1  Upper Extremity
   Rheumatoid Arthritis
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2  Overview
   • Introduction
   • Shoulder
   • Elbow
   • Wrist
   • Tendinopathy
   • Hand
   • Questions

3  Introduction
   • Definition, basics
   • Disease origin, etiology
   • Pathophysiology
   • Medical management
   • Basic surgical principles

4  Rheumatoid arthritis is an auto-immune inflammatory arthopathy characterized by symmetric polyarticular inflammation typically involving small joints of hands and feet

5  Basic Facts
   • Affects 1% of adults
   • Women > men by 3 or 4 to 1
   • Cytokines (TNF, IL-1) are key mediators
   • Systemic disease w/pulmonary and cardiovascular effects

6  Disease Origins
   • Recent Origin
   • Ancient Origin
   • New World to Old World

7  Recent Origin
   Based on Clinical Descriptions
   • 1800 – Landre-Beauvais described pts in France
   • 1859 – Alfred Garrod – “rheumatic gout”
   • 1890 – Archibald Garrod – “rheumatic arthritis”

8  Ancient Origin
   Evidence from Literature and Art
   • 1638 – The Three Graces by Peter Paul Rubens
   • Anecdotal evidence
   • RA deformity similar to other diseases

9  New World to Old World
   Based on Paleopathological Evidence
   • Oldest skeletons suggesting RA were found in Americas
   • RA originated in Americas & transmitted to Old World
Contemporary Research
Suggests Etiology is Multifactorial
- Genetic predisposition – MHC alleles HLA-DR on chromosome 6
- Risk or triggering factors – viral or bacterial infection, smoking or pregnancy
- Rheumatoid factor – anti-IgG antibodies

Laboratory Diagnosis
Early Diagnosis Allows Early Treatment
- RF (Rheumatoid Factor) positive up to 90%
- ANA (Anti–Nuclear Antibodies) positive 41%
- Anti–CCP (Cyclic Citrullinated Peptides) has sensitivity up to 67% and specificity up to 98%

Pathophysiology – Stage 1
Synovitis and Tenosynovitis
- Vascular congestion
- Increased synoviocytes, polymorphs, lymphocytes
- Villous hypertrophy
- Capsular thickening
- Cell–rich effusion

Pathophysiology – Stage 2
Joint and Tendon Destruction
- Synovial & tenosynovial hyperplasia
- Pannus invasion
- Cartilage proteolysis
- Osteoclastic resorption
- Tendon partial rupture

Pathophysiology – Stage 3
Joint and Tendon Deformity
- Disruption normal architecture hand
- Loss of delicate flexor–extensor balance
- Articular destruction
- Progressive instability
- Tendon rupture

Immune Activation Cascade
Positive Feedback Loop
- T–cells respond to synovial antigens
- Activate fibroblasts, macrophages, monocytes
- Secrete cytokines (TNF, IL–1), chemokines
- Recruit leukocyte infiltration, angiogenesis
- T–cells stim B–cells to produce antibodies (RF)

Rheumatologist vs Hand Surgeon
Disagree that Surgery Improves Function

Basic Surgical Principles
Preoperative Planning Is Important
- Base plan on patient’s functional needs
- Clinical or XR deformity alone is insufficient
- Patient must be good rehabilitation candidate
18 Procedure Staging
- Prophylactic procedures before reconstructive
- Operate on less involved side first
- Predictable outcome procedures first
- Remember carpal tunnel release
- Minimize total number operative interventions

19 Rheumatoid Shoulder
- Conservative rx as for non-rheumatoids
- Shoulder arthroscopy, rx as needed
- Shoulder replacement hemi vs TSA
- Assess rotator cuff integrity (preop MRI)
- Use humeral stem convertible to reverse

20 Rheumatoid Elbow
- Clinical features
- Larsen classification
- Surgical options
- Illustrative cases

21 Larsen Classification
for RA-Induced Radiographic Changes
- Grade 0 – No changes
- Grade 1 – Soft tissue swelling, osteoporosis
- Grade 2 – Periarticular erosions, cartilage loss
- Grade 3 – Marked joint interval narrowing
- Grade 4 – Subchondral erosions
- Grade 5 – Advanced destruction, loss contour

22 Surgical Options for Elbow Joint
- Arthroscopic synovectomy
- Open synovectomy +/- radial head excision
- Interpositional arthroplasty
- Total elbow replacement

23 Rheumatoid Nodules – Excise if Symptomatic

24 Rheumatoid Wrist
- Clinical features
- Wrightington classification
- Surgical options
- Illustrative cases

25 Wrightington Classification
for RA-Induced Radiographic Changes
- Stage 1 – Osteoporosis, cysts, erosions
- Stage 2 – Carpal instability
- Stage 3 – Carpal subluxation (volar, ulnar)
- Stage 4 – Severe carpal destruction

26 Surgical Options for Wrist Joint
- Arthroscopic or open synovectomy
- Soft tissue recon (Blatt capsulodesis)
Partial wrist arthrodesis
• Total wrist arthrodesis
• Total wrist arthroplasty

27 Total Wrist Arthrodesis
• Workhorse procedure
• Severe pain, instability
• Individualize wrist position
• Consider bilateral fusions
• IM vs plate & screw fixation

28 Total Wrist Arthroplasty
• Motion preserving
• Swanson implants fractured
• 2nd gen implants dislocated
• Newer designs more stable
• Patients prefer over fusion
• May use with U-head

29 Rheumatoid Tendinopathy
• Coexists w/wrist arthropathy
• Extensor tendinopathy
• Flexor tendinopathy
• Surgical treatment options
• Illustrative cases

30 Extensor Tendinopathy
• Painless swelling dorsal wrist, DRUJ
• Pain on resisted digital extension
• Caput ulnae syndrome (prominent distal ulna)
• Loss of digital extension (Vaughan-Jackson)
• Loss of thumb IPJ extension (EPL rupture)

31 Surgical Options
for Extensor Tendinopathy at Wrist
• Extensor tenosynovectomy
• Darrach resection +/- stabilization
• Extensor tenodesis
• Tendon transfer (EIP donor)
• Tendon segmental graft

32 Surgical complications must be expected in immunocompromised patients

33 Flexor Tendinopathy
• Painless swelling volar wrist, distal forearm
• New onset trigger fingers
• Pain on resisted digital flexion
• Difficulty with digital flexion, grasping
• Loss of thumb IPJ flexor (Mannerfelt lesion)
• Loss of index / middle finger DIPJ flexion

34 Surgical Options
for Flexor Tendinopathy at Wrist
• Flexor tenosynovectomy
- Extended carpal tunnel release
- Flexor tenodesis
- Tendon transfer (ring FDS donor)
- Tendon segmental graft

35  
**Rheumatoid Hand**

**Finger Deformities**
- MCPJ synovitis, instability
- IPJ synovitis, arthritis, instability
- Swan neck deformity
- Boutonniere deformity
- Rheumatoid thumb deformities

36  
**MCPJ Synovitis / Arthritis**
- Ulnar drift of digits (zig-zag deformity)
- Attenuation of radial structures
- Contraction of the ulnar structures
- Ulnar subluxation of extensor tendons
- Volar subluxation base proximal phalanx

37  
**MCPJ Synovectomy vs Arthroplasty**

**EDC Centralization**
- Synovial & tenosynovial hyperplasia
- Pannus invasion
- Cartilage proteolysis
- Osteoclastic resorption
- Tendon partial rupture

38  
**MCPJ Interposition Arthroplasty**
- Swanson silastic implants
- Better than medical rx
- Good pain relief
- Slightly improved motion
- Late implant fracture
- Improved appearance

39  
**Digital Flexor Tenosynovitis**
- Presents as trigger digit
- Complete tenosynovectomy
- Preserve A1 pulley
- Expect flexor pathology
- Flexor tendon nodules
- Flexor tendon ruptures

40  
**Swan Neck Treatment**
- Silver rings to limit PIPJ hyperextension
- Full PROM – FDS tenodesis
- Limited PROM – Lateral band mobilization
- No PROM – PIPJ arthrodesis

41  
**Boutonniere Treatment**
- PIPJ extension splinting
- Full PROM – Extensor tenotomy
- Limited PROM – Reconstruct central slip
• No PROM – PIPJ arthrodesis

42  □ Rheumatoid Thumb
• Synovitis, arthritis
• Swan neck MCPJ
• Boutonniere MCPJ
• Joint instability

43  □ RA Thumb Treatment
• TMCJ – Arthroplasty
• MCPJ – Arthrodesis possible arthroplasty
• IPJ – Arthrodesis

44  □ Primary Reference
• Current Concepts in the Treatment of the Rheumatoid Hand, Wrist and Elbow
  Chung KC (ed), Hand Clinics 27(1), February 2011