

# Thumb polydactyly

## Duplication of the thumb

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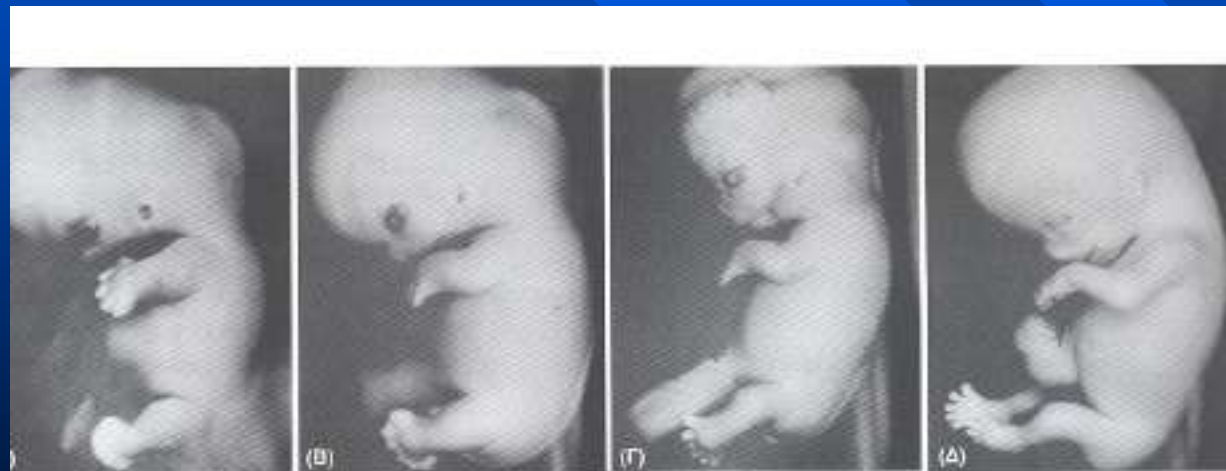
Professor G Kapetanos

# Duplication of the thumb

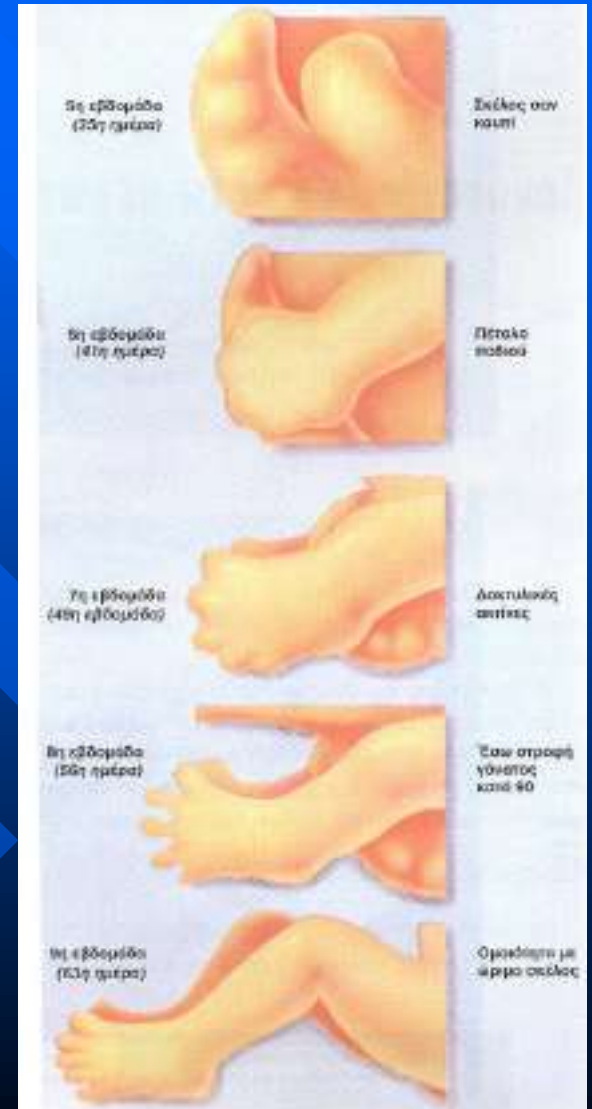


# Fetus development

- lateral Buds
- Limb formation
- Digit formation

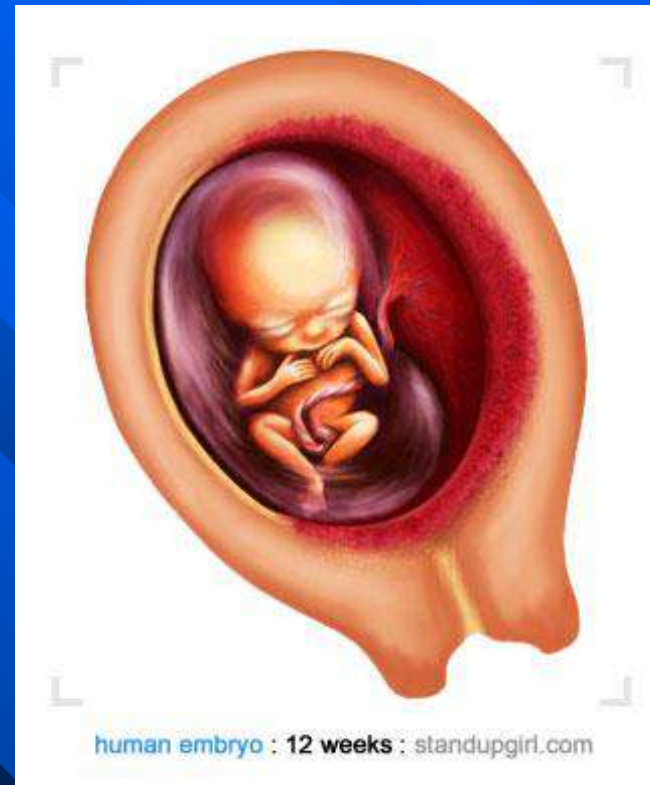


Εικόνα 1-3. Διαχωρισμός δακτύλων κατά την 8η εβδομάδα. (Α) Έμβριο 48 ημερών (Β) Έμβριο 51 ημερών (Γ) Έμβριο 54 ημερών (Δ) Έμβριο 56 ημερών (τροποποιημένη από Μουσε Κ: Έγχρωμη Κλινική Εμβρυολογία, Ιατρικές Εκδόσεις Π.Χ. Παπασχογιάνη 1997).



Εικόνα 1-2. Σχηματική απεικόνιση των κυριότερων σταδίων

# Fetus development



# Fetus development

7 week girl

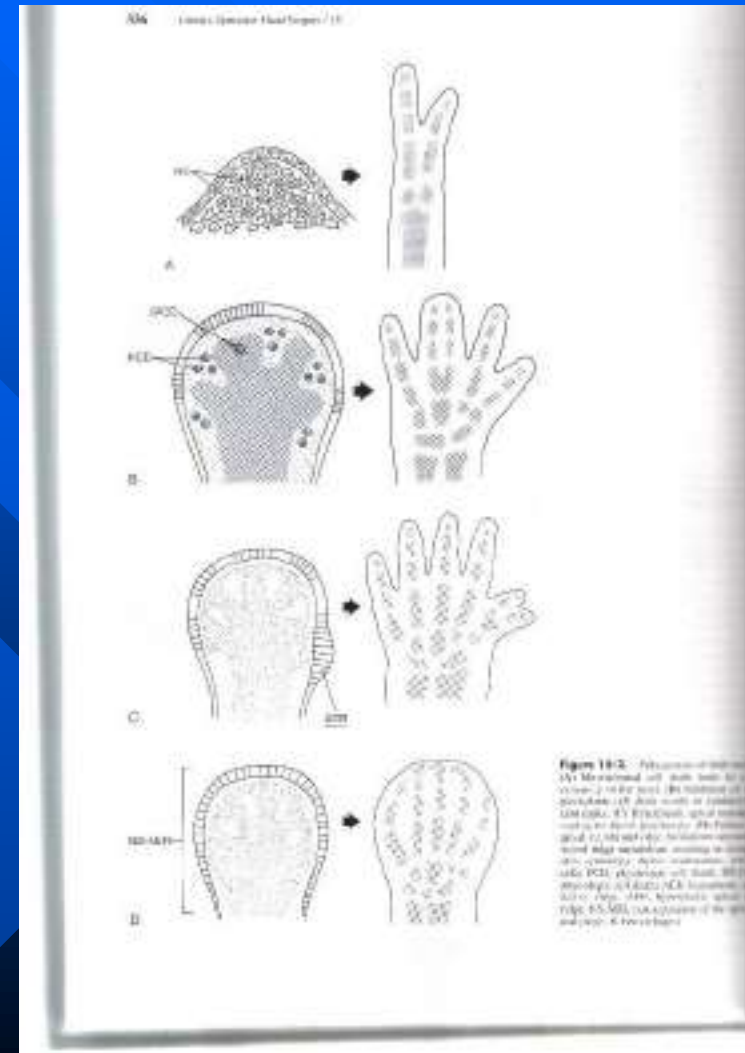


11 week girl

# Duplication of the thumb

## Embryo genesis

- Altered fetal development
- Apical ectodermal ridge  
AER
- Dorsal ectoderm
- Zone of polarizing activity  
ZPA
- Sonic hedgehog ( 4 Hox genes)



# Duplication of the thumb

## Incidence

- 0.08 per 1000 births
- Not associated with major abnormalities
- Sporadic in origin
- When there is a triphalangeal component, there is an autosomal dominant trait



# Duplication of the thumb

## Classification

- Duplication of distal phalanx
- Duplication of distal two phalanges
- Duplication by a minor thumb with noticeably less than normal size

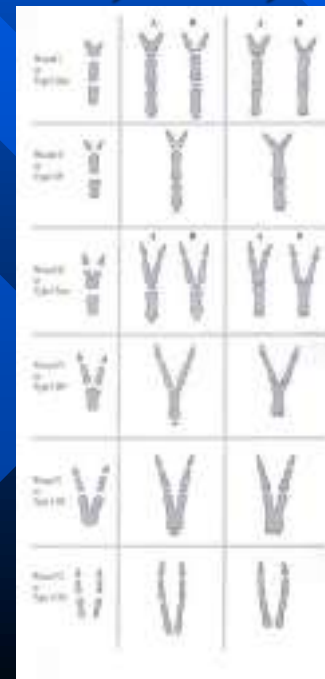
Hartrampf 1974



# Duplication of the thumb

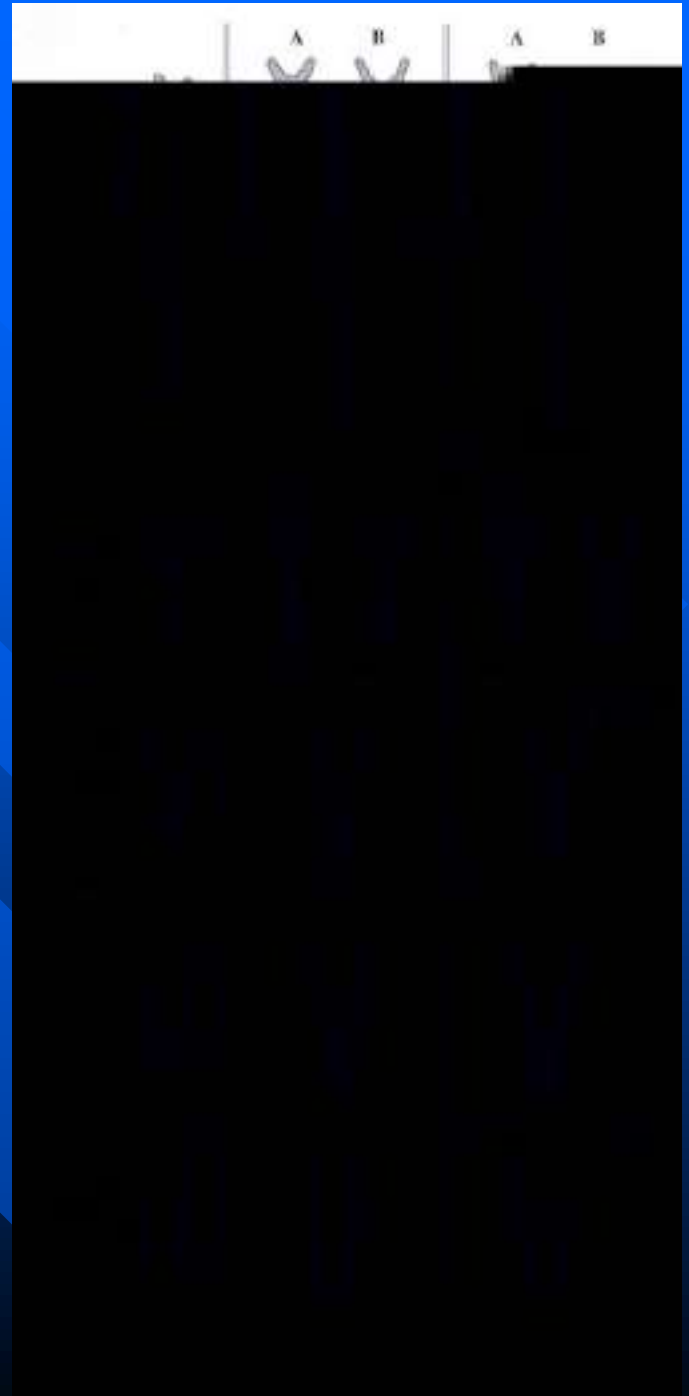
## Classification

- Wassel classification in 7 types
- Universal classification system of Buck Gramko
- I,II, III, IV,V involved ray
- Dist,DIP,MID,PIP,Prox, MP, MET, CM,C



# Duplication of the thumb Classification

- Wassel classification in 7 types



# Duplication of the thumb

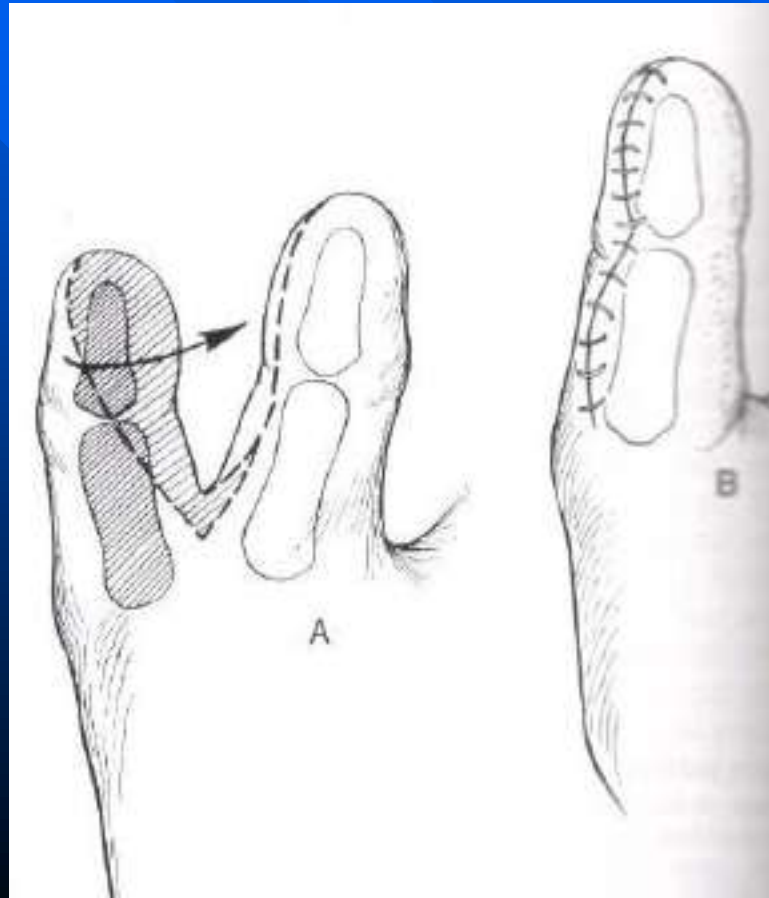
- Duplication is NOT the appropriate term
- The additional digit is rarely an exact duplicate
- The residual “normal” digit when compared with the contra lateral normal digit, is usually smaller, with a smaller fingernail
- The proximal part of the malformed digit, is wider than the normal
- INNAPROPRIATE Splitting of the finger anlage

# surgical strategy

- Reconstruction of a single mobile stable thumb
- Adequate size and contour, appropriate nail
- Straight digit with MP and IP joints at right angles to the axis of the thumb

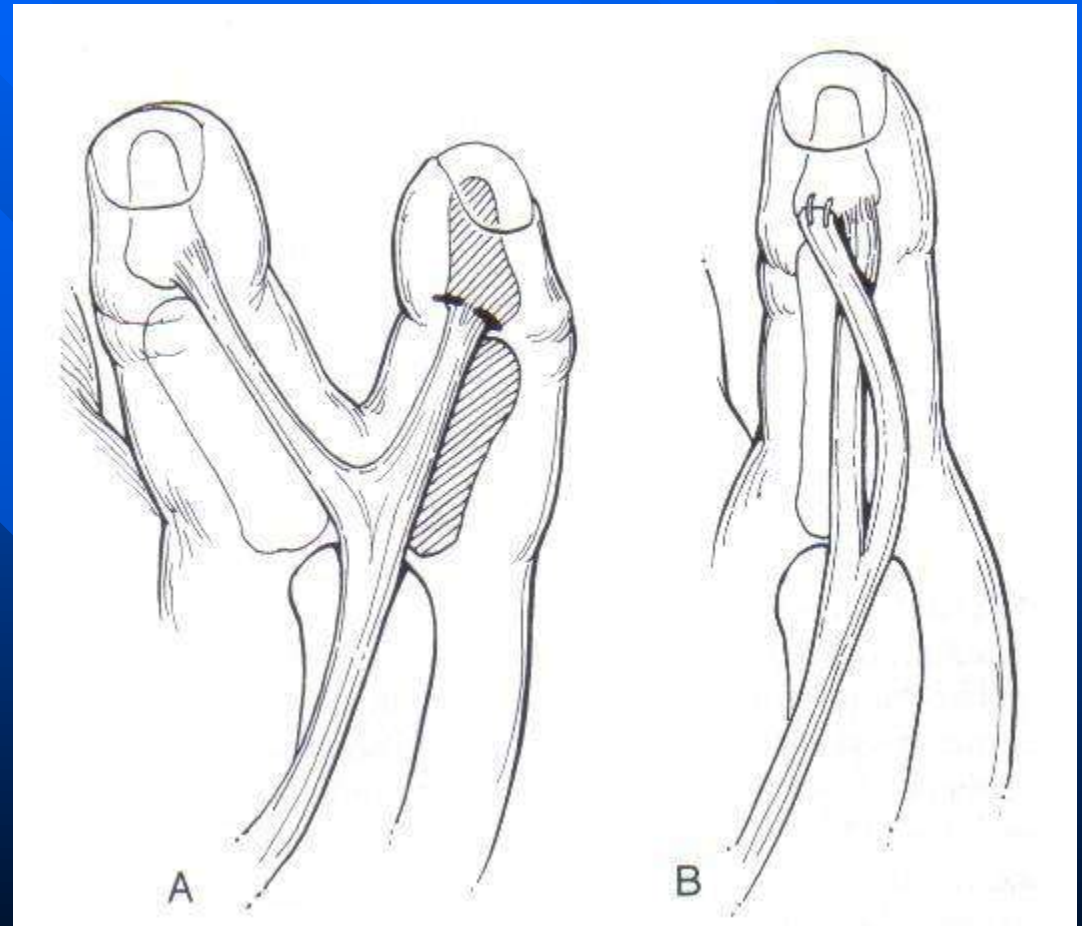
# surgical strategy 2

- Radial or ulnar component
- Almost always the radial digit is less developed
- Joint reconstruction



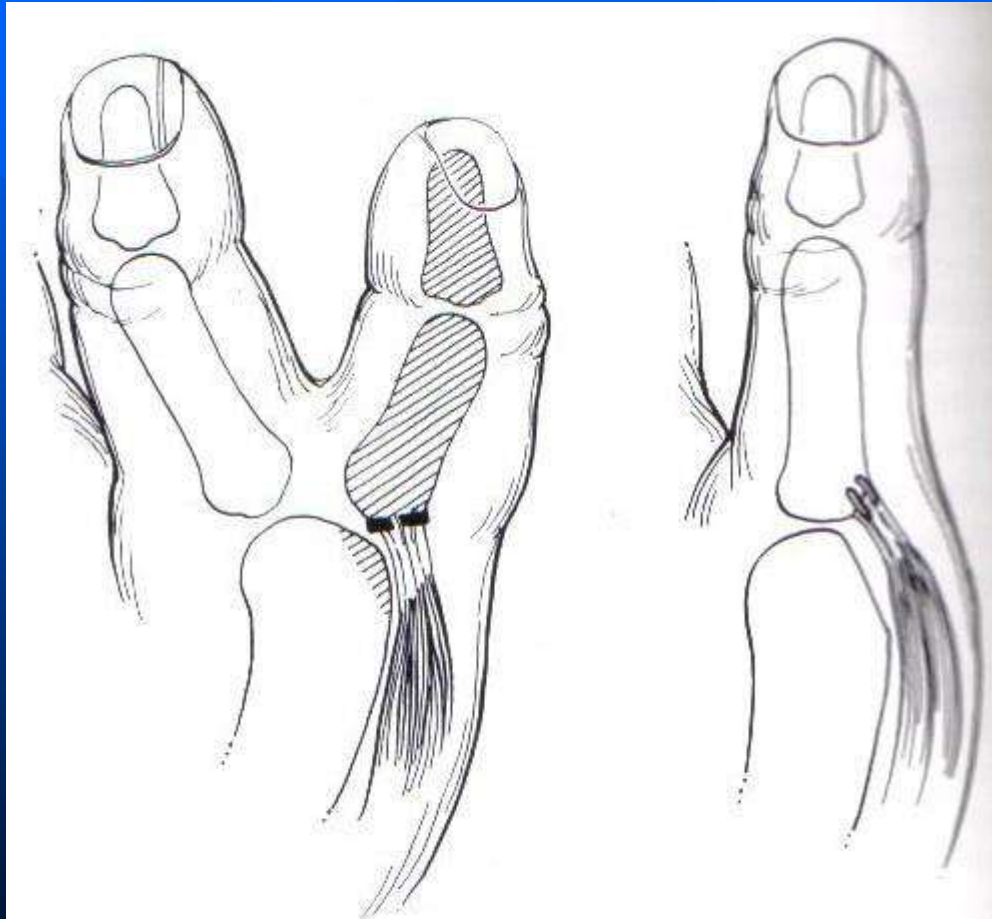
# Extrinsic flexor and extensor tendons

- Separate tendons or a single common tendon that diverge in two tendons
- Eccentric insertions on the distal phalanx
- Anomalous slip of FPL to extensor mechanism creates stiffness of the IP joint flexion
- Incidence of 20% as reported from Lister



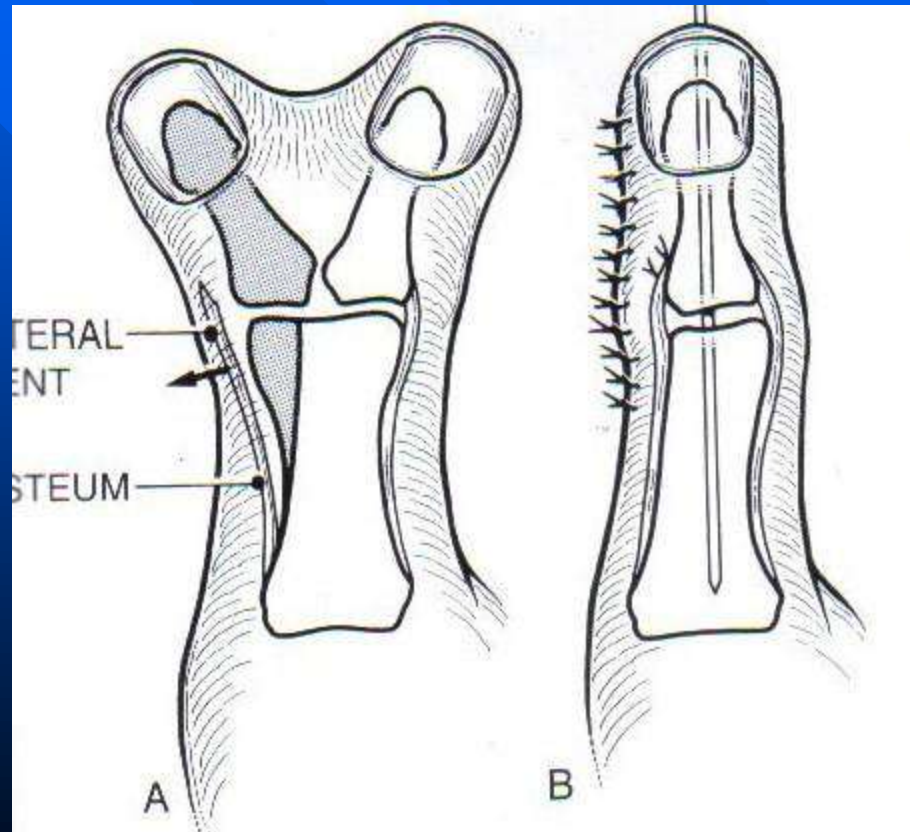
# Intrinsic muscle insertion

- Abductor pollicis brevis in the radial digit



# Collateral ligament reconstruction

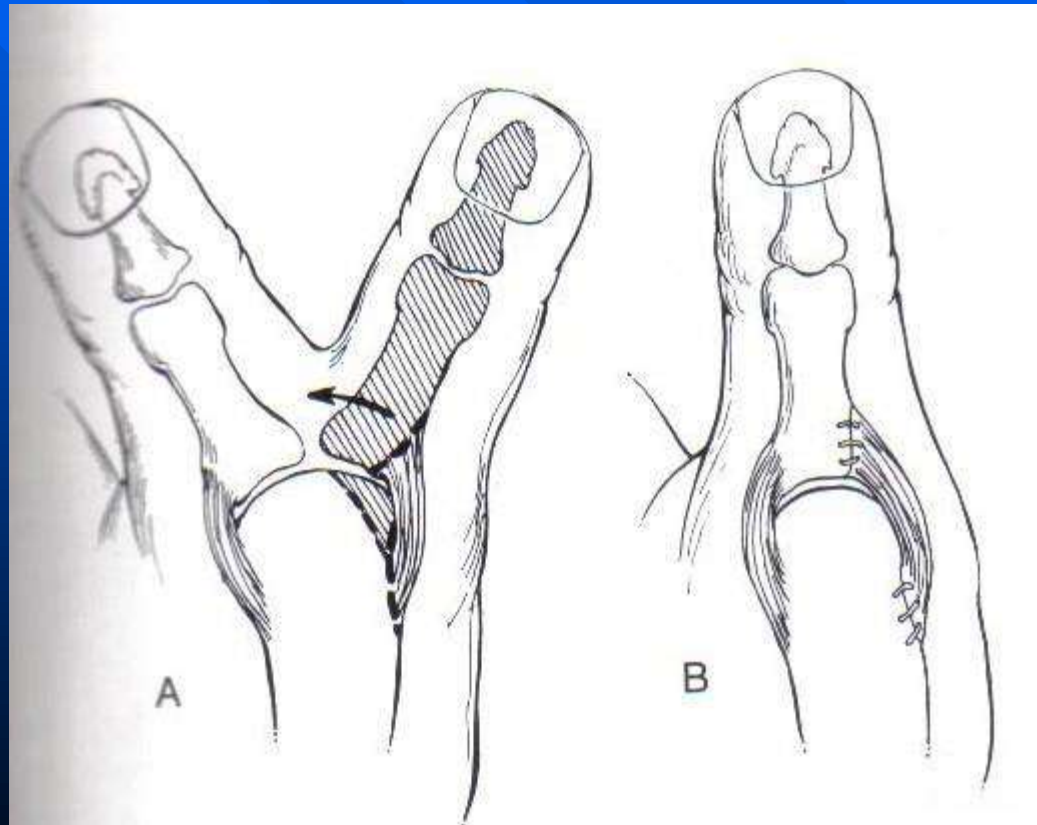
- Radial collateral ligament
- Unstable ulnar digit



# Articular surface contour

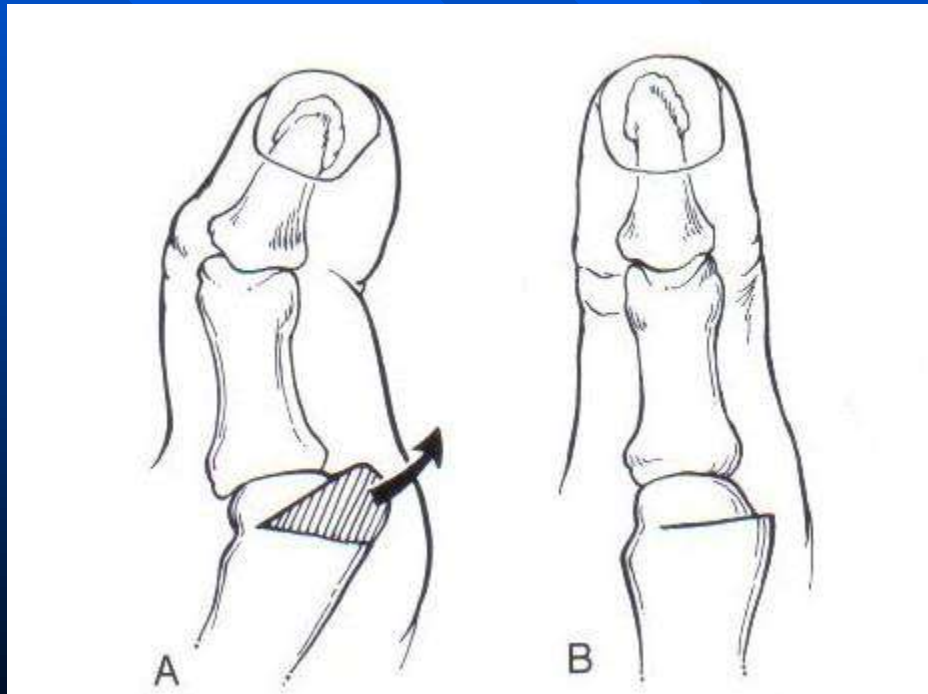
metacarpal or proximal phalangeal head width

- The uncovered bone can be narrowed with longitudinal osteotomy



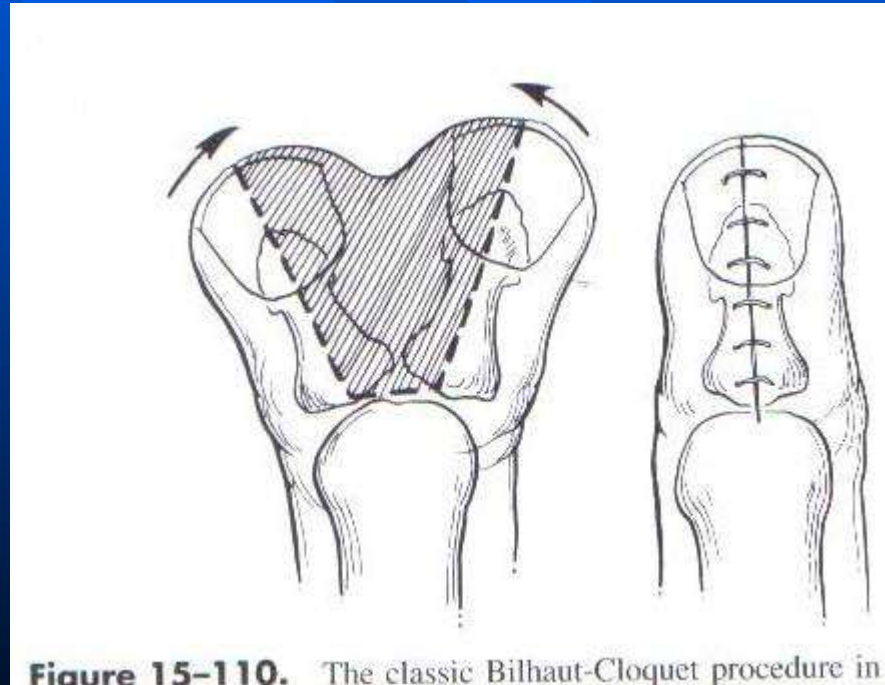
# Angular deformity

- Trapezoid proximal metacarpal or phalanx
- Closing or opening wedge osteotomy



# Distal phalangeal duplication

- Bilhaut Cloquet procedure



# Patients method

- 11 patients during 1998-2010
- All unilateral involvement
- No family history
- No other major musculoskeletal abnormality
- Surgically treated between 8m to 18 months

mp



# Kou 1



# Kou 2



# Kou 3



# Kou 4



Mar 1



Mar 2



# efraim



# Efraim 2



# Efraim 3



# charal



# Charal 2



# Charal 3



**Duplicate thumbs: a survey of results in twenty patients.**

**Andrew JG, Sykes PJ.**

**St. Lawrence Hospital, Chepstow**

**J Hand Surg [Br]. 1988 Feb;13(1):50-3.**

- Wassel 1 and 2 good results
- Wassel 3 and 4 require MULTIPLE procedures to achieve satisfactory results

## **Revision of residual deformities after operations for duplication of the thumb.**

**Kawabata H, Tada K, Masada K, Kawai H, Ono K.**

**Department of Orthopaedic Surgery, Osaka University Medical School, Japan.**

**J Bone Joint Surg Am. 1990 Aug;72(7):988-98**

- 36 patients (38 thumbs) who had residual deformity after ablation of a duplicated thumb.
- The deformities were classified into three groups: interphalangeal (eight thumbs), metacarpophalangeal (sixteen thumbs), and zigzag (fourteen thumbs).
- The indication for operation was primarily cosmetic; only eight patients had a functional disability, and that was mild.

## **Radial polydactyly: an outcome study.**

**Ganley TJ, Lubahn JD.**

**Department of Orthopaedics, Hamot Medical Center, Erie, PA 16550, USA.**

**Ann Plast Surg. 1995 Jul;35(1):86-9**

- **21 patients treated between 1979 and 1994**
- **Ablation alone was performed in 6 thumbs (6 patients), a combined procedure consisting of ablation with radial collateral ligament reconstruction and shaving of the metacarpal in 10 thumbs (9 patients), and a Bilhaut-Cloquet procedure in 5 thumbs (4 patients).**
- **Ablation with collateral ligament reconstruction and articular surface shaving improved clinical alignment and stability but did not return normal interphalangeal joint motion. The Bilhaut-Cloquet procedure improved the overall cosmetic and functional appearance but likewise did not restore normal joint motion**

# Long-term results of surgical treatment of thumb polydactyly

Ogino T, Ishii S, Takahata S, Kato H.

Department of Physical Therapy, School of Health Sciences, Sapporo Medical University, Japan.

J Hand Surg [Am]. 1996 May;21(3):478-86

- 113 hands exhibiting thumb polydactyly were treated and followed up for an average of 49 months. Of these, 109 hands were treated by resection of a supernumerary hypoplastic thumb. Radial thumbs were resected in 107 hands and ulnar thumbs in 2 hands.
- Results were evaluated as good in 97 hands, fair in 12 hands, and poor in 4 hands.
- The incidence of unsatisfactory results was relatively high in Wassel types 3, 5, and 6 and triphalangeal-type thumb polydactyly.

# Long-Term Follow-Up of Surgical Treatment for Thumb Duplication

M. LARSEN and J. P. A. NICOLAI

From the Department of Plastic Surgery, University Hospital, Groningen, The Netherlands

**Journal of Hand Surgery (British and European Volume), Vol. 30, No. 3, 276-281 (2005)**

- We reviewed the treatment of 19 of 74 patients treated at our institution between 1956 and 2002. The average follow-up was 22 (range, 7 years to 35 years).
- Satisfactory function was achieved in 18 thumbs and cosmesis in 12 thumbs. Six thumbs were cold-intolerant at this late follow-up. Pinch strength was similar to the contralateral normal thumbs.
- An objective method of postoperative evaluation showed good results in 5, fair results in 12 and poor results in 2 thumbs .

# Thumb duplication, 66 years' experience--a review of surgical complications

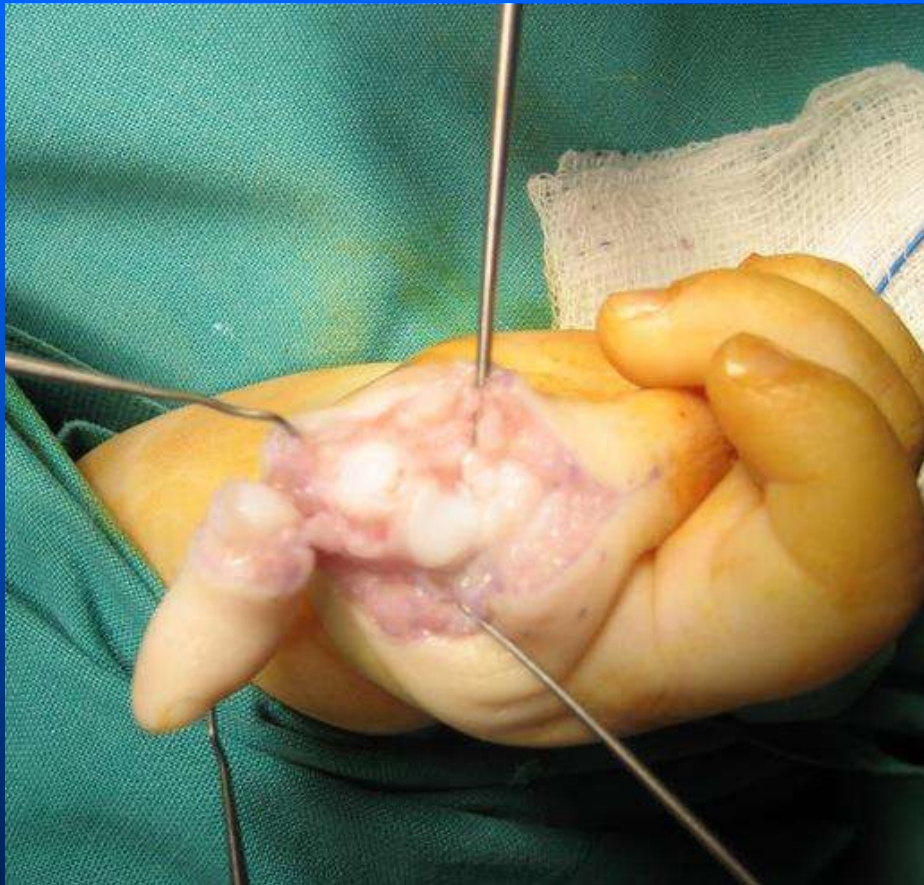
Townsend DJ. Lipp EB Jr. Chun K. Reinker K. Tuch B.  
Department of Surgery, John A. Burns School of Medicine

Journal of Hand Surgery - American Volume. 19(6):973-6, 1994 Nov

- 54 supernumerary thumbs excisions were followed for an average of 9 years for results of their surgical management, which consisted of simple excision (16 patients), reconstructive procedures (33 patients), or central wedge resections (5 patients)
- Half of all simple excisions and reconstructive procedures gave unacceptable results, most were salvaged. These were primarily joint deviations, joint instabilities, and bony prominences
- All of our central wedge resections gave unacceptable results that were not salvageable--short, stiff, fat thumbs with nail deformities. We feel this procedure should probably be reserved for cases where both digits of the supernumerary thumbs are severely hypoplastic



# Thumb duplication hamas male 2



# Thumb duplication hamas male 3



# Thumb duplication hamas male 4



## Modified Bilhaut-Cloquet Procedure for Wassel Type-II and III Polydactyly of the Thumb

By Goo Hyun Baek, MD, Hyun Sik Gong, MD, Moon Sang Chung, MD,  
Joo Han Oh, MD, Young Ho Lee, MD, and Sang Ki Lee, MD

*Investigation performed at the Department of Orthopedic Surgery, Seoul National University College of Medicine, Seoul, South Korea*

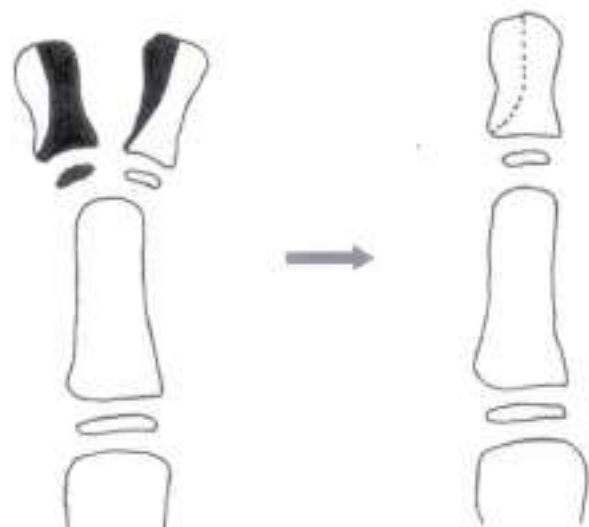


Fig. 1  
The modified Bilhaut-Cloquet procedure applied to a Wassel type II thumb. The distal area is resected, and the two distal phalangeal bones are combined end-to-end.

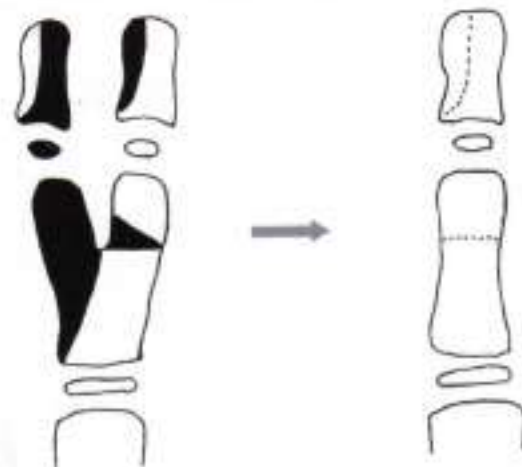


Fig. 2  
The modified Bilhaut-Cloquet procedure for a Wassel type III thumb. The two distal phalangeal bones are combined, and a corrective osteotomy of the proximal phalanx is performed.

## Modified Bilhaut-Cloquet Procedure for Wassel Type-II and III Polydactyly of the Thumb

By Goo Hyun Baek, MD, Hyun Sik Gong, MD, Moon Sang Chung, MD,  
Joo Han Oh, MD, Young Ho Lee, MD, and Sang Ki Lee, MD

Investigation performed at the Department of Orthopedic Surgery, Seoul National University College of Medicine, Seoul, South Korea

Journal of Bone and Joint Surgery - 89(3B)  
Volume 89-B, Number 3, March 2007

Wassel's Bilhaut-Cloquet Procedure for Wassel Type-II and III Polydactyly of the Thumb



Fig. 4A

Fig. 4A (through 4B) Case 1. A five-year-old boy with type II polydactyly of the left thumb.

Fig. 4A Anteroposterior (left) and anteroposterior oblique (right).

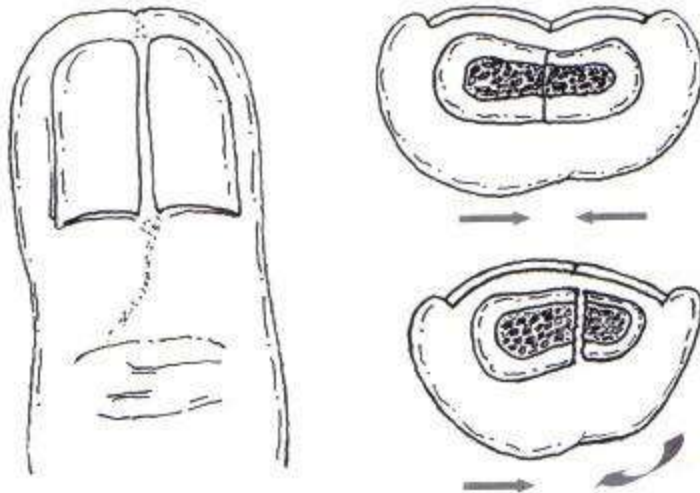


Fig. 2

Axial rotation of the distal phalangeal bone is necessary to make one sesamoid nail bed (right bottom). Axial rotation of the distal phalangeal bone in a transverse plane creates a sesamoid nail bed (right top).

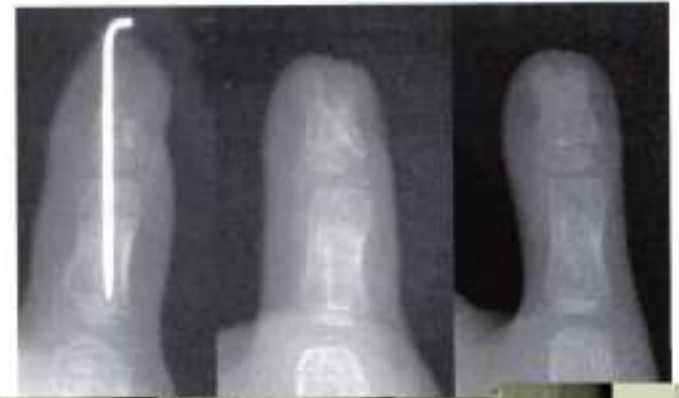


Fig. 4B

Radiographs made immediately postoperatively (left), six weeks after surgery (middle), and eight to ten months (right) after the modified Bilhaut-Cloquet procedure, showing maturing of the sesamoid nail bed.

# Bilhaut cloquet



# Bilhaut cloquet 2



# Bilhaut cloquet 3



# **The Bilhaut-Cloquet procedure for Wassel types III, IV and VII thumb duplication.**

**Tonkin MA, Bulstrode NW.**

**Department of Hand Surgery and Peripheral Nerve Surgery, University of Sydney, Royal North Shore Hospital, Sydney, Australia.**

**J Hand Surg Eur Vol. 2007 Dec;32(6):684-93. Epub 2007 Sep**

- **Five cases of Wassel types III, IV and VII thumb duplication underwent a Bilhaut-Cloquet procedure**
- **A stable and mobile metacarpophalangeal joint was achieved in all cases. Interphalangeal joint motion was limited but this joint was stable in all cases.**

**A classification system of radial polydactyly: inclusion of triphalangeal thumb and triplication.**

**Zuidam JM, Selles RW, Ananta M, Runia J, Hovius SE.**

**Department of Plastic and Reconstructive Surgery, Erasmus Medical Centre  
Rotterdam, The Netherlands**

**J Hand Surg [Am]. 2008 Mar;33(3):373-7.**

**Thumb function is critical to hand function. Despite its seeming simplicity surgery of thumb duplication is a complex procedure. Nowadays it is recognized that simple ablation leads mostly to poor functional and cosmetic results. Treatment requires a thorough preoperative assessment, as well as an appreciation and understanding of the bony, capsuloligamentous and tendinous components involved. Taking this into account in mostly all cases a satisfactory cosmetic and functional result can be achieved.**



Ευχαριστώ για την προσοχή σας

