The distal radioulnar joint

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The presenter is part owner of
APTIS Medical LLC
Manufacturer and Distributor of
the total DRUJ replacement
prosthesis

Force of Gravity
Axial Loading
The ulna supports the radius actively, here the brachialis is lifting the weight.

and passively, in this case the deltoid is lifting the weight!

Pathologies

- Soft tissue
- Bone
- Combination
Loss of Function of the Distal Radio Ulnar Joint

**Congenital**

- **Madelung deformity**
- The abnormality occurs in individuals under the age of 18, and may result in pain and decreased range of motion.

**Ehlers-Danlos syndrome**

Although it is difficult to estimate the overall frequency of Ehlers-Danlos syndrome, the combined prevalence of all types of this condition may be about 1 in 5000 individuals worldwide.

**Madelung deformity**

The disorder is relatively uncommon, occurring in less than 2% of the general population and in male patients (4:1) compared with female patients. Ehlers-Danlos syndrome

Although it is difficult to estimate the overall frequency of Ehlers-Danlos syndrome, the combined prevalence of all types of this condition may be about 1 in 5000 individuals worldwide.

Inheritance and characteristic features of Madelung deformity in a southern Swedish region

**Loss of Function of the Distal Radio Ulnar Joint**

**Congenital**

- An overall incidence rate of 26 per 10,000 person-years, which did not change substantially when standardized to the Swedish general population. The incidence rate for men aged 15-74 years in Sweden was 14 per 10,000 person-years, which was 14 per 100,000 person-years for men in that age group.

**Degenerative**

Hand OA = 100 per 100,000 person years

An estimated 1.5 million adults had rheumatoid arthritis in 2007.

Distal Radio Ulnar Joint treatment in the 21st century

1. Corrective osteotomy
   - Radius, Ulna or both
   - Shortening Radius or Ulna

2. Ligament reconstruction
   - Dorsal, palmar or both

3. Joint replacement
   - Partial or total

Ulna Shortening for the treatment of early post-traumatic arthritis at the radioulnar joint.

Scheker LR, Severo A

Excellent: 22%
Good: 35%
Fair: 28%
Poor: 15%
The distal radio ulnar joint is an eccentric mechanism that when the points of origin and insertion of the connecting band approximate, the band is loose (d) while when the points' distance is increased the band is under tension (p).

This technique augments the collagen fibers on top of the existing ligaments while allowing healing in a tight manner.
Palmar Ligament Reconstruction

© 1993 CMKI

Both Ligaments Reconstruction

© 1993 CMKI

Procedures performed today

- Darrach: Total resection 1912
- Sauvé-Kapandji: Pseudo-arthrosis 1936
- Bowers: Hemi-resection 1985
- Watson: Matched resection 1986
- Wolfe: Wide excision 1998
No grip strength or lifting capacity was evaluated.

We should not prejudge what we are seeing.

AP view taken on top of the x-ray table.
Until we have the whole picture

X-ray taken while lifting weight in neutral

Radiographic Demonstration of Dynamic Ulnar Impingement

Lees and Scheker
J. Hand Surg. (B) 1997

The elbow is held in 90° holding 5 lbs weight
Sauvé-Kapandji Darrach with tendon stabilization

After wide excision of the distal ulna.

The impingement is just moved to the mid-forearm.

The ulna head is critical for both weight bearing and forearm motion.
When the head of the ulna is lost due to trauma, tumor, arthritis or congenital abnormalities, there is a need to replace it in order to restore forearm function.

The market has the following unipolar unconstrained implants:

- U-head: SBI/Stryker
- Eccentric: Wright Medical
- Herbert: Martin-Medizin-Technik
- Ulnar head implant: Kapp
- First Choice DRUJ: Integra
- Eclypse: Tornier

These implants replace only the head of the ulna. They can be effective if the sigmoid notch is present and the restraining ligaments are competent.
In the market there is a unconstrained bipolar implant.

Stability Sigmoid Notch  SBI
(Requires ligament stabilization)

And two semi-constraint bipolar implants
(Do not require ligament stabilization)

Total DRUJ Replacement Aptis Medical

A New Distal Radioulnar Joint Prosthesis
A. H. Schuurman, MD, PhD

The replacement needs to provide:

1. Intrinsic stability
2. Full pronation/supination
3. Normal radial migration
4. Variable angle of rotation
5. Weight lifting capability

Our experience with APTIS implant

This prosthesis has been implanted in patients with post traumatic, degenerative and inflammatory arthritis, congenital anomalies, post tumor resection and after other failed procedures.
Here are a few cases demonstrating its use and why no other implants were indicated or capable of solving the problems.


There are three major problems:
1. There is not a sigmoid notch present
2. There are not restraining ligaments
3. The ulna is missing length

Reversed radio-ulna synostosis in January 2012

The solution:
1. A radial plate with a distal socket
2. An extended ulna stem
3. A polyethylene ball linking them
Shoulder pain subsided once DRUJ motion was re-established.

Failed Achilles tendon interposition

This is a Madelung deformity

1. Sigmoid notch did not develop.
2. There are no DRUJ stabilizers.
3. The distal ulna has been shortened and is worn down with a pencil tip appearance.

The Achilles tendon, in spite of being well secured, did not prevent contact between the radius and ulna and needed further treatment.
The advantage of the self-stabilizing total DRUJ implant is that it does not require the presence of a sigmoid notch or the triangular fibrocartilage.

2 weeks post op

6 weeks post op
Wide excision of the distal ulna: a multicenter case study
Wolfe SW et al
J Hand Surg Am. 1998

“Nine of the 12 procedures resulted in good or excellent results; 1 patient had a fair result after resection for osteosarcoma, and the procedure in 2 patients failed, requiring conversion to a one-bone forearm.”

DRUJ problems since 1979, from Darrach's procedure to wide excision of distal ulna.

The pain migrated from the distal forearm to mid forearm.
Due to the wide excision of the ulna, a custom made stem was needed. This restored the integrity of the load-distributing system of the forearm.
Able to lift weights in pronation, neutral and supination without pain.

Combination of Sauvé-Kapandji and wide excision of the distal ulna.

No one, but both forearms!
I hope this presentation has illustrated how important the DRUJ and the head of the ulna are to the function of the forearm.

Thank you!