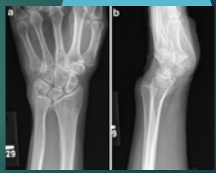
Madelung's Deformity



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Disclosures:

- I am a consultant for Arthrex, Inc
- I am on the Speaker's Bureau for Endo Pharmaceuticals
- I am not receiving any reimbursement for this talk

Introduction:

- Initially Described in 1878 by Otto Madelung
- More common in females than males
- Age of presentation is variable with most patients asymptomatic until adolescents
- Familial Clustering is present

Clinical Presentation

- Typically present with pain in the DRUJ
- Ulnar prominence, at times asymptomatic, can be a presenting complaint
- Often bilateral wrists are involved (74%)
- Hand is typically volar and ulnar to the position of the wrist
- Forearms can appear foreshortened secondary to the position of the carpus on the radius

Pathoanatomy

- Radiographic appearance is that of increased radial and volar inclination of the distal radius epiphysis
- As the deformity progresses, the carpus begins to appear more pyramidal in shape
- Radiographs are the mainstay of diagnosis and the deformity is defined via radiographic changes
- Key structure – Vicker's Ligament

Vickers Ligament

- Described by Vickers and Neilsen in 1992
- Described an abnormal volar carpal ligament tethering the ulnar portion of the distal radial physis
- Origin on the Volar-ulnar radius
- Terminates on the volar lunate
- Compresses physis on the volar ulnar radius
- Leads to the typical subsidence lunate with growth
- Physeal tethering leads to progression of deformity

Vickers, D et al. J Hand Surg Br 1992; 17(4):401-407

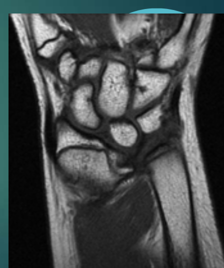
Radiography

- Ulnar Tilt > 33 degrees
- Lunate Subsidence > 4mm
- Lunate Fossa Angle > 40 degrees
- Palmar Carpal displacement > 20mm

McCarrol, HR et al, Madelungs Deformity: Diagnostic thresholds of Radiographic Measurements. J Hand Surg Am. 2010; 35(5):807-812

Other Imaging Modalities

- MRI: Vickers ligament can be visible on MRI
- Role of MRI in diagnosis is unclear
- Mainstay of Diagnosis is via plain radiographs
- MRI can be used for pre-op planning



Treatment

- Conservative therapy –
  - Minor deformity
  - Minimal Pain
  - Orthosis and activity modification
  - Serial radiographs to determine for progression
- We have all seen the incidental finding of mild Madelung's in adult patients when obtaining radiographs for other pathology

Surgical Treatment

- Decision making is based upon
  - Age at presentation
  - Potential Growth
  - Symptoms at Presentation
  - Degree of Deformity
  - Expectations of family and patient

Early Presentation – Mild Deformity

- Observation
- Physiolysis
  - Release of Vickers Ligament
- Physiolysis with Temporary Epiphysiodesis

Early Presentation – Mild Deformity

- Observation
- Physiolysis
  - Pros – Simple operation, quick recovery, limited risk
  - Cons – Variable reported results, very dependent upon growth potential

Early Presentation – Mild Deformity

- Observation
- Physiolysis
  - Release of Vickers Ligament
- Physiolysis with Temporary Epiphysiodesis
  - More technical
  - Implant require removal to "detether the physis"
  - Variable results

Late Presentation – Mild Symptoms

- Ulnar Sided Pain –
  - USO +/- Ulnar Epiphyseodesis
  - Pros: Addresses source of symptoms, can improve appearance of prominent ulna
  - Cons: Timing important esp with high potential for growth, nonunion, does not address anatomic source of deformity

Late Presentation – Moderate to Severe Symptoms

- Dome Osteotomy +/- USO

Dome Osteotomy

Volar Ligament Release and Distal Radius Dome Osteotomy for Correction of Madelung's Deformity

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Dome Osteotomy

- A dome shaped osteotomy is created in the distal radius, concave distal
- A dome is chosen to correct the deformity in three dimensions
- It is fixated by a small plate or percutaneous wires through the styloid
- Prior to correction and osteotomy, Vickers ligament is released
- After fixation of the osteotomy, ulnar sided issues are addressed

Dome Osteotomy

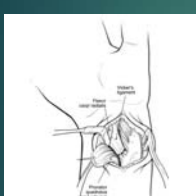

Figure 1. Surgical technique: Vickers' ligament. After ulnar reflection of the pronator quadratus, the abnormal volar radiolunate ligament is visualized and released from the radius with a scalpel.

Figure 2. Surgical technique: radial dome osteotomy. The volar crescent-shaped osteotomy (concave distal) is marked with a K-wire and completed with a fine osteotome. A curved osteotome is used to complete the cut through the cancellous bone of the metaphysis and the dorsal cortex to obtain a dome shape to the distal cut surface.

Dome Osteotomy

- Results:
  - Improvement in pain/appearance
  - Improvement in extension and supination
  - Similar pronation/flexion
  - Radiographic improvement
  - 4 of the 26 required immediate ulnar shortening and 3 more required staged ulnar shortening

Conclusion

- Madelung's deformity has a variable presentation in both age of presentation and severity of symptomatology
- Conservative treatment with serial exam/radiographs is viable
- Treatment should be determined by growth potential and severity of deformity

Madelung's in the Adult

- Symptoms range from none to cosmetic to pain with ADLs
- Treatment is directed at the source of the pain
- Radiocarpal joint – limited to total wrist fusions are the mainstay of treatment
  - Consider radial osteotomy in presence of severe radial sided deformity

Madelung's in the Adult

- Ulnar sided pain –
  - Abuttment - treated with ulnar shortening osteotomy
  - Arthrosis with or without abuttment
    - Case reports of use of semi-constrained implant arthroplasty have been reported with acceptable results
    - Classic treatments include Darrach with limited outcomes

Madelung's in the Adult

- Both radiocarpal and radio-ulnar joints are often symptomatic and should both be addressed
- Differential/diagnostic injections with local can be helpful in preoperative planning
- Reminder – even really bad deformities can be asymptomatic!

Thank You!