Upper Extremity Surgery for Rheumatoid Arthritis
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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 hand architecture
- Loss of delicate flexor-extensor balance
- Articular destruction
- Progressive instability
- Tendon rupture

Basic Surgical Principles - Preoperative Planning
- Base plan on patient’s functional needs
- Clinical or radiographic deformity alone is insufficient
- Patient must be good rehabilitation candidate
- Outcome expectations must be realistic
- Procedure complications, disease progression, deformity recurrence all must be anticipated

Procedure Staging
- Prophylactic procedures first, then reconstructive
- Operate on less involved side first
- Predictable outcome procedures first
- Remember carpal tunnel release
- Minimize total number of operations

- Survey 500 hand surgeons, 500 rheumatologists
- Rheumatologists disagree with hand surgeons about the effectiveness of surgery on rheumatoid hand deformities
- True for all physician ages, regardless of rheumatologist’s exposure to hand surgery
- True for all procedures, prophylactic & reconstructive

Surgical Options for Rheumatoid Shoulder
- Shoulder arthroscopy
- Shoulder arthroplasty (hemi, TSA, RSA)
- Use humeral stem convertible to reverse
- 108 hemiarthroplasties, 195 total shoulder arthroplasties
- 10-year survivorship: 89% HA, 93% TSA
- 73% glenoid loosening in TSA group
- 81% glenoid erosion in HA group
- If intact rotator cuff, pain relief & ROM better with TSA
- Therapeutic Level IV Case Series (Mayo Clinic)

- Hypothesized poorer short-term outcomes in RA patients
- Analyzed 25,400 TSAs (1186 w/RA) during 1988-2005
- No difference in perioperative complications
- RA group had shorter hospital stays, higher likelihood of routine discharge, lower hospital cost
- Therapeutic Level III study (Duke University)

- 21 patients treated with RSAs were followed prospectively for minimum 2 years
- All outcome scores (ASES, SST, VAS) improved
- 3 complications (2 infections, 1 periprosthetic fracture)
- RSA offers pain relief, improved function in RA patients
- Therapeutic Level IV Case Series (FL Ortho Institute)

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

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

- PearlDiver supercomputer (Warsaw, IN)
- 25-26 million Medicare patients, about 1200 TEAs per year
- Indications for TEA - OA, PTA, RA, distal humerus fracture or nonunion
- Fewer RA patients now require TEA due to effectiveness of DMARDs
- Epidemiology study (Holy Cross Ortho Institute)

Surgical Options for Rheumatoid Wrist
- Arthroscopic or open synovectomy
- Soft tissue reconstruction (e.g., Blatt capsulodesis)
- Partial wrist arthrodesis
- Total wrist arthrodesis
- Total wrist arthroplasty
Long-Term Results of Arthroscopic Wrist Synovectomy in Rheumatoid Arthritis. Lee et al, JHS 2014; 39A: 1295-1300.
- 49 patients (56 wrists), mean F/U 7.9 years
- Mayo & VAS outcome measures improved
- Larsen radiographic stage progressed from 2.2 to 3.3
- Synovitis was controlled in 75% (42/56) wrists
- Therapeutic Level IV study (South Korea)

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

Total Wrist Arthroplasty
- Motion preserving
- Swanson implants fractured
- 2nd generation implants dislocated
- Newer designs are more stable
- Patients prefer arthroplasty over fusion
- May use with U-head to replace distal ulna

- 175 members ASSH surveyed
- Arthroplasty outcome better than medical treatment
- Arthrodesis outcome better than medical treatment
- Arthroplasty marginally better than arthrodesis
- Economic, decision analysis IV (Univ Michigan)

- Survey RA patients (n = 49), random sample hand surgeons & rheumatologists (n = 109)
- Patients & physicians preferred operative treatment
- Total wrist arthrodesis & arthroplasty are extremely cost-effective procedures
- Decision analysis Level II (Univ of Michigan)

Five to Ten-Year Outcomes of the Universal Total Wrist Arthroplasty in Patients with Rheumatoid Arthritis. Ward et al., JBJS 2011; 93A: 914-19.
- 20 patients, 24 wrist arthroplasties studied
- Universal wrist implant (KMI), mean 7.3 years F/U
- Implant survival 75% at 5 years, 60% at 7 years
- 10 of 20 wrists (50%) required revision surgery
- Therapeutic Level IV study (Univ of Iowa)

Rheumatoid Extensor Tendinopathy
- Painless swelling dorsal wrist and DRUJ
- Pain on resisted digital extension
- Prominent distal ulna (caput ulnae syndrome)
- Loss of digital extension (extensor ulnar subluxation or Vaughan-Jackson lesion)
- Loss of thumb IPJ extension (EPL rupture)
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-year follow-up
- Improvement in wrist pain, pronosupination, writing, card turning
- No improvement in wrist extension, ulnar deviation, grip strength
- Decreased wrist volar flexion
- Therapeutic Level IV study (UK)

Rheumatoid 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

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

Digital Flexor Tenosynovitis
- Presents as trigger digit or limited digital flexion
- Expect flexor tendon nodules, attritional tendon wear or rupture
- Flexor tenosynovectomy, but preserve A1 pulley to minimize ulnar drift

MCPJ Synovitis / Arthritis
- Ulnar drift (zig-zag deformity)
- Attenuation radial sagittal bands
- Contraction of ulnar structures
- Ulnar subluxation EDC tendons
- Volar subluxation proximal phalanx

MCPJ Silicone Interposition Arthroplasty
- Better than medical treatment
- Good pain relief
- Slightly improved motion
- Improved appearance
- Late implant fracture

- 70 surgical, 93 nonsurgical patients (2004-08), 1 year F/U
- MHQ showed significant improvement in surgical group, but no change in the non-surgical group
• In the surgical group, there was improvement in ulnar deviation, extensor lag, but no improvement in grip or pinch strength
• Therapeutic Level III study (Univ of Michigan)

• 46 patients w/SMPAs followed for 2 years
• Patients with improved extensor lag, ulnar drift and MCPJ arc of motion were satisfied
• Improvement in grip or pinch strength did not correlate with patient satisfaction
• Patient satisfaction is a function of cosmetic appearance
• Therapeutic Level II study (Univ of Michigan)

• 18 patients (20 hands) had revision surgery (1986-2005)
• 76% of the 62 implants removed had fractured
• At mean 5-year F/U, 15/44 revised implants fractured
• Arc of MCPJ motion unchanged, ulnar drift better
• 11 of 16 patients were satisfied with result
• Therapeutic Level IV study (Univ of Cincinnati)

Surgical Approach to the Rheumatoid Patient
• Global perspective of patient pathology
• Prophylactic procedures before salvage
• Proximal limb procedures before distal
• Some patients are not surgical candidates
• Surgery is last resort but should be timely
• Tenosynovitis should be addressed early
• Complications occur with & without surgery

Reference List
General


Shoulder


Elbow


Wrist


Hand


