Extensor Tendons Finger Deformities
Finger joints deformities in rheumatoid arthritis

- Boutonniere deformity
- Swann neck deformity
- Mallet finger deformity
The classics

The rheumatoid Hand and Wrist
J. Stanley

Lluch A:
The treatment
of the finger joint deformities
in the rheumatoid arthritis

Churchil Livingstone Dec,2000
boutonniere and swan neck: imbalanced posturing @ IP joints

TRAUMA
- Specific injury
- Localized
- Can affects one tendon

RHEUMATOID ARTHRITIS
- Systemic disease
- Involves all the tissues
  - Skin
  - Vessels
  - Synovium
  - Bones
boutonniere and swan neck: imbalanced posturing @ IP joints

- Extrinsic and intrinsic tendon system balances IP’s
- Loss of static restraint
- Tendon
  - Attenuation
  - Rupture
  - Contracture
- Alteration of joint motion
- Strectching of the ligaments
Boutonniere and swan neck can appear in the same hand.

Figure 2. This patient with rheumatoid arthritis has swan-neck and boutonniere deformities in the same hand. The swan-neck deformities are different types: type II in the index, type III in the middle, and type IV in the ring finger. The PIP joints of the middle and ring fingers are stiff, and the types can only be distinguished by radiographs. The boutonniere deformity in the small finger is stage II.
Swan neck

- Hyperextension PIP + Flexion DIP
- SYNOVITIS at any joints: MP PIP DIP
- MP j rebalancing difficult
- Carpal collapse contributes to the deformity lack of the tenodesis effect
- EX & IN unbalance leading to Intrinsic plus position
Swan neck as a disturbance @ PIP

Type I

- Full flexibility of PIP, popping lateral bands passing over condyles
- Difficulty with initiating PIP flexion
- TX restriction of extension:
  - Silver Ring Splint
  - Plastic static extension limit splint
- Surgery: DIP arthrodesis w/ dividing terminal tendon
- FDS flexor PIP tenodesis
- ORL reconstruction
Swan neck as a disturbance @ PIP
Type II

- PIP joint motion is limited
- MP j position influences PIP motion
  - Intrinsic tightness test (+)
- Surgery: ulnar intrinsic release
- DIP arthrodesis for mallet finger
- MP arthroplasty
- FDS flexor PIP tenodesis
- PIP temporary fixation in 20 degree flexion
Swan neck as a disturbance @ PIP Type III

- Considerable stiffness & loss of function
- Contracture of extensors, ligaments and the skin
- Nalebuff suggests:
  - joint manipulation with pinning
  - lateral band mobilization
  - As well as a MP arthroplasty
  - Extension block splint as an after treatment option
Swan neck as a disturbance @ PIP
Type IV

- Severe intra-articular destruction
- Arthrodesis PIP with MP arthroplasty
- Arthroplasty PIP while “adjacent joints, soft tissues and tendons are intact”
Boutonniere deformity

- Pathology located at the PIP
- Synovitis distends the joint
- Central slip is stretched out
- Lateral bands are spread out
- Retinacular ligaments contract
  - Flex the PIP
  - Hyperextend DIP (diagn) distinguishes from PIP contr
  - Positive intrinsic-intrinsic plus test
Boutonniere deformity

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- Central slip is stretched out
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- Retinacular ligaments contract
  - Flex the PIP
  - Hyperextend DIP (diagn) distinguishes from PIP contr
  - Positive intrinsic-intrinsic plus test
Positive retinacular sign with contracture of the retinacular ligament
Boutonniere deformity  stage I

PIP synovitis with correctable extension lag
DIP lack of active flexion
Night extension splint  + cortisone injection
Surgery: DIP terminal tendon release  (?)
with preservation of the ORL
Boutonniere deformity stage II

- 40 degree of flexion contracture PIP
- For good MP and DIP
- PIP imbalance despite cortisone and splinting:
  - Littler reconstruction
  - None of the procedures for boutonniere reconstructions is predictable enough to return major function of the digit.
Boutonniere deformity stage III

- Fixed flexion + intra-articular erosion
- **Arthrodesis** - bone resection required predictable results
  attention: do not stretch n-v bundle
  assess circulation before the dressing
- **Implant arthroplasty + extensor realignment**
  immobilisation for 2-3 wks
  dynamic splint
Alberto Lluch: The treatment of finger deformities in RA

Describes the functional anatomy
Emphasizes the role of the synovitis and ligaments in IP joints deformities and the factor of the aesthetic appearance as an indication for the surgery
boutonniere

Fig. 5. – a) Division of the central slip alone will not cause a boutonnière deformity, as the lateral bands by themselves will provide for joint extension. b) Progressive elongation of the interconnection between the central slip and the lateral bands will cause a progressive anterior displacement of the latter. c) Boutonnière deformity is characterized by the protrusion of the concyles of the proximal phalanx in between both lateral bands. The triangular ligament will elongate and the transverse retinacular ligaments will remodel in a shortened position.
Boutonniere staged:

I  “partially” correctable deformity

II  fixed deformity
   with loss of passive extension 15-40 degree

III joint destruction   A or A
The correction of boutonniere deformity presents a dilemma to the surgeon:

- Treatment of early deformities can make the finger worse,
- While advanced deformities are difficult to treat and may give poor results.
Boutonniere Tx

- PIP joint synovectomy
- Correction of DIP joint hyperextension
- Extension improvement of the PIP
  - Passive
  - Active anatomical reconstruction
  - Active by means of tendon graft
  - Active by means of tendon transfer
- Arthrodesis or arthroplasty
Correction of DIP joint hyperextension

- Division of the distal extensor tendon
- Dorsal capsulotomy
- Skin left open to heal by 2\textsuperscript{nd} intention

**Fig. 6.** Different tenotomies used for the treatment of a hyperextension of the DIP joint. a) Fowler. b) Dolphin and Littler. c) Curtis. d) Tubiana.

**Fig. 7.** Correction of severe and chronic hyperextension of the DIP joint. Skin incision, division of the extensor tendon distal to the insertion of the ORL and division of the dorsal capsule. The resulting skin defect is covered by a full thickness skin graft.
Correction of DIP joint hyperextension

- Division of the distal extensor tendon
- Dorsal capsulotomy
- Skin left open to heal by 2nd intention

- Arthrodesis if indicated
Extension improvement of the PIP

- Requires meticulous anatomical repair
- Full passive joint extension
- Surgery if splinting program fails:
  - Flexion contracture manipulation or release
  - Extensor apparatus repair:
    - Central slip,
    - PL tendon graft,
    - Lateral band, FDS transfer
Fig. 9. - Different surgical procedures used in treatment for reconstructing a boutonnière deformity.
Arthrodesis preferred for index & middle

25 deg IF and 40 deg for SF more aesthetic
40 deg IF and 65 deg for SF more functional

Position of the index according to the thumb

flexion deformity of the PIP
is better tolerated if MP extends
Arthroplasty PIP in boutonniere

- REQUIREMENTS
- Painlessness
- Stability
- Mobility
- Durability
Arthroplasty PIP in boutonniere

Results unpredictable

- Joint destruction AND
- Disruption of the extensor apparatus

INDICATED for the ring and small fingers
Arthroplasty PIP in boutonniere

- Recommended flexible silicone implants

THE GOAL

Reduced joint motion
in a more functional arc of motion
Swan neck deformity pathogenesis

- Carpal collapse contribution is questionable. PRC, DRF does not cause SN.
- MP synovitis with anterior subluxation of the P1? MPj synovitis without SN & SN without synovitis MP.
- PIP synovitis & ligaments disbalance? → flexion.
- Elongation of the volar plate from flexors or PIP synovitis → YES IT DOES.
Swan neck deformity pathogenesis

- FDS rupture but not in the RA
- DIP j synovitis + extensor deterioration: rare
- Intrinsic muscle factors – adaptive shortening?
- Synovitis of the flexor tendons restricts ROM
- with substitute use of intrinsic muscle for MP j flexion
Nalebuff classification of swan neck

- **I** PIP flexion is normal:
  - elongation of the TRL, volar plate
  - dorsalization of the lateral bands

- **II** PIP flexion is limited:
  - + retraction of the intrinsic muscle > ulnar

- **III** PIP flexion limited in all positions
  - + dorsal retraction ext. app. & capsule

- **IV** PIP stiffness with joint destruction
  - + instability and cartilage destruction
Swan neck deformities are both esthetically and functionally more disabling than boutonniere deformities, mainly the stages where there is a loss of active PIP joint flexion.
Swan neck deformity treatment opts

- Correction of the **mallet finger** deformity
  - **Arthrodesis DIP** improve a function and appearance
- Correction of PIP joint hyperextension:
  - Dermadesis, tenodesis FDS, capsulodesis,
  - TRL, ORL retinacular ligament reconstruction
- Improving active and passive PIP joint flexion:
  - Digital flexor **tenosynovectomy** and tenolysis- all digit @ time
  - Manipulation, K-wire pinning, lateral bands release
- **Intrinsic muscle release** ulnar side for III degree
- PIP joint arthroplasty
- PIP joint arthrodesis: prefered for the index finger for rupture of both flexor tendons, MP arthroplasty
Oblique retinacular ligament reconstruction made from lateral band.

And from the tendon graft.
Mallet finger deformity

- The description comes from Segond 1880
- Drop finger – Bunnell 1948
- Mallet finger – Boyes

- Small arch of motion – 70-90 degree of flexion
- Synovitis is less common but could be severe
  contributes to the Zig-Zag theory of Landsmeer
  in PIP hyperextension
Mallet finger deformity

- Early stages: Extension ALU splint
- Flexible deformity: extensor tendon repair
- Synovitis: synovectomy
  for secondary to a swan neck: ORL reconstruction
- Joint destruction: arthrodesis IMF-extension
  RSF- flexion
The treatment of RA finger deformities could be challenging but the results are not promising.

The pathology, function, restraints should be assessed at the every joint level: IP’s MP Wrist.

Applying the proper conservative Tx is valuable.

To meet the patient needs and existing pathology.

Surgery: meticulous anatomic repair.

FU close supervision to the every REHA step.