# **Rheumatoid** Arthritis



What it means for your patient's hands

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#### **General Presentation**

1% of the population

- Females 3X as affected as males
- Affecting the wrist,MP, PIP joints, and tendons
- Disease can manifest in a few joints with a self limited course or be global and steadily progressive
- + RF in 80% of patients, non specific

### **Primary Presentation**



More diffuse
"Tendon connected"
Can precede joint involvement by months



#### **Microscopic Features**

- Synovial pannus
   Sheets of histiocytes and fibroblasts, B&T cells
  - Giant cells
  - Secretion of lysosomal enzymes
- Enzymatic tissue degradation (prostaglandin,cytokine, interleukin-1, TNF-α)



#### **Choking off bone and cartilage**

- Hyalin cartilage
   breakdown deprived of synovial nutrition
  - Pressure of pannus on articular cartilage
- Stretch supporting ligaments
- <sup>†</sup>Osteopenia, osteoclasts
- Process irreversible





#### **Joint Destruction**

Osteopenia Chondrolysis Joint instability, subluxation Frank destruction With 6 months 40% have joint erosion and by two years have joint destruction

#### Two years apart



### **Typical Primary appearance**

 Swelling, rash, morning stiffness, pain, generalized fatigue



#### **Medical Treatment**

- Non steroidal anti inflammatories NSAID's (i.e. MOBIC)
- Disease modifying anti rheumatic drugs DMARD's initially given too late now given within 3 months in the disease process to prevent irreversible joint destruction
- Methtrexate, leflunomide, azathioprene,entanercept,infliximab
- Modifies the response to TNF- α, inhibition of clonal B-cell growth and migration,

#### **Non Steroidal anti-inflammatory**



### **Meloxicam in RA**

- By 2002: seven studies with 2500 patients
  - Limited duration 3-12 weeks
  - Significant improvement in joint swelling and subjective assessment of pain and dysfunction
- No change in ESR,CRP, RF
- Effect similar to naproxen750 mg BID

#### **Mobic Long Term in RA**

- Increased withdrawals with Mobic than Naprosyn 2° to less effectiveness but these were in the first two months
  In 18 month study, effectiveness increased up to I year and then leveled off.
- Ising > 7.5 mg, re: AM stiffness and grip strength.
- Role for 22.5 mg?

#### Hand surgical care:

almost every branch of hand surgery involved

Teno-synovectomy, synovectomy
Joint stabilization
Soft tissue realignment
Tendon repair, transfer, grafting
Arthroplasty
Arthrodesis

### HAND SURGEONS vs. RHEUMATOLOGISTS

Alderman and Chung, ASSH 2002 HS Rheum MP arthroplasty 83% 34% Tenosynovectomy 93% 55% Synovectomy 53% 13%



#### **Surgical Principles**

Weakness, functional loss, IADL's, pain relief, progressive deformity
"tailor made" surgery: no cookbook
Proximal deformities first!
Limit surgery to that can be done in 2 hour tourniquet time

### **Joint and tendon failure**



 DRUJ separation (TFCC rupture), loss of carpal height, carpal translocation, tendon rupture

#### "Prophylactic" Surgery: Extensor Teno-synovectomy Dorsal Stabilization



#### **Dorsal Stabilization**

Central 1/3 of the extensor retinaculum
 Threaded beneath the tendons
 Reinforce joint
 ECRL ECU transfer
 Prevent bowstringing: leave some retinaculum



J. Retinacular flaps positioned under extensor tendons and sutured with small flap looped around extensor carpi ulnaris tendon. Extensor tendons repaired, shortened or transferred as necessary

### Vaughn-Jackson

- Carpal supination
   Proud caput ulnae
   Volar carpal subluxation
   DRUJ synovitis, TFCC attrition, ECU sublux
   Extensor tendon shift over the ulnar head
   Attritional over tondon
- Attritional ext. tendon rupture
- R/O radial nerve palsy (tenodesis test)





### **Extensor Tendon Rupture**



Lysosomal enzymes
Sharp bone edges
Ischemic changes
Ulnar to radial progression



#### Darrach DRUJ stabilization



- DRUJ synovectomy
- Capsule, tendon stabilization
- Suave-Kapandji

86% g→e results in RA
36% g→e results in trauma

#### **Extensor Tendon Reconstruction**





#### $\mathsf{FCU} \longrightarrow \mathsf{EDC} \Vdash \mathsf{V}$

+/-tendon graft

EIP ──→EPL

#### EDC IV,V→ EDC II,III

### **Flexor Tenosynovitis**





### This is not a trigger finger !!

- The stenosis can be at the A-1, A-2 & A-4
- Teno-synovectomy, FDS excision
- No pulley release (bowstringing)





### **Carpal Tunnel Syndrome**



 Flexor Tenosynovitis
 Severe median neuropathy



#### **Mannerfelt Syndrome**

 Attritional rupture of the FPL and FDS and FDP to the index finger
 Teno-synovitis and friction over scaphoid tubercle





#### **"Prophylactic"** Surgery

Shaving down the scaphoid tubercle
Periosteal repair
Teno-synovectomy



### Reconstruction

# FDP-3→FDP-2 (side to side) FDS-4→ FPL





#### Wrist Pathology

- Chronic synovitis
   Ligament, bone destruction
   Ulnar head dissolves
- Ulnar carpal drift
- Carpal bone, distal radius destruction
- Zig-zag deformity



- SL dissociation
- Rotatory subluxation
- Loss of carpal height
- Palmar/ulnar carpal sublux

### Wrist synovectomy open vs arthroscopic



#### Wrist synovectomy

#### Open

- Pain relief
- Grip strength preserved
   Wrist stiffness
   Carpal collapse not prevented

#### Arthroscopic

- Pain relief @ 4 years
- Grip strength preserved
- No wrist stiffness
- Can be repeated
- Can be <u>very useful</u> early in the disease





### Arthroscopic images: Wrist





### **Total wrist arthroplasty**

- Low demand patients
- Bilateral involvement
  - Titanium and polyethelene (Biaxial)
- Loosening, subsidence (25%)
- Athrodesis salvage



- F. Intramedullary canal of radius drilled to receive proximal stem of implant. Channel for distal stem reamed through remnant of capitate bone and 3rd metacarpais. Smail holes drilled in radial cortex for later use in securing capsular torem. Distal yuna prepared for implant cap
- G. Implant of appropriate size chosen from 5 sizes available. (Implants are reinforced with polyester fabric)
- H. Imptant stams inserted proximally and distanty land, centraliped over radius, and secured abric)
- "Swanson" silicone
  40% failure rate @ ten years
  Wear particles-synovitis, implant breakage,



#### **TWA contraindications**

- Opper extremity weight bearing
- Prior sepsis
- Severe loss of bone stock
- Dislocation
- Extensor tendon ruptures
- Failed prior arthroplasty unless custom prosthesis used

### Wrist arthrodesis

One or two rods
Trans/intermetacarpal
w/wo tension band
Plate if not osteopenic
Can do partial fusion: radiolunate or radioscaphocapitate (can preserve 30° ROM)

 Bilateral fusions don't affect function



#### 90-95% fusion rate



### Metacarpophalangeal deformities

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Metacarpophalangeal Joint Disabilities



Deformed hand with marked ulnar deviation of fingers and subluxation of MP joints. Deformities secondary to rheumatoid arthritis

#### **Pathomechanics**

Synovial inflammation-joint laxity
 Destruction primarily at the collateral ligament insertion
 Ulnar EDC sublux
 Volar MP subluxation





### **Clinical picture**



#### Divergent pattern

late

early

### **MP** synovitis

Can be isolated Or diffuse Joint space maintained

### MP Synovectomy open vs arthroscopic





### **Arthroscopic images**



#### **MP** view

#### Dorsal recess synovitis

### **Soft tissue repairs**

Extensor tendon centralization
 Radial sagittal band imbrication
 Rerouting of extensor slip
 Crossed intrinsic transfer (stiffness)

### **MP** Arthroplasty

A. Transverse skin incision over necks of metacarpal bones to expose extensor tendons. Superficial veins and nerves preserved by blunt dissection. Displaced tendon released on the ulnar side (see B) and retracted radially Line of Incision through dorsal hood Central tendon Lateral tendon

Metacarpal bone Ulnar intrinsic

Proximal phalanx Middle phalanx

B. Dislocated long extensor tendon released by inclaing dorsal hood along tendon's ulnar margin, except in 5th digit, where approach is made between extensor communis and proprius tendons. Division of intrinsic tendons. Division of intrinsic tendon on ulnar side may further the release

E. Intramedullary canal of

proximal phalanx similarly prepared.

Unless deformity exists, bone not usually removed from phalangeal base

C. Head of metacarpal cut off using air drill with sidecutting burr. Part of flare of metaphysis preserved. Bone ends smoothened

Netter

CLINICAL SYMPOSIA

A. VIO CIBA

D. After extensive softtissue release (including division of collateral ligaments if necessary), intramedullary canal prepared to receive implant stem using air drill with special blunt tip burn to prevent outling through cortex



### **Clinical images**

- Intra-operative
- Transverse or longitudinal incisions
- Post-operative
   Early protected motion





### **Pyro-carbon Arthroplasty**



 Contraindicated if there's joint instability



#### Post op care

Begin dynamic splinting day 4-5
Remove for active ROM often, early
Night splinting
D/C @ 4 wks



#### **Follow-up correction**



preop postop
@10 years, 100% pain
relief, 75% <sup>↑</sup>function
↓ MP flexion ↑ extension

28% implant breakage

89% osteolysis

### **PIP Deformities**

#### Boutonniere

#### Swan-neck





### **Swan neck deformity**

Hyperextension PIP, flexion DIP
Attenuation of volar plate @ PIP
FDS rupture
Dorsal lateral band displacement
FDP tension, extensor insertion erosion : mallet DIP

#### Swan neck defrormity : 4 types

Type 1: supple active PIP motion 2° to DIP mallet. **Rx: DIP fusion** Sublimis tenodesis ORL reconstruction for <sup>†</sup>DIP extension ulnar lateral band rerouting volar to axis of rotation

### **Swan-neck deformity**

Type 2: DIP mallet, intrinsic tightness (no PIP flexion when MP extended) MP volarly subluxed and ulnarly deviated
 RX: DIP arthrodesis

 ulnar intrinsic release
 sublimis tenodesis
 <u>MP</u> arthroplasty PIP pin at 20° x 3 wks.



#### **Swan neck deformity**

Type 3: PIP extension contracture, ↓pROM, lateral band scarring, flexor tenosynovitis. Special Procedure for Swan-Neck Deformit **Rx: EUA** manipulation Swan-nec deformity of finger PIP arthroplasty, fusion lateral band mobilization central slip lengthening tendon by onnecting fiberr tendon step-cut flexor teno-synovectomy

Lateral tendons relocate palmad. After insertion of implant, central tendon sutured with buried knots in a lengthened

### **Swan neck deformity**

Type 4: Severe DJD PIP joint
 Rx: PIP fusion

#### **Boutonniere deformity**

PIP flexion DIP extension
PIP synovitis
Central slip attenuation
Lateral band displacement volarly
Transverse retinacular ligament contraction

#### **Boutonniere deformity: 3 types**

Type 1: >15° extensor lag PIP joint, passively correctible
 DIP flexion passively OK
 Rx: Night splinting PIP extension

 Fowler extensor tenotomy (beyond PIP)

### **Boutonniere deformity**

Type 2: PIP flexion >30° MP hyperexpension Passively correctable PIP joint **Rx:** central slip imbrication TRL tenotomy lateral band relocation pin PIP x 3 wks. in extension passive DIP flexion



leased and relocated



#### **Boutonniere deformity**

 Type 3: Significant PIP articular destruction
 Rx: PIP arthroplasty with soft tissue reconstruction
 PIP arthrodesis

#### PIP Synovectomy or RA nodule excision





### **PIP Arthroplasty**

Implant Resection Arthroplasty for Proximal Interphalangeal Joint



A. Longitudinal, slightly curved incision made over PIP joint



C. Head of proximal phalanx resected using air drill with side-cutting burr. (In very tight joints, head may have to be removed piecemeal)



E. Middle phalanx similarly reamed. Base not resected, but osteophytes trimmed if present



G. With joint in extension, neither proximal nor middle phalanx should impinge on implant. More soft-tissue release or bone removal from proximal and middle phalanges indicated if this not optimal





Plate

8. Central tendon incised longitudinally (preserving insertion at base of middle phalanx) and each half refracted paimed. Collateral ligament insertions on proximal phalanx preserved asmuch as possible



D. Proximal phalanx reamed with air drill to receive implant. Special bunt-tip burr used to avoid perforating cortex of phalanx



F. Largest implant that can be well seated inserted first into proximal and then into middle phalanx. Note hole drilled in middle phalanx and suture



H. Halves of incleed central tendon drawn together, and sutured through drill hole using inverted knot technique. Collateral ligaments reattached



#### pre-op

#### post-op



## Pre/post op x-rays

### Post -op images





# "Opera- Glass" Hand



#### **Distal interphalangeal joint**

Joint destruction will require arthrodesis
25° flexion, neutral rotation, cascade effect



# Rheumatoid thumb deformities

### Deformity patterns: 5 types

Type 1 Boutonniere deformity MP flexion, IP hyperextension MP synovitis, dorsal capsular distension Attenuation of EPB, extensor hood EPL displacement volar, ulnar Can start from IP with FPL Extenso rupture=hyperextension pollicis pollicis previs tendon ongus tendo

#### Boutonniere

Rx: If MP & IP passively correctible then extensor reconstruction and synovectomy, **EPL** rerouting Distal EPL tenotomy and capsular augmentation If MP joint stiff then - MP fusion If IP joint stiff the IP fusion or arthroplasty

Boutonniere repair soft tissue reconstruction EPL tenodesis



### Boutonniere repair: arthroplasty

 ligament rebalancing
 Central slip advancement
 EPL, EPB rerouting



C. Intrameduilary canais of metacarpal and proximal phalanx reamed, and implant inserted. Bony concavity and small drill hole made at base of proximal phalanx. Tension of extensor poliicis brevis tendon adjusted as it is

sutured into concavity

D. Fibers of incised dorsal hood approximated and sutured over insertion of extensor pollicis brevis tendon

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E. Tendon of extensor poliicis longue advanced distaily and centered with a few sutures. If indicated, temporary Kirschner wire used to fix distai joint

### Swan neck deformity type 3

- Starts at CMC joint
   Synovitis instability
   Metacarpal adduction
   MP volar plate laxityhyperextension
- IP flexion



### Swan neck deformity Type 3

 Splinting
 Adductor tenotomy
 MP arthrodesis/ no arthroplasty
 CMC arthroplasty/ arthrodeses

### Deformity patterns: IP Joint



# Thank You for your attention !

