Boutonniere and Swan Neck Deformities

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Nomenclature

- Extensor
- Extensor mechanism
- Intrinsics
- Dorsal apparatus: flexes MCP joint and extends PIP, DIP joint

[Diagram of hand showing muscles and tendons related to Boutonniere and Swan Neck deformities]
Anatomy of the dorsal apparatus

- Complex system of tendons/ligaments
- Combination of two separate systems
  - Intrinsic
  - Retinacular ligaments
- Coordinates movements between joints

Boutonniere Deformities

- Definition:
  - Position
    - Flexed PIP -> hyper-extended DIP -> hyper-extended MCP
    - Imbalance between muscle and tendon units across finger joints
    - Deformity begins at the PIP, adjacent joint changes are secondary

Boutonniere Deformities

- Etiology:
  - Injury to PIP joint
    - "jamming" injury retrograde force on end of finger, i.e. ball sports
    - Collapse of intra-articular chain
      - DIP flexion
      - PIP hyperextension with or without dorsal dislocation
**Pseudo-Boutonniere Deformity**

- Fixed Flexion Deformity (FFD) of PIP joint
- Flexion variable, usually normal with time
- DIP deformity not usually fixed
- No subluxation of lateral bands
- This is a PIP joint injury and changes in dorsal apparatus are secondary

**Pseudo-Boutonniere Deformity**

- Trauma
- Attenuation (inflammatory arthritis, Dupuytren’s)

**True Boutonniere Deformities**

- Trauma:
  - Laceration of central slip
  - Palmar dislocation (by definition any palmar dislocation->central slip rupture)
- Full passive extension of PIP joint
  - Initially presents extensor lag at PIP
  - Lateral bands fall volar to PIP axis; PIP extensor/intrinsics becomes a flexor
  - DIP hyperextension follows in several weeks
• True Boutonniere Deformities

French name: “button-hole deformity”

• Laceration
• Dorsal burn
• Rupture of the central tendon due to trauma (volar dislocation)

True Boutonniere Deformities

Treatment of Pseudo-Boutonniere injuries

• Reduce swelling and pain
  • Splinting
  • Compression dressing
• Prevent PIP flexion contracture
• Restore AROM and PROM of MP/PIP/DIP
• Explain to patient that some FFD may remain
Treatment of the True Boutonniere injuries

- Splint 6wks full extension @ PIP with DIP flexion exercises, 4-6 wks intermittent pm splinting
- Like a mallet finger one joint proximal
- Allows central slip to heal

A multitude of options...

Boutonniere Deformities

- True boutonniere deformities can become fixed mimicking pseudoboutonniere deformities
- Etiology important for treatment
  - Must correct FFD of PIP joint
Surgical Treatment

- Rarely necessary
- Must have full, passive PIP extension
- In cases of FFD, need to stage and do capsular release 1st and dorsal apparatus reconstruction 2nd
- Multiple procedures including intrinsic transfers
- Consider digit-widget

Surgical Treatment

- Too much for most patients
- Almost never regain a full ROM at PIP joint
- Lose virtually all DIP flexion or develop extensor lag at DIP
- Prolonged period of rehabilitation
- IS IT WORTH IT?

Swan Neck Deformity

- Posture in which the PIP joint is hyperextended and the DIP joint is flexed
- Lack of voluntary DIP extension
- Functional loss relative to PIP flexibility
- All swan-neck deformities are not the same
**Swan Neck Pathophysiology**

- Altered functional dynamics
  - If PIP hyperextends, the lateral bands ride dorsally → decreases distal tendon tension → results in droop of DIP into flexion

**Swan Neck Deformity**

- Trauma
  - "jamming injury", instead of resulting in boutonniere deformity, ruptures volar plate
  - Hyperextension causes "locking" with digital flexion as normal flexion cascade disrupted
  - Lateral bands slide over condyles of proximal phalanx
  - Can be misinterpreted as trigger finger

**Swan Neck Deformity**

- Trauma
  - Long standing instability can lead to DJD
- Mallet finger
  - Rare
  - Usually in patients who have laxity
- PIP joint supple
Swan Neck Deformity

- Congenital
  - Most common
  - Rarely symptomatic
- Intrinsic tightness
  - Ischemia
  - Spasticity
- Inflammatory arthritis
  - Synovitis
  - Intrinsic tightness

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Swan Neck Deformity

- Supple
- Fixed
  - Maintained PIP joint
  - Destroyed PIP joint

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Non-operative Tx

Splinting can be definitive for supple SN deformities: figure of eight
**Surgical treatment**
- Supple SN deformity due to trauma
  - Volar plate repair or FDS tenodesis
- Mallet
  - DIP arthrodesis
  - Central slip release

**Flexor tenodesis**
- Strong internal splint to PIP hyperextension
- One slip FDS divided proximal to MCP, left intact distally
- FDS Sutured to itself around A2 pulley
- Suture in 20-30° flexion at PIP
- Post-op: Early flexion, extension-block splint for 4-6 wks

**Fixed Swan Neck Deformities**
- Depends on status of joint
- Joint preserved
  - Intrinsic release
  - PIP capsulotomy
  - FDS tenodesis
- Arthritic joint
  - Prefer arthrodesis
  - Arthroplasty requires soft tissue stabilization
• Rheumatoid Arthritis
  - Severe deformity; can have different deformities in one or both hands
  - MCP arthroplasty and PIP fusions

Jaccoud' syndrome SLE

• don’t forget that proximal phalanx is an intercalated segment between PIP and MCP
• Need to correct any MCP deformity at same time or PIP reconstruction will fail (unless fused)

MCP arthroplasty and PIP manipulation