Fingertip Injuries

Mr. Jason Bernard
Repair the nailbed...

Dress the pulp
Anatomy
Classification

- That part of the finger distal to the tendon insertions and flexor crease
- Allen
  - Zone I - Distal to the phalanx
  - Zone II - Follows the nailbed
  - Zone III - Nail matrix
  - Zone IV - Proximal to the nailbed
Classification
Natural History - Nailbed

- **Children**
  - 112 of 227 developed deformities when not repaired

- **Adults**
  - 27 of 100 developed deformities when not repaired
    - Chow J Hand Surg 7(5):470-6
Natural History - Nailbed
Surgical Repair - Nailbed

- Children - 22 digits, no deformities
  14 digits, 2 deformities

- Adults - 184 digits, 10% deformity
  - Zook *J Hand Surg* 1984 9:247
Surgical Repair - Nailbed

- Nail bed grafts
  - Full thickness
    - 6 digits, 100% success
    - 11 digits, good results in all
  - Split thickness 31 digits
    - 84% success
- McCash *J Hand Surg* 1983 8:171
- Shepard *J Hand Surg* 1983 8:49
Natural History - Pulp

- **Children**

- **Adults**
  - 100 injuries, >1cm²
  - 1% tenderness, 2PD 4-6mm, ROM 98% of normal
    - Allen 1980 *Hand* 12:257
    - Chow 1982 *J Hand Surg* 7(5):470
Occlusive Dressings

- 42 digits, up to 2cm$^2$ plus bone loss
- Well padded, painless, no infections, 2PD 2-8mm
- 200 digits, “Opsite” dressing, Well padded, 2PD 2.5mm
- 156 digits, 63% with bone exposed, hypothecan dressing, no science, but “deformity almost never seen”
Primary Closure

- Tenderness in 36 to 51%
- Decreased sensitivity in 17 to 24%
  - Sturman *JBJS* 1963 45(A):289
Split Skin Graft

- Compared 52 primary closures with 27 SSG
- No differences were identified
- Shortening the nerves in proximal amputations closed by residual flaps did not decrease nerve irritation. Resection of bone produced a mobile amputation-stump tip.

Full Thickness Graft

- Hypothenar
  - as a free graft
  - Zone I only, excellent results
  - 25 digits
  - 12x16mm average
  - 2PD 6-10mm
  - 9 patients had sensitivity up to 1 year
  - Schenk 1984 J Hand Surg 9A:750
Flaps

- Homodigital
  - V-Y
  - Advancement
  - Rotation
  - Island

- Heterodigital
  - Cross finger
  - Island

- Free Flaps
Thenar Flap
Thenar Flap

(Gatewood 1926)

- 56 flaps vs. 44 free grafts
  - Equivalent sensation to cross finger flap
  - Porter

- 4 digits, full ROM, pain free
V-Y Flaps
Kutler *JAMA* 1947 133:29
V-Y Flaps

Atasoy *JBJS* 1970 52(A):921
Tranquilli-Leali *Infort Traum Lavaro* 1935 1:186
V-Y Flaps
Kutler *JAMA* 1947 133:29
Atasoy *JBJS* 1970 52(A):921
Tranquili-Leali *Infort Traum Lavaro* 1935 1:186

- 22 digits, Kutler flaps, 8 tender, 6 cold sensitive, 2PD 6mm
- 28 digits, Kutler and Atasoy, 58% hypersensitive, 50% cold sensitive, 30% nail deformities
- 12 of 20 hypersensitive “sensation is not normal in almost all fingertips treated by V-Y plasty for transverse amputations.”

- Frieberg *Plast Rec Surg* 1972 50:371
- Frandson *Acta Orth Scand* 1978 49:225
Advancement Flaps
Möberg *JBJS* 1964 46(A):817
Advancement Flaps
Möberg *JBJS* 1964 46(A):817

- 69 flaps, all on fingers, <5° of Extension lost, 2PD within 2mm of normal. (90% was revision surgery)
  - Kirk Watson *J Hand Surg* 1980 5:372
- More appropriate for the thumb.
- O’Brien modification.
Advancement Flaps
Heuston 1966 *Plast Rec Surg* 37:349

- 43 digits, 30 cold intolerance, 24 nail deformity, 10 had pain, 2PD 7mm

- Foucher GJ *Hand Surg [Am]* 1994 May;**19(3)**:508-515
Neurovascular Island Flap
Island Flaps

- 16 flaps, 2PD 10mm, cold intolerance (6 patients), hypersensitivity (3)

- 44 digits, 2PD 6.2 and 10.2 mm in sensate and insensate flaps

- Reverse digital artery flap. 52 digits 2PD 6.8 mm and 3.9 mm
Cross Finger Flaps
Cross Finger Flaps

- **Smith PJ** *J Hand Surg [Br]* 1992 Feb; **17**(1):102-107
- 54 patients
- 53% suffered cold sensitivity, 50% tender
- None of the cross-finger flaps was found to have recovered tactile gnosis
Heterodigital Island Flaps
Heterodigital Island Flaps
Heterodigital Island Flaps

- Donor Morbidity
  - Cold intolerance
  - Pain
  - Loss of half of sensate pulp

- Limited benefit
  - 2PD 7mm

- Martin *CORR* 1998 353:63
Free Tissue Transfer
Reimplantation

- *J Reconstr Microsurg* 1988 Jan; 4(2):89-98 Rose EH

- Replants averaged 2PD of 9.8 mm and pulp pinch 65%
- Free toe transfers, 2PD of 6 mm, pulp pinch 58%
- Nerve reconstruction, 2PD 6 mm.
- Operating time per digit averaged 5.0 hours for replants, 4.3 for toe flaps
Reimplantation

- **Hirase** *Ann Plast Surg* 1997 Feb;**38**(2):151-157

- 49 replantations who were operated on consecutively by a single surgeon survival rate was 91.5%.


- 135 fingers

- 78% survival
Repair the nailbed...

Dress the pulp
And Finally...

- Less than ten--surgeons with amputated fingers.

- “One hundred eighty-three surgeons who had lost parts of their hands were surveyed. Only three claimed any significant professional disability; all others continued to practice operative surgery. Some even claimed that their loss resulted in professional advantage.” Brown PW *J Hand Surg [Am]* 1982 Jan;7(1):31-37