal radius. Neutral ulnar variance.
Right Wrist CT Findings (Labelled)

Coronal CT

- Downsloping of volar-ulnar aspect of distal radial epiphysis/physis with increased radial inclination
- Mild widening of distal radioulnar joint

Sagittal CT

- Dorsal subluxation of distal ulna
- Not pictured: increased volar tilt with apex dorsal bowing of distal radius, neutral ulnar variance
Left Wrist CT Findings (Labelled)

Coronal CT
- Downsloping of volar-ulnar aspect of distal radial epiphysis/physis with increased radial inclination
- Mild widening of distal radioulnar joint
- Neutral ulnar variance

Sagittal CT
- Increased volar tilt of distal radius with apex dorsal bowing of the distal radius
- Not pictured: dorsal subluxation of distal ulna
Final Diagnosis:

Bilateral congenital Madelung deformity.
Madelung Deformity

Summary: Premature closure of the medial (ulnar) physis of the distal radius leading to dorsal subluxation of the distal ulna, increased distal radioulnar joint (DRUJ) space, and palmar displacement of the carpus.

Common Clinical Features: Prominence of the distal end of the ulna, limitation of supination, and DRUJ incongruity with forearm rotation. Increased wrist pain with activity as well as decreased wrist strength develops later on in adolescence.

Initial Differential Diagnoses: Pseudo-madelung deformity resulting from trauma or infection, Turner’s syndrome, skeletal dysplasia.

Epidemiology: More common in females than males, M:F ratio 4:1

Associated Congenital Conditions: Leri-Weill dyschondrosteosis, Hurler syndrome, Turner syndrome, achondroplasia, Madelung dyschondrosteosis, and Ollier disease. \(^2,4,5\)
Madelung Deformity

Treatment Performed:

Dome Osteotomy of the distal radius to restore the inclination of the distal articular surface of the radius to within normal limits (i.e. 22°-23° on the anteroposterior view and 10°-11° on the lateral projection)²

Intraoperative fluoroscopic image of a dome osteotomy performed on the 10 y/o female identified in the case
References:


