Upper Extremity
Rheumatoid Arthritis
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Overview
- Introduction
- Shoulder
- Elbow
- Wrist
- Tendinopathy
- Hand

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

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

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

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%
- Order anti–CCP titre, if RF titer is low

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
Pathophysiology – Stage 3 – Joint and Tendon Deformity

- Osteoclastic resorption
- Tendon partial 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 stimulate B-cells to produce antibodies (RF)

Disease-Modifying Anti-Rheumatoid Drugs

- Biologics include the anti-TNF drugs (Enbrel, Remicade, Humira)

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 a good rehabilitation candidate
- Outcome expectations must be realistic
- Disease progression, deformity recurrence must be anticipated

Procedure Staging

- Prophylactic procedures before reconstructive
- Operate on less involved side first
- Predictable outcome procedures first
- Remember carpal tunnel release
- Minimize total number of operative interventions

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

Rheumatoid Elbow

- Clinical features
- Larsen classification
- Surgical options
- Illustrative cases

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

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

20 Rheumatoid Nodules – Excise if Symptomatic

21 Rheumatoid Wrist
- Clinical features
- Larsen classification
- Surgical options
- Illustrative cases

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

23 Clinical and Radiological Results of Radiolunate Arthrodesis for Rheumatoid Arthritis: 22 Wrists Followed for an Average of 7 Years
- 22 wrists in 19 patients followed for 7 years
- Fourteen Larsen Grade 3, eight Larsen Grade 4
- All wrists improved clinically and fused by XR
- Larsen grade did not worsen during follow-up

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

25 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

26 Total Wrist Arthroplasty and Total Wrist Arthrodesis in Rheumatoid Arthritis: A Decision Analysis From the Hand Surgeons’ Perspective
- 175 members ASSH surveyed
- Arthroplasty outcome better than medical rx
- Arthrodesis outcome better than medical rx
- Arthroplasty marginally better than arthrodesis

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

28 Extensor Tendinopathy
- Painless swelling dorsal wrist, DRUJ
- Pain on resisted digital extension
- Caput ulnae syndrome (prominent distal ulna)
- Loss of digital extension (extensor ulnar subluxation or Vaughan-Jackson lesion)
- Loss of thumb IPJ extension (EPL rupture)

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

- 23 patients (26 wrists), min 5-yr follow-up
- Improvement in wrist pain, pronosupination, writing, card turning
- No improvement in wrist extension, ulnar deviation, grip strength
- Decreased wrist flexion

31 Surgical complications must be expected in immunocompromised patients

32 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

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

34 Digital Flexor Tenosynovitis
- Presents as trigger digit
- Complete tenosynovectomy
- Preserve A1 pulley
- Expect flexor pathology
- Flexor tendon nodules (excise)
- Flexor tendon ruptures (repair, recon)
Rheumatoid Finger Deformities

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

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

MCPJ Interposition Arthroplasty

- Swanson silastic implants
- Better than medical rx
- Good pain relief
- Slightly improved motion
- Late implant fracture
- Improved appearance


- Data from 2004–08 with 1-year follow-up
- 70 surgical, 93 nonsurgical patients
- MHQ showed significant improvement in surgical group, no change in non-surgical group
- Improvement in ulnar deviation, extensor lag
- No improvement in grip or pinch strength


- 46 patients w/SMPA followed for 2 years
- Patients w/improved extensor lag, ulnar drift and MCPJ arc of motion were satisfied
- Improvement in grip or pinch strength did not correlate w/patient satisfaction
- Patient satisfaction a function of cosmetic appearance rather than functional improvement

Swan Neck Pathogenesis – May start at any joint

- Dorsal MCPJ synovitis, EDC rupture
- Volar MCPJ synovitis, volar plate attenuation, intrinsic contracture
- Volar PIPJ synovitis, volar plate attenuation, dorsal shift lateral bands
- Dorsal DIPJ synovitis, terminal tendon rupture and proximal migration

Swan Neck Treatment

- Silver rings to limit PIPJ hyperextension
- Full PROM – FDS tenodesis
- Limited PROM – Lateral band mobilization
- No PROM – PIPJ arthrodesis
42 Boutonniere Pathogenesis – Is initiated at PIPJ
- PIPJ synovitis
- Central slip rupture
- Volar shift lateral bands
- Contracture TRL, SORL

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

44 Rheumatoid Thumb
- Synovitis, arthritis
- Swan neck MCPJ
- Boutonniere MCPJ
- Joint instability

45 RA Thumb Treatment
- TMCJ – Arthroplasty
- MCPJ – Arthrodesis, possible arthroplasty
- IPJ – Arthrodesis

46 Summary
- Global map or picture of pathology
- Address clinical problems, not XR changes
- Work from proximal to distal
- Predictable outcome procedures first
- Manage outcome expectations
- Consider smaller, focused interventions