

REVIVING HANDS CONGRESS
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CROWNE PLAZA AIRPORT

Challenge of "boutonnière" and Swan neck

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1

Boutonniere deformity

PIP flexion
DIP hyperextension

2

Boutonniere deformity : physio pathogeny

PIP flexion, DIP hyperextension

Development of deformity

- Central slip disruption
- Triangular ligament attenuation
- Lateral bands subluxate volar
- Transverse retinacular ligaments retracts
- Increased intrinsic pull increases terminal tendon tension

3

Boutonniere deformity : diagnosis

- Elson test : Flex PIP → if central slip is disrupted DIP will be in rigid extension
- Haines test : PIP joint hyperextended → If central slip is disrupted, DIP will have limited passive motion secondary to a tight oblique retinacular ligament.
- Rubin test : MP joint is hyperextended. If central slip is disrupted, cannot completely extend PIP.

4

Boutonniere deformity : classification

Tableau 6.1. Classification de la déformation en boutonnière selon Nalebuff et Millender (1975) et ses conséquences thérapeutiques.

	Stade I	Stade II	Stade III
IPP	Déficit d'extension de - 10 à - 15° réductible passivement	Déficit d'extension de - 30 à - 40° partiellement réductible	Enraidissement en flexion
IPD	Légère hyperextension Flexion limitée lorsque IPP à 0°	Hyperextension modérée Flexion limitée	Enraidissement en hyperextension
MCP		Légère hyperextension de compensation	Hyperextension modérée
Traitement	Orthèse d'extension nocturne ± ténotomie exc. à P2 (Dolphin)	IPP : reconstruction de la bandelette médiane (Lester) IPD : ± Dolphin	IPP : arthrolyse, arthroplastie IPD : ± Dolphin

5

Boutonniere deformity : treatment

Stage I

- Splinting
 - DIP joint free
 - PIP joint extension
 - 6 weeks immobilization
 - 6 additional weeks of night time splinting
 - Active DIP motion
- If the limitation of the IPD is significant when the PPI is in extension → Tenotomy
 - Dolphin
 - Littler
 - Tubiana
 - Curtis

Dolphin Tenotomy of the lateral bands

6

Boutonniere deformity : treatment

Stage II

At this stage, the extension function of the PIP must be restored, while the hyperextension of the DIP must be corrected

Littler - Eaton technique

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7

7

Boutonniere deformity : treatment

Stage III

Stiffening of the PIP in flexion with bone destruction.

Arthroplasty

Arthrodesis

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8

8

Swan-neck deformity

DIPJ Flexion

PIPJ Extension

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9

9

Swan-neck deformity

• physiopathogeny

- Trauma
 - Late mallet injury
 - Terminal tendon (F) rupture and lengthens with healing
 - Lateral bands (E) bowstringing dorsally
 - Additional PIP extension force transmits through transverse retinacular ligament (O)
 - PIP volar plate laxity allows hyperextension
- Inflammatory
 - Deformity can only progress if sufficient PIP volar plate laxity allow hyperextension
 - Synovitis
 - Inflammatory > post-traumatic
 - Early disease
 - More severe deformity = joint of origin

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10

10

Swan-neck deformity

Type	Mechanism	Etiology
Extrinsic	Increased extensor force on middle phalanx	<ul style="list-style-type: none"> - Chronic mallet finger - MP or wrist flexion contracture - Extensor overpull
Intrinsic	Tightness or contracture of intrinsic muscles	<ul style="list-style-type: none"> - Chronic MP volar subluxation - Ischemic contracture - Intrinsic tightness - Tendon adhesion
Articular	Injury or degeneration to volar structures of PIP joint	<ul style="list-style-type: none"> - Volar plate laxity/disruption - FDS injury

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11

11

Swan-neck deformity

Disruption of Terminal Tendon

Extrinsic causes

due to PIP hyperextension caused by excess traction on EDC

- Disruption of terminal tendon (mallet finger)
- Chronic post-traumatic wrist or MCP flexion contracture
- Tendinous adhesion or muscular shortening of EDC
- Extrinsic spasticity of EDC

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12

12

Swan-neck deformity

Intrinsic causes

due to overactivity or contracture of interosseous or intrinsic muscles

1. Spasticity of intrinsic associated with neurological conditions
2. Fibrosis with ischemic intrinsic muscle contraction in compartment syndrome
3. Ulnar intrinsic tendon shortening or contracture in RA associated with MCP flexion, volar subluxation, and ulnar drift
4. Adhesion or scarring of intrinsic tendon with contraction

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13

Swan-neck deformity

Articular causes

due to weakening or destruction of volar stabilizing mechanism at PIP joint

- Volar plate disruption (open, closed)
- Articular fracture with resulting PIP volar instability
- Loss of FDS function including surgical or traumatic disruption or paralysis
- Attenuation of volar plate or ORL secondary to articular synovitis
- Acquired dorsal PIP capsule contracture
- Congenital PIP joint volar laxity

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14

Swan neck deformity : clinical exam

- Active and passive movement at MCP, PIP, DIP

Bunnell-Littler Test (Finocchio-Bunnel)

Capsular restriction

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15

Swan neck deformity : radiology

X-ray often confirms clinical examination

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16

Swan neck deformity : classification

Nalebuff Classification 1989

- Type I - PIP joints flexible in all positions
 - No intrinsic tightness or functional loss
- Type II - PIP joint flexion limited in certain positions
 - Intrinsic tightness
 - Limited PIP motion with extended MCP with ulnar deviation
- Type III - PIP joint flexion limited in all positions
 - Near normal radiograph
- Type IV - PIP joints stiff with poor radiographic appearance

Zancolli (1979)

Cause	Etiology
Extrinsic	Disruption of the terminal tendon (Mallet finger)
Intrinsic	Wrist or MCPJ flexion contracture
	Chronic MCPJ volar subluxation
Articular	Ischemic contracture
	Tendon adhesion
	Volar plate/capsule injury (hyperextension)
	Disruption of FDS

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17

Swan neck deformity : Treatment

Type	MP	PIP	DIP
I	none	Splint FDS tendodesis Volar plate repair SORL Lateral band reloc Dermodesis	splinting arthrodesis
II	Intrinsic release MP recon	Intrinsic release +	splinting arthrodesis
III	Intrinsic release MP recon	Capsulotomy, flexor tenolysis, intrinsic release +	splinting arthrodesis
IV	Intrinsic release MP recon	Arthrodesis Arthroplasty +	splinting arthrodesis


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18

Swan-neck deformity: Treatment

Stage I

- Non-operative (>95%)
 - DIP extension splinting with PIP flexion
 - Adjust splints as deformity corrects
 - 6 weeks trial (+6 weeks nighttime splinting)
- If rupture of extensor tendon at DIP
 - tenodesis
 - arthrodesis
- If synovitis of flexors
 - dermodesis
 - tenodesis
 - reconstruction of oblique retinacular ligaments (SORL)




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19

Swan-neck deformity: Treatment

• Stage II



Active flexion of the PIP is limited when the MCP joint is placed in extension
Finocchio test

- Bunnell : disinsertion of interosseous muscles = effective but aggressive
- Littler technique: dorsolateral ulnar resection of the interosseous expansion at the base of P1

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20

Swan-neck deformity: Treatment

• Stage III

The stiffening and flexion limitation of the IPP exist regardless of the position of the MCP

- Closed or open manual Nalebuff mobilization



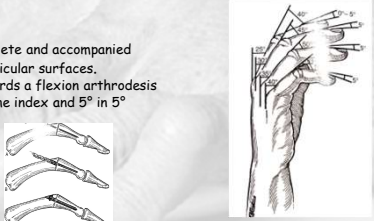
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21

Swan-neck deformity: Treatment

• Stage IV

- Stiffening of the IPP is complete and accompanied by alteration of the articular surfaces.
- It is preferable to move towards a flexion arthrodesis of the PPI of 25° for the index and 5° in 5° to reach 40° for D5.




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22

Swan-neck deformity: Treatment

• Operative

- Volar plate repair
- FDS tenodesis
- Joint fusion (DIP Joint)
- Central slip tenotomy
 - If DIP extension lag < 30
- Spiral oblique retinacular ligament
 - If DIP extension lag > 30



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23

Conclusions

Differences	Boutonnire deformity	Swan-neck deformity
Signs	PIP Flexion DIP Hyperextension	PIP Hyperextension DIP Flexion
Symptoms	Aesthetic concern	Functional immobility
Causes	Pathology at the PIP only	Pathology at wrist, MCP, PIP, DIP
Biomechanics	Volar migration of lateral bands	Extension > Flexion force
Classification	Nalebuff and Millers Classification	Nalebuff Classification
Treatment	Splints Tendon Release Joint Surgery	Splints Tendon Release Joint Surgery

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24



25