

# Surgery of the Hand and Wrist in Inflammatory Arthritis: A Lost Art

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## Robert Brigham Hospital

- First Rehabilitation Hospital in the Country:
  - Rheumatologists
  - Orthopedists
- Before total hip and knee replacements
- Hip: cup arthroplasty
- Knee: Mc Keever prosthesis

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## Development of Hand Surgery in Inflammatory Arthritis

- No prostheses
- Mainly soft tissue reconstruction
- “Terrible” results:
  - Stiffness
  - Recurrent deformity
  - Recurrent synovitis

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## Development of Hand Surgery in Inflammatory Arthritis

- MCP Joints: resection arthroplasty with or without volar plate interposition
- Swanson in early 70’s developed silastic “spacer” (not prosthesis)
- Emphasized that this is mainly a soft tissue operation

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## Development of Hand Surgery in Inflammatory Arthritis

- PIP joint silastic “spacer”
- Again emphasized soft tissue reconstruction
- Don’t “cut the skin and kick it in”
- Newer generation of silastic: high density to address breakage
- Actually it was produced for wrist and elbow

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## Prosthetic joints for the Hand and Wrist

- Multiple prostheses have found their way to the trash bin of history, both digital and wrist
  - Depuy bi-axial
  - Triaxial (HSS)
  - Flatt
  - Etc

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## Prosthetic joints for the Hand and Wrist

- Is there something to be learned here?
- We have to be advocates for our patients
- We have to balance advances vs. traditions
- Are the newer prostheses falling into the same trap:
  - Universal (Integra)
  - Pyrolytic carbon PIP joint

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## Arthritis & Rheumatism 13: 6; 1970

• Synovectomy in Rheumatoid Arthritis A Retrospective Study Edward S. Mongan, William M. Boger, Bruce C. Gilliland and Sanford Meyerowitz The consensus of three physicians regarding the results of 84 synovectomies performed in the joints of 60 patients with rheumatoid arthritis was obtained; 43 joints were considered better, 17 unchanged, and 24 worse than they were before surgery. At an average of 2.5 years after surgery, synovial swelling recurred in 70% of the joints; in 67%, there was evidence of radiographic progression in the operated joint. These data suggest that synovectomy temporarily slows the disease in the operated joint but that the rheumatoid process probably will recur eventually.

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Alderman, AK, Chung, KC et al  
J Hand Surgery 28: 3; 2003

- Effectiveness of Rheumatoid Hand Surgery: Contrasting Perceptions of Hand Surgeons and Rheumatologists
- Surveyed over 400 hand surgeons and rheumatologists:

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Effectiveness of Rheumatoid Hand Surgery: Contrasting Perceptions of Hand Surgeons and Rheumatologists

93% of Hand Surgeons versus 50% of Rheumatologists think dorsal tenosynovectomy is effective in preventing tendon rupture  
66% of Hand Surgeons versus 25% of Rheumatologists think soft tissue reconstruction for swan-neck or boutonniere deformity successful in increasing function

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[Clin Exp Rheumatol. 1989 Sep-Oct;7 Suppl 3:S145-8.](#)  
**Surgical treatment of the rheumatoid hand.**  
[Altissimi M<sup>1</sup>, Ciaffoloni E.](#)

- Surgery plays a major role in an integrated treatment program that considers the patient's possibilities for improvement. Extensor and flexor tenosynovitis requires an early synovectomy to prevent tendon ruptures.

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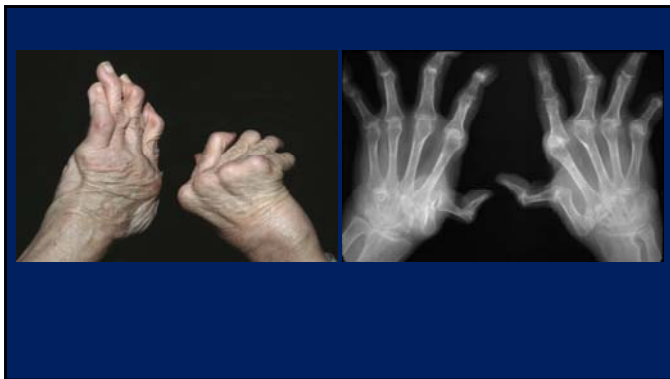
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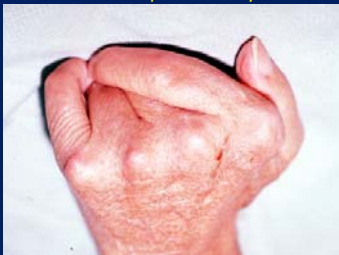
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The Most Important Factor in Predicting Results is the Status of the Hand and Wrist Pre-Operatively



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Mentors

- Edward A. Nalebuff
- Lewis H. Millender
- Richard J. Smith

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### Development of Hand Surgery Education

- No funding
- Traveling fellowships
  - Guy Pulvertaft-Derby, England
  - Raoul Tubiana-Paris, France
  - Douglas Lamb-Edinburgh, Scotland
- Domestic fellowships
  - Littler and Eaton
  - Carroll
  - Kleinert

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### The Simmons' Family Adventure

- Raoul Tubiana offered me a position sight unseen
- Barry accepted it sight unseen
- Enormously supportive wife
- Two little girls (one now a hand surgeon)
- Unfunded
- No job
- Greatest adventure of our lives

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### Paris France

- Raoul Tubiana, MD
- Worked in several institutions:
  - Clinique Ambroise Pare
  - The American Hospital
- Shared time with multiple "etranger"
- Learned about alternative medical systems
- Now almost impossible

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### Opportunities

- Attended GEM (Groupe de L'Etude de Main), now the French Hand Society
- Attended the meetings of the British Society of the Hand (Raoul Tubiana President)
- Subsequently joined GEM and BSSH
- Unique opportunity to meet and have discussions with some of the founders of Hand Surgery in Europe

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### Mentors (expanded)

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| <ul style="list-style-type: none"><li>• Raoul Tubiana, Paris</li><li>• Guy Pulvertaft, England</li><li>• Douglas Lamb, Edinburgh</li><li>• John Varian, Dublin</li><li>• Angimantas Narakas, Switzerland</li></ul> | <ul style="list-style-type: none"><li>• Graham Stack, England</li><li>• Erik Moberg, Sweden</li><li>• L. Mannerfelt, Germany</li><li>• Dieter Buck-Gramko, Germany</li><li>• Hanno Millesi, Vienna</li></ul> |
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### All experts in surgery of the hand in Rheumatoid Arthritis

- Many were committed to soft tissue procedures
- Moberg may be ahead of his time:
  - Convinced that early, early synovectomy was essential in preventing the progression of deformities and DJD
- DMARD's in conjunction with early synovectomy may stop progression and prevent recurrence
- DMARD's usually stops synovitis non-surgically

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### Outcomes Research: subjectively-based analysis of results

Levine, DW, Simmons, BP, et al. A Self-Administered Questionnaire for the Assessment of Severity of Symptoms and Functional Status in Carpal Tunnel Syndrome. *J Bone Joint Surgery*, 1993; 75-American, 11: 1585-1591.

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### Prioritizing surgery if multiple joints involved

- Patients usually most satisfied from wrist and thumb surgery: pain relief and function
- Wrist and thumb surgery require less post-operative rehab
- Digital surgery more complex, more rehab, less satisfying
- If start with digits, may not want any further surgery

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### Current thoughts about Surgery of the Hand and Wrist in Inflammatory Arthritis

- Tenosynovitis
- Soft tissue procedure
- Wrist/distal radioulnar joint
- MCP joints
- PIP joint
- Boutonniere and Swan-Neck Deformities

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### Tenosynovitis: dorsal



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### Tenosynovitis: dorsal and volar

- Consider tenosynovectomy if no response to 6-9 months of medical treatment
- I never inject either palmar or dorsal b/o fear of rupture
- In dorsal tenosynovitis always address the DRUJ: hemiarthoplasty or synovectomy

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- Tenosynovitis: dorsal and volar

- Surgery to prevent ruptures is considerably easier
- Rehabilitation after tenosynovectomy is easier
- Results are better

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### Tenosynovitis: dorsal and volar

- Digital tenosynovitis: tenosynovectomy when passive motion is greater than active motion
- Transverse incision at palmer crease and individual digital incisions as necessary
- Recurrence rate is low and maybe lower with DMARD's

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### Reconstructive Alternatives at the Radiocarpal Joint

- Wrist arthrodesis
  - Gold standard
  - High success rate
- Wrist arthroplasty
  - Multiple failed implants
  - Patients prefer arthroplasty to arthrodesis if have bilateral surgery

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### Wrist Arthrodesis



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### Total Wrist Arthroplasty

- Silastic spacer
- Metal-to-plastic
  - Meuli
  - Arizona Medical Center
  - Tri-axial
  - Biaxial
  - Universal (KMI); Universal 2 (Integra)

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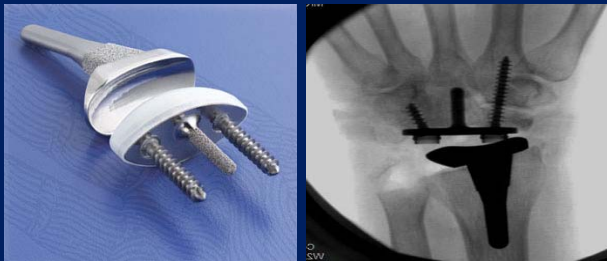
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### Universal: Metal to Plastic



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### How do I decide how to guide patient in their decision

- I have converted 7/25 Universal TWA to fusions
- All within 7-10 years of implant
- Conversion to arthrodesis is difficult operation: femoral head allograft
- Make patients aware of failure rate
- "Dr Simmons, thank you for the 10 years of painless wrist motion that you gave me."

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### Metacarpophalangeal joint Arthroplasty



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**MCP arthroplasty**

- Aggressive soft tissue reconstruction
- Don't forget the thumb

An intraoperative photograph showing the surgical site for MCP arthroplasty. The joint is open, and the articular surfaces are visible. The surrounding soft tissue is being managed, consistent with the text's emphasis on aggressive soft tissue reconstruction.

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**Rehabilitation**  
(1 ½ -2 hours to fit/instruct)

Two photographs of hand rehabilitation devices. The left image shows a hand in a white cast with a metal splint and a small motorized device attached to the thumb. The right image shows a hand in a white cast with a more complex, motorized rehabilitation device attached to the thumb and wrist area.

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### Hand-Based Cast for 3-4 Weeks



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Mandl, LA, Galvin, DH, Bosch, JP, George, CC, Simmons, BP, Axt, TS, Fossel, AH, Katz, JN. Clin Rheumatol., 2002 December 12:2488-2491.

- Metacarpophalangeal joint arthroplasty in rheumatoid arthritis: What determines satisfaction with surgery?

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### Objective and Subjective (Outcome Study) results for MCP arthroplasty

- 80% Patients Satisfied with Surgery
- **Hand Appearance** and Pain Relief
  - Most highly correlated with satisfaction
- Ability to hold large, light objects
  - Only functional ability that is associated with patient satisfaction

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### Combined Deformities



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### Swan-neck deformities



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## Digital Surgery in Inflammatory Arthritis

- Swan-Neck Deformity
  - Generally more successful
  - Need to address status of MCP joints
  - FDS tenodesis if joints intact
  - Manipulation at time of MCP arthroplasty

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## Digital Surgery in Inflammatory Arthritis

- Boutonniere Deformity:
  - Misnomer as joints not passively correctable
  - Need good joint preservation to do soft-tissue procedure
  - Arthroplasty depends on soft-tissue reconstruction
  - Arthrodesis most common procedure

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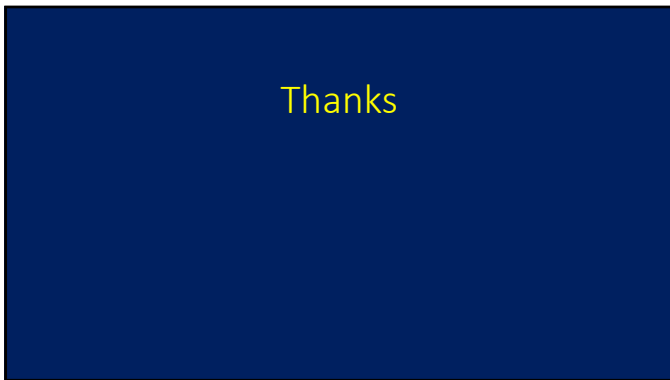
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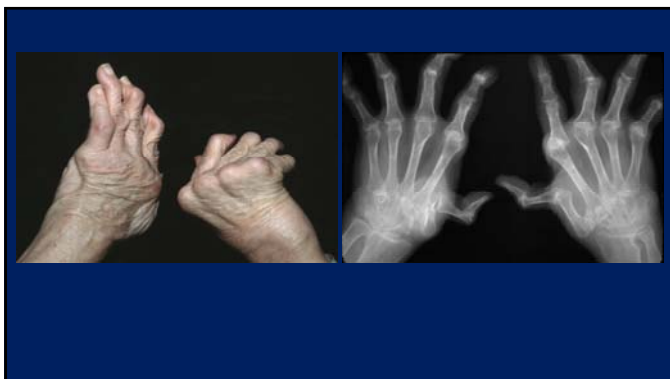
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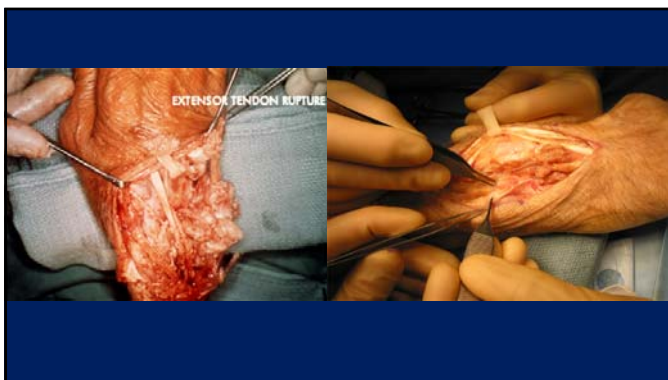
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- ### Distal radioulnar joint
- Darrach procedure (resection distal ulna)
  - Distal radioulnar arthrodesis with proximal ulna ostectomy (Suave-Kapandji)
  - Baldwin procedure
  - Hemi-interposition arthroplasty; less instability of distal ulna
  - Avoid implants
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- ### Extensor tendon reconstruction
- EDQ/EDC 5 rupture: EIP transfer
  - EDQ/EDC 4.5 rupture: EIP transfer to EDQ and adjacent juncture EDC 4 to 3
  - If more than 2 then use FDS ring to EDC/EDQ

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Flexor tendon ruptures: FPL, Index flexors in wrist over scaphoid tubercle  
Differential Dx: AIN palsy



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Flexor tendon ruptures: FPL, Index flexors

- FPL often reconstructable if not ruptured in sheath
- Arthrodesis of the IP joint if destroyed
- FDS ring transfer to FPL

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Prosthesis Placement



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### How do I decide how to guide patient in their decision

- Bilateral disease
- Adequate bone stock
- 50\*-60\* of motion
- Non crutch walker
- Arthroplasty non-dominant, arthrodesis dominant wrist
- If you do the arthroplasty first they will request the same on the contralateral wrist

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### PIP Arthroplasty

- Traditionally performed w/ Swanson silicone implants
- New pyrocarbon implants gaining popularity for osteoarthritis
  - Soft tissue balancing/stability remain difficult in RA



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### PIP Arthroplasty

- Long term assessment of Swanson implant arthroplasty of PIP in OA, RA
  - Takigawa, et al JHS Sept. 2004
    - Provides pain relief but no change in motion or correction of deformity
    - Poorer outcomes in RA

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### Metacarpophalangeal joint arthroplasty in rheumatoid arthritis: What determines satisfaction with surgery?

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| <ul style="list-style-type: none"><li>• MCP motion</li><li>• Grip strength</li><li>• 3-point pinch</li><li>• Key grip</li><li>• Large light objects*</li><li>• Ability to write</li></ul> | <ul style="list-style-type: none"><li>• Hold small objects</li><li>• Pain relief*</li><li>• Perform ADL</li><li>• APPEARANCE**</li></ul> |
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### Thumb ray

**Boutonniere thumb:**

- MCP flexion
- IP hyperextension
- CMC usually spared

**Surgical options**

- MCP arthroplasty
- IP arthrodesis
- Try to avoid fusing both joints; never fuse all 3

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### Boutonniere Thumb



The image contains two side-by-side visualizations. On the left is a clinical photograph showing a thumb in a hyperextended position. On the right is an X-ray of the thumb, showing the metacarpophalangeal (MCP) joint in a flexed position and the interphalangeal (IP) joint in a hyperextended position, characteristic of a Boutonniere deformity.

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### Thumb ray

**Swan neck deformity**

- CMC usually involved
- MCP hyperextension
- IP flexion

**Surgical options**

- CMC resection arthroplasty
- MCP fusion
- IP spared



The image shows two X-rays of a hand. The left X-ray shows a swan neck deformity of the thumb, characterized by hyperextension at the MCP joint and flexion at the IP joint. The right X-ray shows a normal thumb joint for comparison.

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### Development of Hand Surgery in Inflammatory Arthritis

- Synovectomy
- Tenosynovectomy
- Arthroplasty
- Arthrodesis

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Does surgery “cure” synovitis and tenosynovitis?

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### outline

- Now go into why rheum won't refer pts, talks should be aimed at rheum, list of tubiana, nalebuff, manner felt, moberg, etc
- Can wait too long-show slide
- List soft tissue procedures
- Emphasize outcome studies and patient satisfaction and appearance
- Philosophy of reconstruction
- Then go into individual joints

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[Clin Exp Rheumatol, 1989 Sep-Oct;7 Suppl 3:5145-8](#)  
**Surgical treatment of the rheumatoid hand.**  
[Zinsman H, J. Goldstone E](#)  
**Author information**  
**Abstract**  
 Multiple involvement of joints and tendons of the hand by rheumatoid disease is frequent and may result in severe deformities. Surgery plays a major role in an integrated treatment program that considers the patient's possibilities for improvement. Extensor and flexor tenosynovitis requires an early synovectomy to prevent tendon rupture, to restore tendon gliding and to decompress the median nerve at the wrist level. Ruptured tendons are usually widely degenerated and restoration of function is provided by end-to-side repair, tendon grafts or tendon transfers. Joint synovectomies must be performed at an early stage to be effective. Restoration of function in eroded, dislocated or unstable joints can be obtained by arthroplasty or arthrodesis. A resection arthroplasty usually complicated by a silicone implant corrects the deformity while preserving or restoring a functional range of motion. Flexible implant arthroplasty is very often performed in the metacarpophalangeal joints, and less frequently in the wrist and interphalangeal joints. Arthrodesis is a satisfactory procedure for those joints where stability is more important than motion.

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PIP Joints

- ARTHRODESIS

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PIP Joints

- Swan Neck and Boutonniere
- Motion more important than at DIP joint
- Motion important in the more ulnar digits
- Stability more important in border digits
- Arthrodesis vs. Arthroplasty



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General Rules

- Index finger arthrodesis preferred
  - Lateral stability needs to be maintained for pinch
- PIP arthrodesis preferred in setting of MP arthroplasty, although PIP/MP arthroplasty may give good results
- Arthroplasty: choice of implants variable

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### Pseudo-Boutonniere

- Misnomer as most boutonniere deformities not passively correctable
- Poor results from soft tissue reconstructions
- X-ray appearance
  - Joint destruction, marked flexion contracture->fusion
  - Good joint (rare), consider arthroplasty

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### Swan-neck deformity

- Must be considered in light of MCP joints
- X-ray appearance
- FDS tenodesis rarely indicated
- Manipulations gives best results when done with MCP arthroplasties

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