TREATMENT OF
GRADE 1 TO 3A
THUMB HYPOPLASIA

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Nancy
Any reason to such a restricted field?

• Grade I to IIIA of thumb hypoplasia: Reconstruction of the existing thumb

• Grade IIIb and IV: Index finger pollicisation
Nothing of financial value to disclose...
Thumb Hypoplasia: A spectrum...

**Manske’s Classification**

**Blauth’s Classification**

Credits: Management of thumb Hypoplasia, WB Kleinman, Hand Clinics, 1990, 6 (4), 617-641
Grade 1

Type 1

Slight decrease in thumb size

Normal intrinsic muscles

Ossified phalanges and metacarpal

Normal S-T-T complex

Normal distal radius
Grade 1 hypoplasia
STRATEGY IN GRADE I THUMB HYPOPLASIA

No treatment !!!
Grade 2

Type 2

Adducted posture

M.P. U.C.L. instability

Slender phalanges and metacarpal

Underdeveloped or absent thenar muscles

CMC instability
Grade 2
CLINICAL FEATURES OF GRADE II THUMB HYPOPLASIA

- Functional impairment
  - Power of grasp (?)
  - Opposition
  - Narrow web space (?)

- Cosmetic consequences
  - Contour of the Thenar eminence
  - Too slender thumb
Grade IIIA and IIIB of thumb Hypoplasia

Type 3A

- Severe decrease in thumb size
- Absence of thenar muscles
- ? Absence of scaphoid
- ? Absence of radial styloid

Type 3B

- Severe decrease in thumb size
- Unstable C.M.C. joint
- Absence of thenar muscles
- Variable absence of trapezium and scaphoid
- ? Absence of radial styloid
Grade IIIA

Type 3A

Severe decrease
in thumb size

Absence of thenar
muscles

? Absence of scaphoid

? Absence of radial
styloid
Instability of the MCP joint in a grade IIIA thumb hypoplasia
Ulnar sided instability

Radial sided instability
«Pollex abductus» a variant of Grade IIIA thumb hypoplasia
CLINICAL FEATURES OF GRADE IIIA THUMB HYPOPLASIA

• Functional impairment
  - power of grasp (?)
  - opposition
  - narrow web space (?)
  - instable MP joint (ulnar side and/or radial side)
  - instable CMC joint
  - ROM of the IP and MP joints

• Cosmetic consequences
  - Contour of the Thenar eminence
  - Too slender thumb
Type 4: Pouce flottant

- Anomalous neural ring
- Distal midaxial origin of floating thumb
- Absent thenar and extrinsic thumb muscles
- Fully developed neurovascular pedicle
- Abnormal position of radial artery
- Variable absence of trapezium and scaphoid
- ? Absence of radial styloid

Grade IV
Type I
- No surgery

Type II
- Reconstruction of the existing thumb

Type IIA
- Reconstruction of the existing thumb

Type IIIB
- Index finger pollicisation

Type IV
- Index finger pollicisation

Indications
• Improve stability of the MP joint
  ▶ ligamentoplasty
• Increase the power of grasp
  ▶ Opponens plasty
• Enlarge the first web space
  ▶ web plasty
• Increase the Range of Motion of the IP Joint
Vanc…Lisa, 2004, Pre-op  
Vanc…Lisa, 2011, follow-up
GOALS

Results of a combination of surgical steps including a first web plasty, an opponens plasty and an MP Joint ligamentoplasty
MATERIALS AND METHODS

• Retrospective study, 1998 to 2006

• 14 patients, three bilateral cases

• Age: 22 to 180 months, mean 64 months

• 10 grade IIIA and 7 grade II

• Right hand: 10 cases
Functional Evaluation
(preop and postop)
FUNCTIONAL ASSESSMENT

• Spontaneous posture of the thumb
• Ability to handle small objects
• Fully opposable thumbs versus side to side pinch between the index and middle finger
FUNCTIONAL ASSESSMENT

Stability of the MCP joint

- **No instability** (less than 30° of angular deviation with provocative maneuvers)
- **Mild instability** (30 to 60° of angular deviation with provocative maneuvers)
- **Severe instability** (more than 60°)
FUNCTIONAL ASSESSMENT

IP and MP motion (pre & postop)

Active and Passive ROM of the IP and MP joint
Kapandji’s Score

FUNCTIONAL EVALUATION

Retraction of the first web space

Comparison with the opposite side

• Absent, mild or severe
FUNCTIONAL EVALUATION

Overall function of the reconstructed thumb

Standardized set of manual tasks designed by Manske to evaluate the results of pollicisation

METHODS...
METHODS : SURGICAL TECHNIQUES

Enlarging the first web space...

First web plasty : **four-flaps Z plasty** in mild cases (grade II)

4 cases
Combination of a kite flap + LLL plasty

METHODS: SURGICAL TECHNIQUES

Enlarging the first web space...

Omega K-wire
Opponens plasty with a ring finger superficialis tendon
MP ligamentoplasty

UCL alone or both UCL + RCL
Extrinsic Tendons abnormalities

- Search for abnormal connexions between extensor and flexor tendons \textit{(pollex abductus)}
- No attempt in this series to retrieve and correct such abnormalities at the forearm level
RESULTS

First web space enlargement

• First web space was inadequate in 15/17 cases

• Kite flap + « LLL plasty » : 10 cases
  - All flaps fully completely
  - Average improvement of M1-M2 angle : 15°
  - Maximal breadth of the skin island : 15, 5 mm (12 to 20)
RESULTS

Mobility

• Mean opposition score: **6** (5 to 8)
• Mean active ROM of the IP joint: **21°** (0° to 60°)
• Mean active ROM of the MP joint: **43°** (30 to 60°)
RESULTS

Stability

Pre-Operative findings

- Instability involving at least one side of the MCP joint (either UCL or RCL) \(16/17\)
- Ulnar sided instability: \(14/17\)
- Radial sided instability: \(10/17\)
- Isolated radial sided instability: \(2\) cases
RESULTS

Stability

Post-operative assessment

• Ulnar sided instability: all but one case was improved
  
  - 3 cases of severe instability (sup to 60°): residual laxity of more than 30°

• Isolated radial sided instability: residual angular deviation: less than 20°
RESULTS

Use

• Grasping large objects with the reconstructed thumb: All but one case

• Handling small objects with a fine tip to tip pinch: 3 failures (still use of a II-III lateral pinch)
Grade IIIA Opponens plasty

Kite flap + triple L

Omega Kwire

Pre-Operative X ray

Double ligamentoplasty

Post-op
Final functional evaluation:

43 months follow-up
DISCUSSION...
OTHERS OPTIONS FOR FIRST WEB ENLARGEMENT

• Strauch and Sandzen (1975) : flap from the dorsal aspect of the thumb
  ▶ Skin graft of the donor site

• Spinner (1969) : pedicle flap from the radial side of the index
  ▶ Skin graft of the donor site
FOUCHER’S KITE FLAP

- Can be designed to match the shape of the skin defect
- Primary closure of the donor site
- Easy to harvest?
- Reliable
FOUCHER’S KITE FLAP

Bad reputation?

- Anatomical variations
- Technical trick: thick pedicle with a strip of the aponeurosis of the dorsal interosseous muscle

Discussion
OPPONENTS PLASTY

Alternative: The abductor digiti minimi flap (Huber-Littler)
ABD DIGITI MINIMI VERSUS SUPERFICIALIS TRANSFER

- Difficult to reach the radial border of the thumb
  + Improve the contour of the thenar eminence no way to restore MP stability

+ Easy to reach the radial border of the thumb
  + Do not modify the contour
  + Ligamentoplasty on
INSTABILITY

- Instability on the radial side is rarely mentionned in the litterature
- Both ligament (UCL and RCL) should be reconstructed if required
TREATMENT OF EXTRINSIC TENDON ABNORMALITIES IN GRADE 3A HYPOPLASIA

• Abnormal tendon interconnexions on the radial aspect of the first ray in pollex abductus
  ▶ pulley reconstruction
  ▶ tendon transfers (EIP on EPL)
  ▶ section of abnormal tendinous connexions

• No attempt in this series to explore the flexor and extensor tendons at the forearm level (Graham and Louis, 1998)
CONCLUSIONS

• Type II and IIIA thumb hypoplasia can be functionally improved by a surgical protocol that includes a web plasty, an opponens plasty and a ligamentoplasty of the MCP joint.
CONCLUSIONS (2)

• Ulnar and radial sided instability can be encountered in grade III A patients. Both should be treated
CONCLUSIONS (3)

• The combination of a pedicled kite flap + an «LLL» Dufourmentel plasty is an effective method to enlarge the first webspace without any skin graft.
THANK YOU...