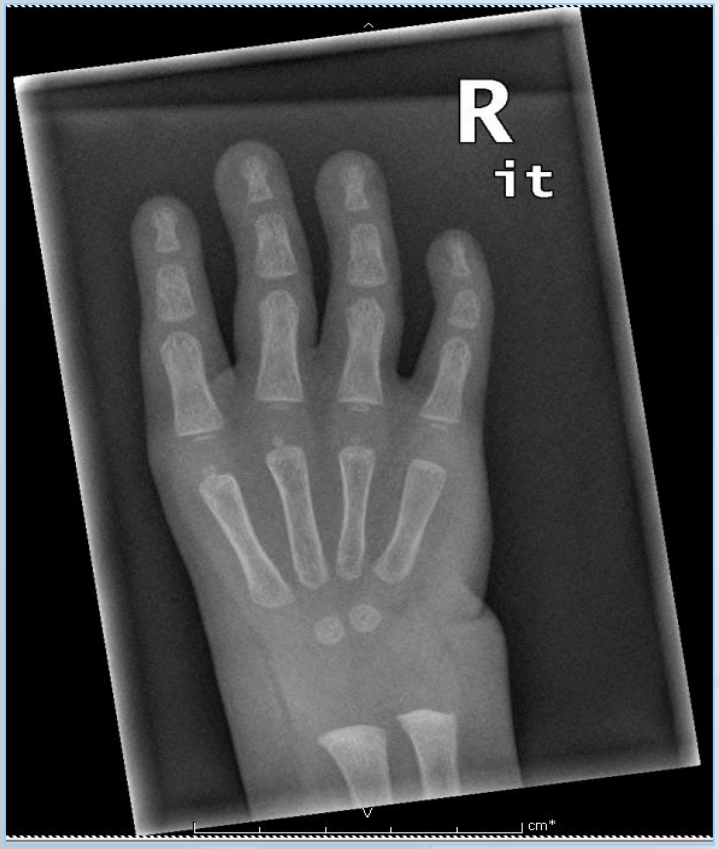
Congenital Hand Anomalies - An Overview



Occupational Therapy Department

The Royal Children's Hospital Melbourne, 2014

Presentation outline

- Incidence
- Embryology
- Classification of Congenital Hand Anomalies
- Splinting
- Surgery

Incidence

- 1 in 600 live births
- When 3 or more minor anomalies exist there is 90% chance of a major anomaly in one of the critical organ systems
  - Eg. cardiac, pulmonary, gastrointestinal, genitourinary & haematological
  - Usually in combinations identified as syndromes eg. VACTERL syndrome

Embryology

Congenital hand anomalies may result from:

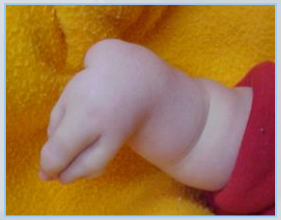
- Chromosomal abnormalities
- Inborn errors of metabolism
- Infections or other environmental factors
- Other unknown influences

Classification of Congenital Hand Anomalies

I. Failure of formation of parts (arrest of development)
II. Failure of differentiation (separation) of parts
III. Duplication
IV. Overgrowth
V. Undergrowth
VI. Congenital constriction ring syndrome
VII. Generalised “skeletal” abnormalities & syndromes

International Federation of Societies for Surgery of the Hand (ISSH)

I. Failure of formation of parts



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Radial deficiency

1. Radial dysplasia (radial club hand)
2. Hypoplastic thumb

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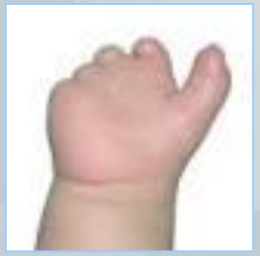

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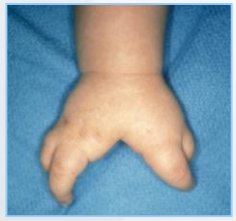
Central deficiency (involves rays 2,3 & 4)

3. Symbrachydactyly
4. Ectrodactyly



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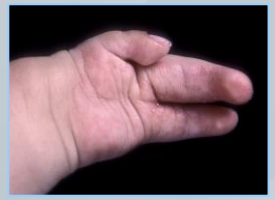

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5. **Ulnar deficiency** (Little & ring finger may be absent +/- ulna & carpal bones)

II. Failure of Differentiation of Parts

Soft Tissue involvement

1. Arthrogryposis
2. Syndactyly
3. Camptodactyly
4. Clasp thumb
5. Trigger thumb

Skeletal involvement

6. Clinodactyly

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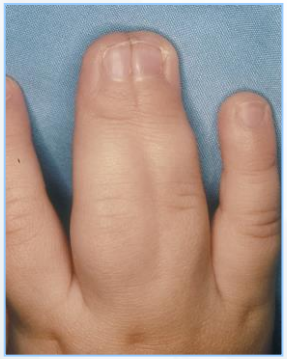

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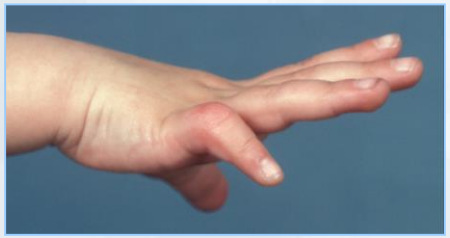

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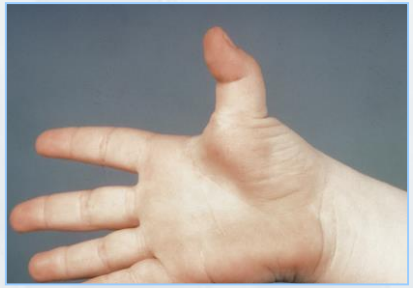

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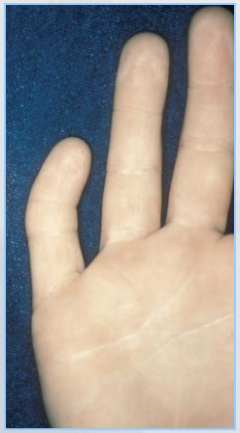

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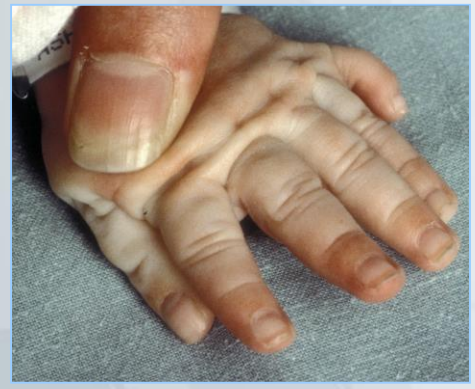
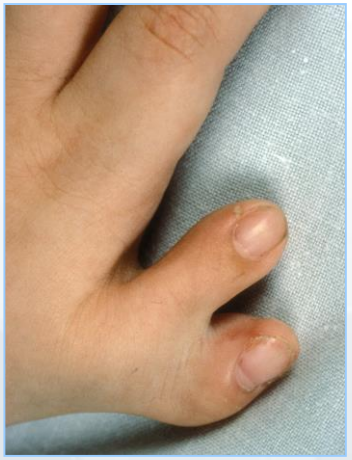
III. Duplication

Digit

1. Polydactyly



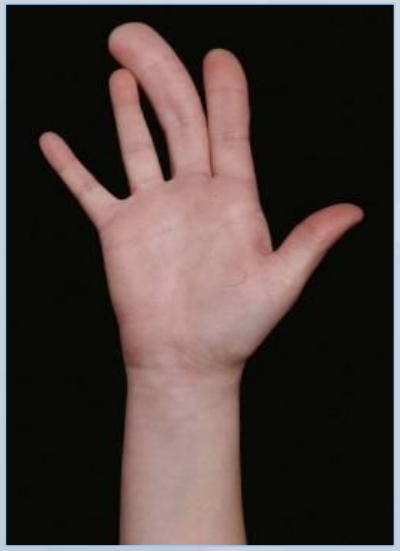
2. Duplicate thumb

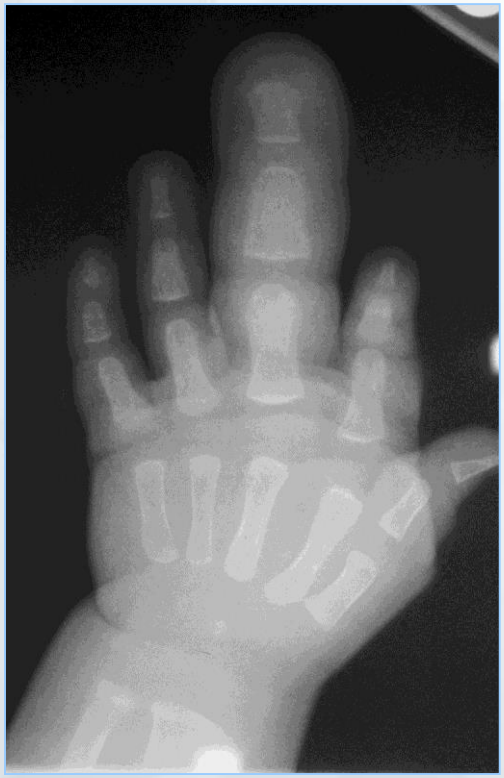


IV. Overgrowth

Digits

1. Macrodactyly





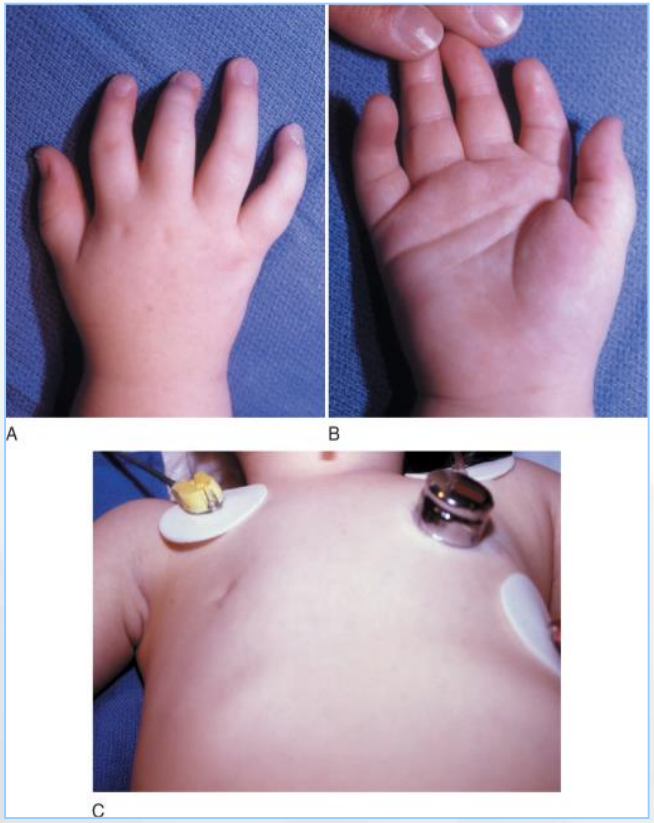
V. Undergrowth

Digits

1. Brachysyndactyly
2. Poland syndrome

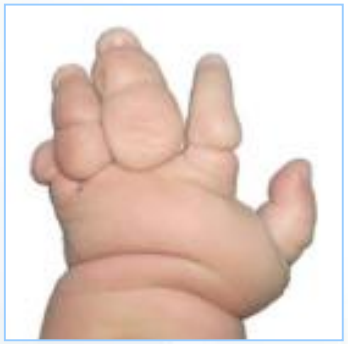
1

2



VI. Constriction Ring Syndrome

- Amniotic bands



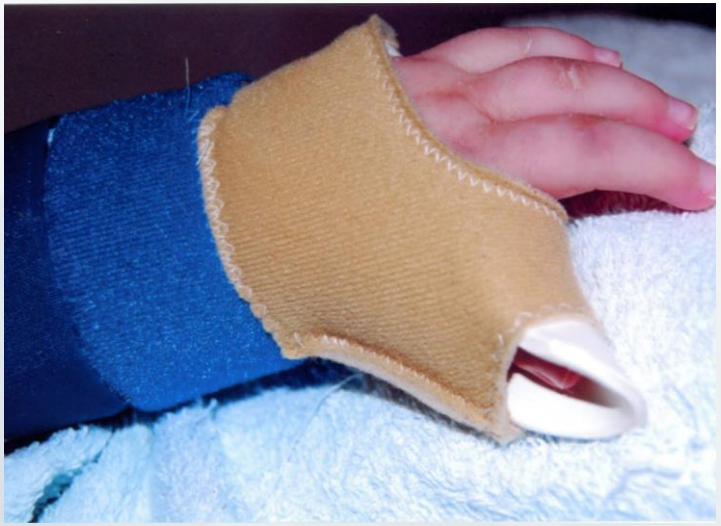
VII. Generalised Skeletal Anomalies

- Chromosomal & others

General Splinting for Congenital Hand Anomalies

Goals of treatment:

- Maximise range of motion
- Maximise functional hand use and independence in occupational performance
- Minimise secondary consequences
- Protection of structures post surgery



Splinting for Congenital Contractures

Timing and Protocol

- As early as possible after birth - Most successful correction before 4-6months
- Rigid thermoplastic splinting
- Ideal: >8-12 hours daily
- Frequent serial adjustment
- When resolved: splint overnight to maintain
- Consider developmental implications

<u>In older children & adolescents:</u>

- More time is required to serially correct
- Some residual contracture is more likely to remain
- Psychosocial issues have greater impact on compliance

Splinting for Contracture Prevention

Timing and Protocol

- From neonate
- Overnight, rest periods
- Rigid thermoplastic splinting if required
- Neoprene, lycra or elastic may be sufficient
- Functional splints may also be required

Splinting for Function

Timing and Protocol

- From neonate
- During functional hand use
- Rigid thermoplastic splinting if stability required
- Neoprene, lycra or elastic if dynamic assistance required
- Wear during functional tasks
- Not required overnight / at rest
- Consider developmental implications

Surgery for Congenital Hand Anomalies

With **early surgery**

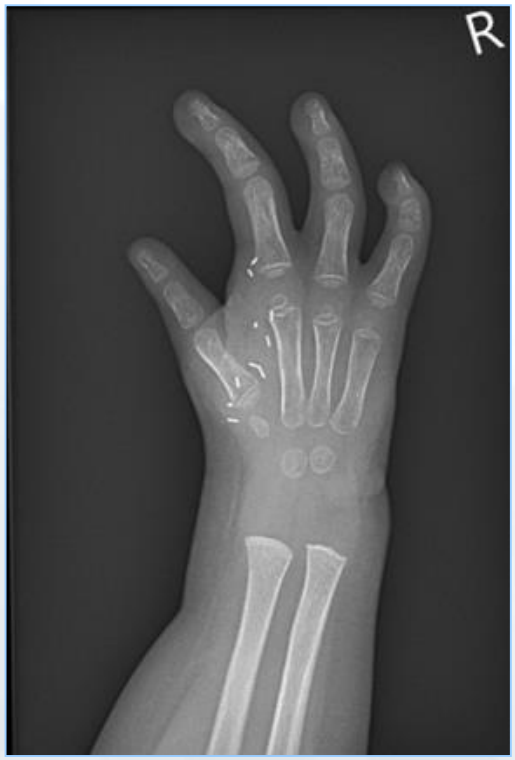
- Joints are more amenable to remoulding
- Child will develop & cortically imprint fewer bad habits
- Plasticity of the central nervous system (motor & sensory cortex) is greater

With **delayed surgery**

- Task of surgery is technically easier
- Child's functional needs are more obvious
- Child is potentially more co-operative

RCH OT Post-surgery protocols

- Hypoplastic thumb reconstruction
- Pollicisation
- Duplicate thumb reconstruction
- Toe-to-hand transfer
- Syndactyly release



*At RCH most procedures of this type will be performed on children between the ages of six months & two years

Protocols available for post-surgical management from RCH

References of interest

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Hand Clinics (2009) Vol 25, Issue 2: Congenital Hand Differences

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Bamshad, Van Heest, Pleasure (2009). Arthrogryposis: A review and update. The Journal of Bone and Joint Surgery. 91, Suppl 4: 40-6.

Occupational Therapy Department
The Royal Children's Hospital
Flemington Road
Parkville 3052
Phone (03) 9345 9300

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