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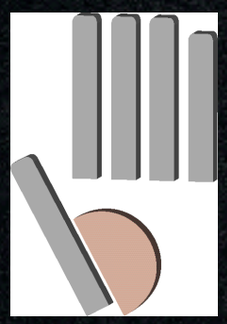
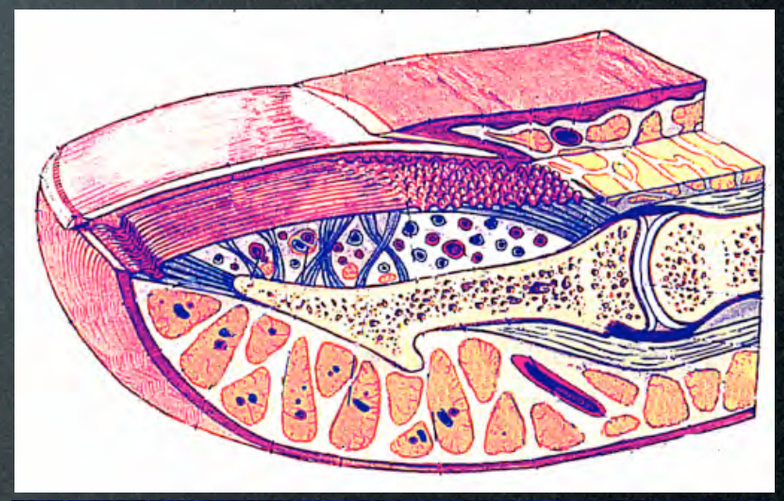
Fingertip injuries (including pulp)

Christian Dumontier,
Institut de la Main & hôpital Saint Antoine,
Paris

(Anatomical work by Brunelli)



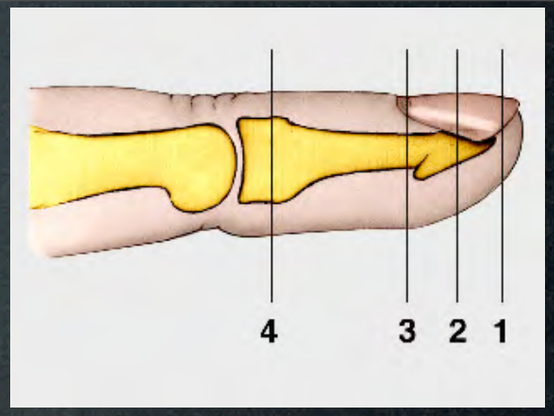
The fingertip



- Bony support
- Pulp:
  - Sensibility, prehension
- Nail apparatus
  - Sensibility, specialized organ

Fingertip injuries are the more common hand injuries

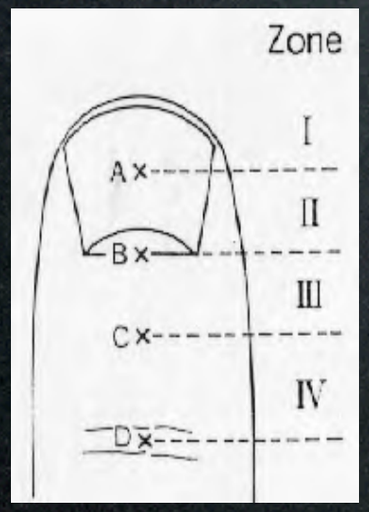
Different injuries



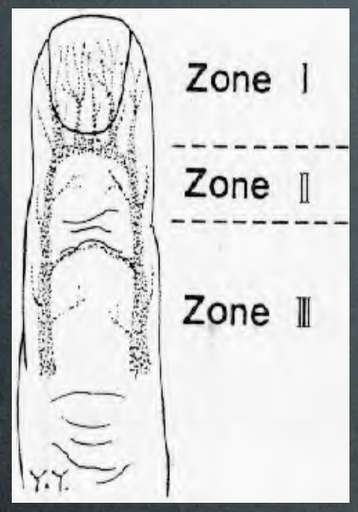
- Pulp (only) injuries
  - Preserve or reconstruct the function of the pulp
- Nail (only) injuries
  - Reconstruct nail structures
- Pulp + nail injuries (+/- bone)

Classification ?

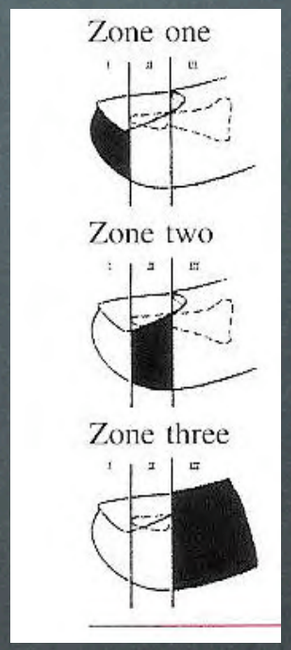
- Many classifications have been designed, mostly for fingertip amputation/replantation



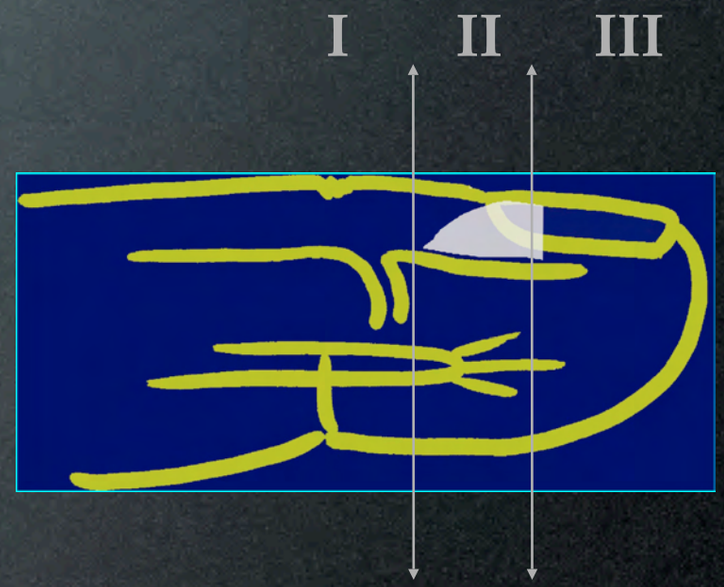
Chen



Tamai



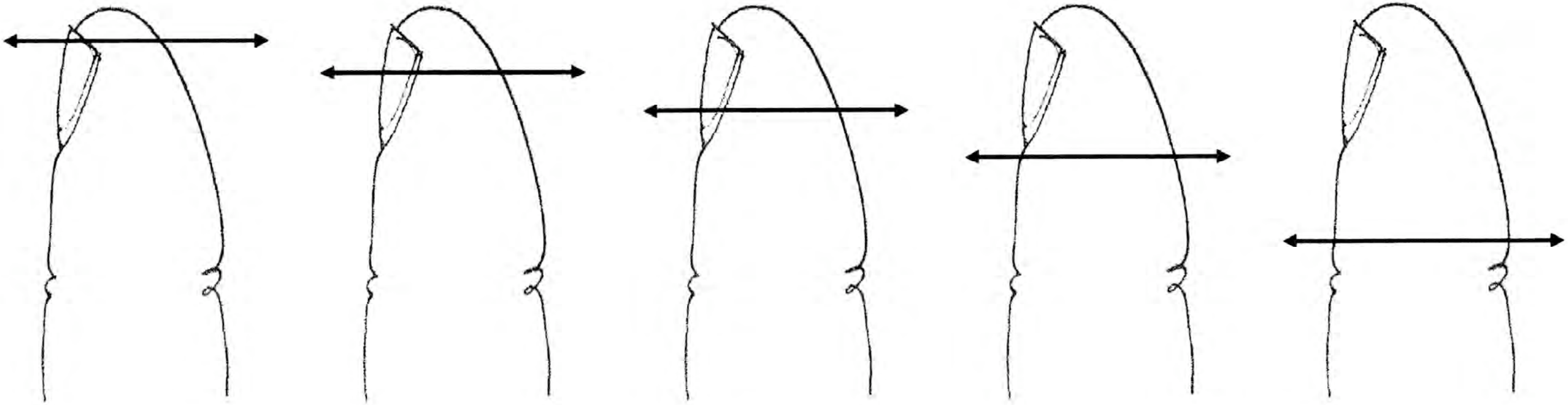
Rosenthal



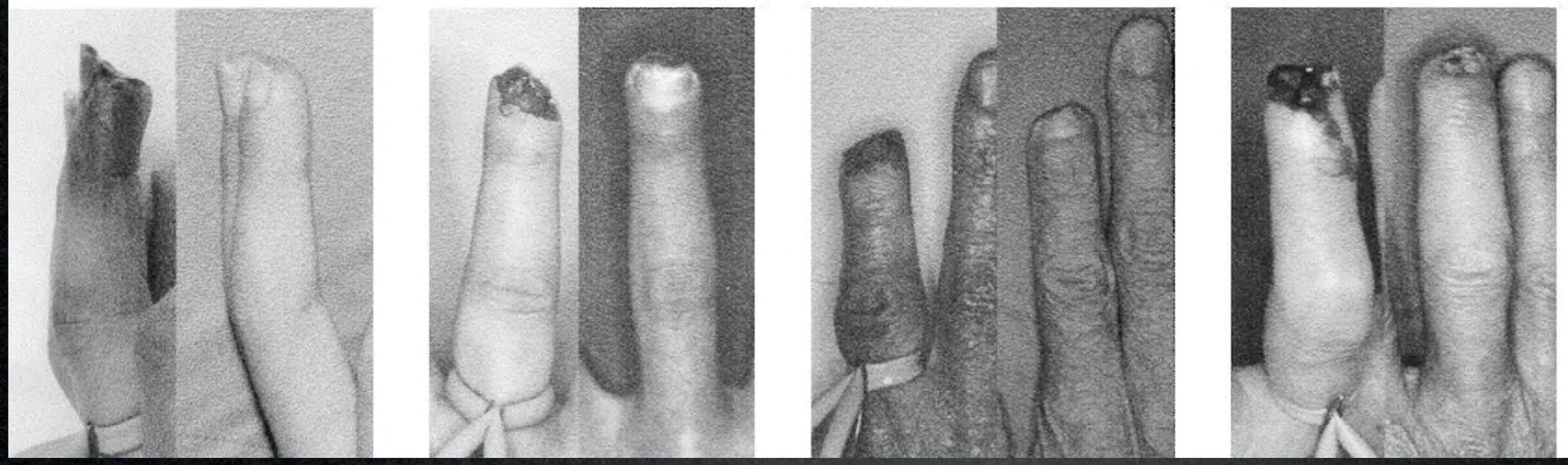
Foucher

- Evans (2000) reported the PNB classification that has proved useful (Muneuchi, Ann Plast Surg 2005) but is difficult to remember

	Pulp	Nail	Bone
0	No injury	No injury	No injury
1	Laceration	Sterile matrix laceration	Tuft
2	Crush	Germinal + sterile matrix laceration	Comminuted non articular
3	Loss-distal transverse	Crush	Articular
4	Loss-palmar oblique partial	Proximal nail bed dislocation	Displaced basal
5	Loss-dorsal oblique	Loss-distal third	Tip exposure
6	Loss lateral	Loss distal 2/3	Loss-distal half
7	Loss-complete	Loss-lateral	Loss-subtotal
8		Loss-complete	Loss-complete



305 355 366 386 788



Examples

Treatment of fingertip injuries ?

- Do not forget tetanus prophylaxis !
- No antibiotic prophylaxis is needed for pulp injuries
- Pain killers

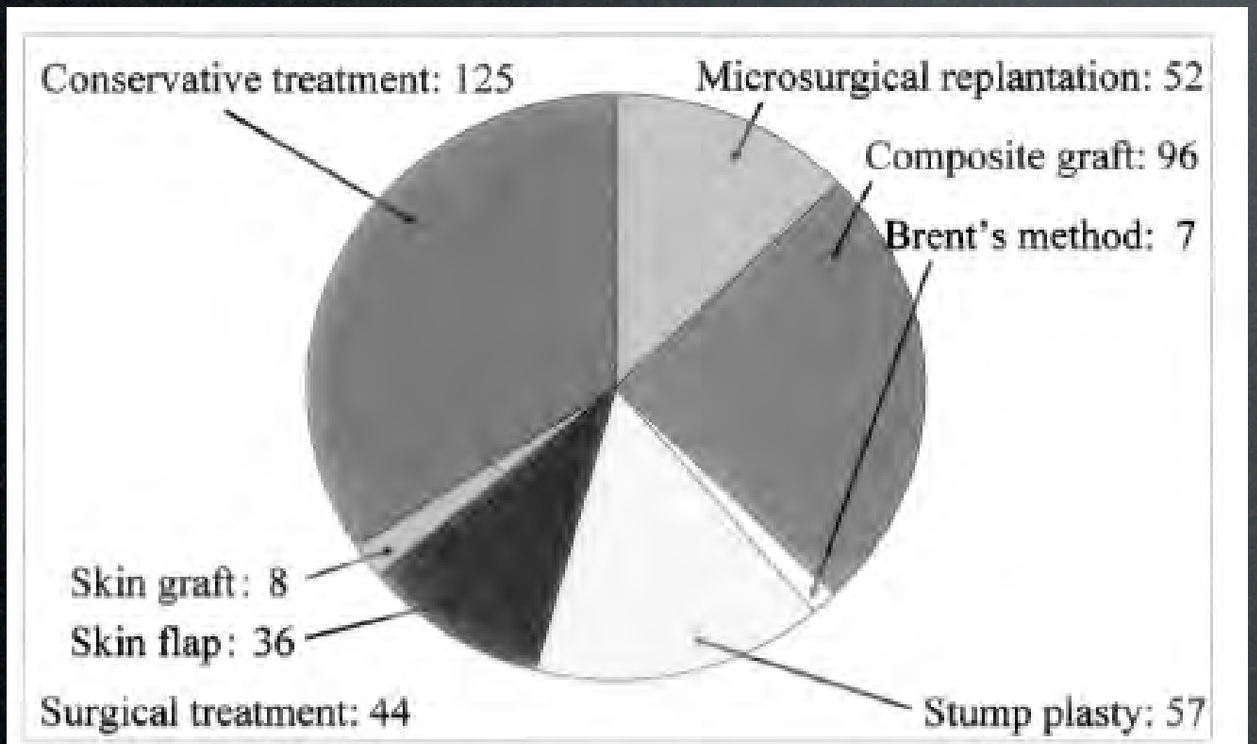
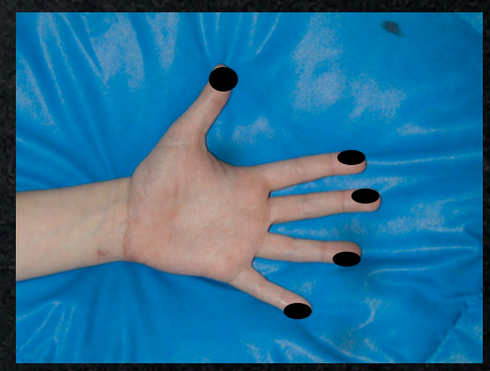


FIGURE 1. Subjects: 381 fingertip injuries.

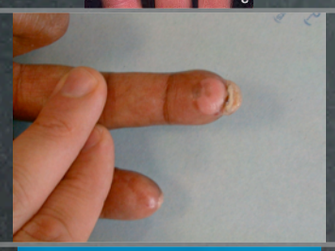
Treatment of the anatomical lesions (no algorithm available yet)

Pulp injuries

- Bone exposure = (flap) coverage
- No bony exposure
  - Size & Depth
  - Age, Tobacco use
  - Localization (i.e. usefulness during pinch)



Techniques for pulp reconstruction

		+	-
Conservative treatment		Easy, cost effective, efficient	Nail deformities, scar tenderness
~~Skin graft~~		?	No sensibility
Flaps		Thickness, Sensible Avalaibility	Difficult Complications
Replantation		“normal” finger	Very difficult, depends on mechanism
Toe transfer		Reconstruction of bone and soft-tissue	Very difficult

Cold intolerance will be observed in almost all patients

Conservative treatment

(prospective or randomized studies)

Most papers reported little or no sequelae with conservative treatment, found no or little differences regarding the type of dressing and Ma's paper reported no benefit of other techniques compared to conservative treatment

- Ma. Ann Acad Med Singapore 1982;11:207-213
- Mennen. J Hand Surg 1993;18B:416-422
- Buckley. Injury 2000; 31:301-304
- Ipsen. Injury 1987; 18: 203-205
- Lee. J Hand Surg 1995; 20B: 63-71

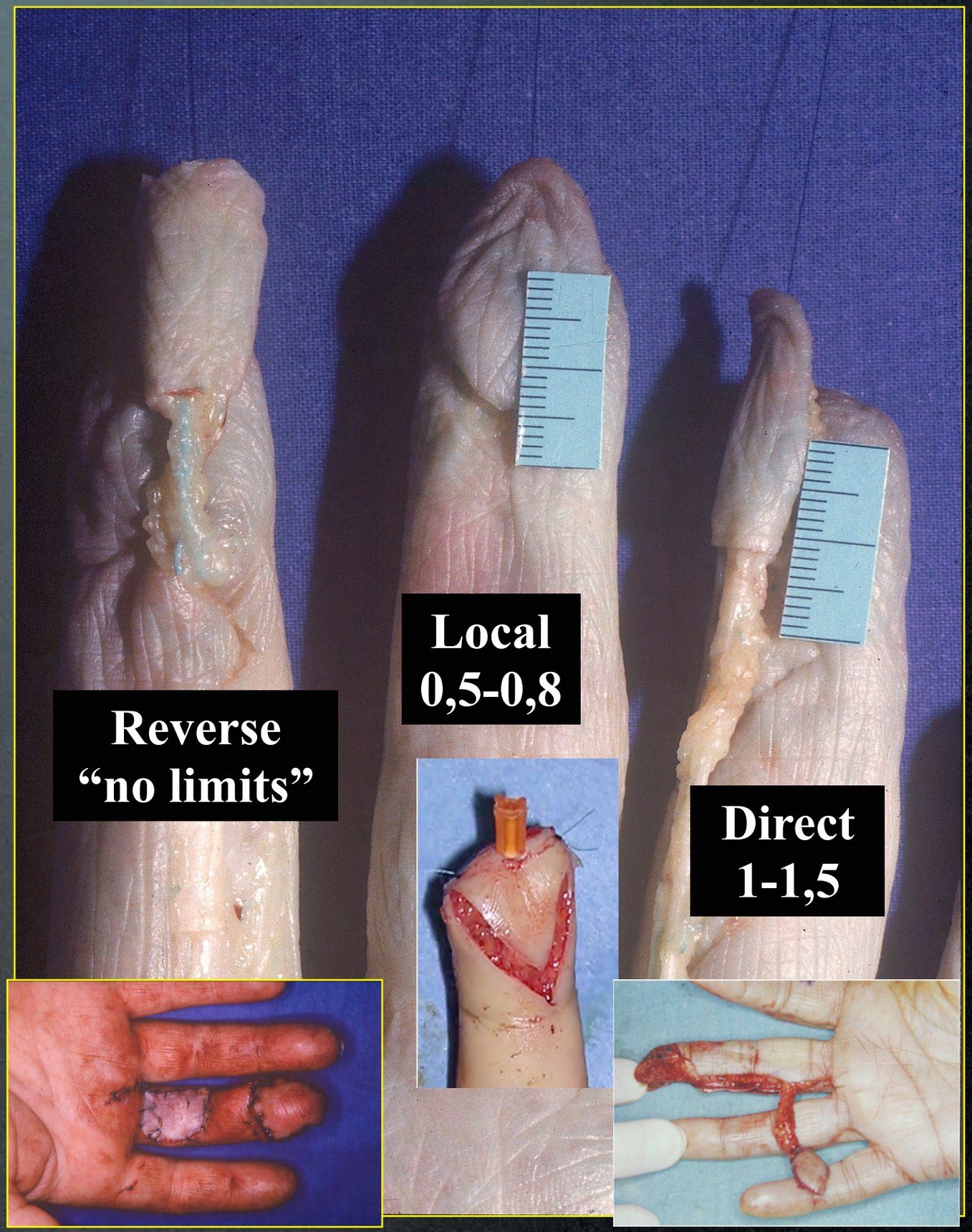
Conservative treatment

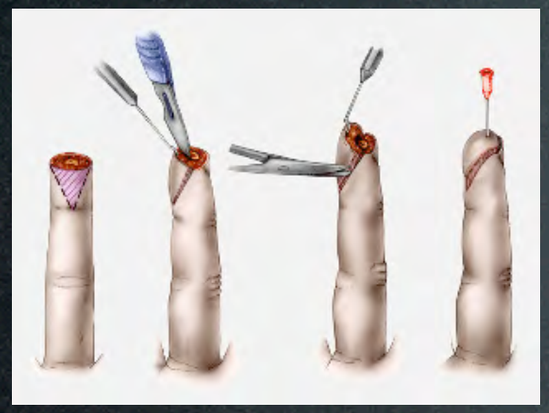
- <u>Débridement and lavage under local anesthesia then dressing</u>

- <u>Which type of dressing ? - 3 layers</u>
  - Non-adherent/ Wet gauze / Adhesive
- <u>How often dressings should be changed ?</u>
  - ≤ once a week
- <u>Results are obtained in 1 month</u>

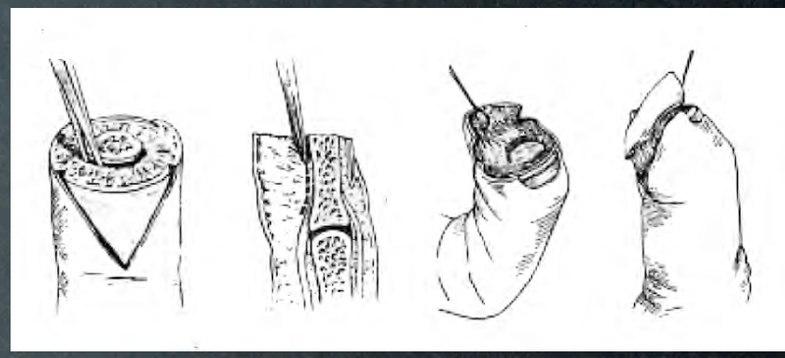
Flaps (Fingers)

- Tranquilli-Leali-Atasoy
- Venkataswami
- Brunelli (reverse)
- Thenar (index & middle)





TLA flap

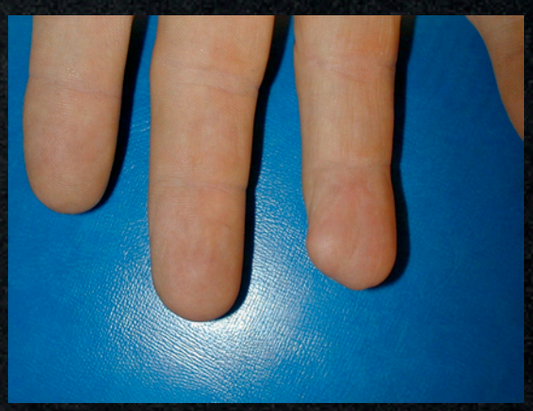


- Easy to do, few complications
- Best indications: transverse or dorsal oblique lesions





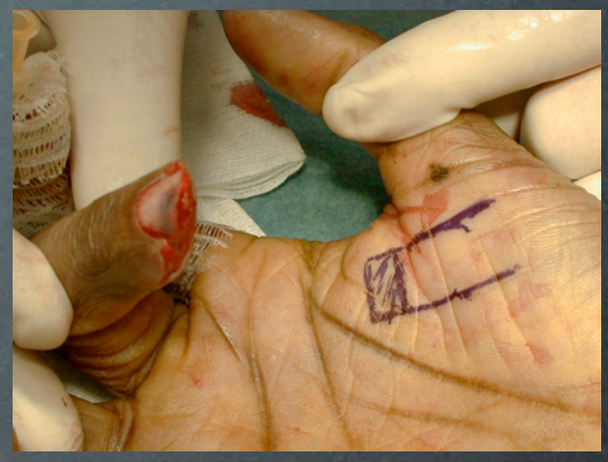


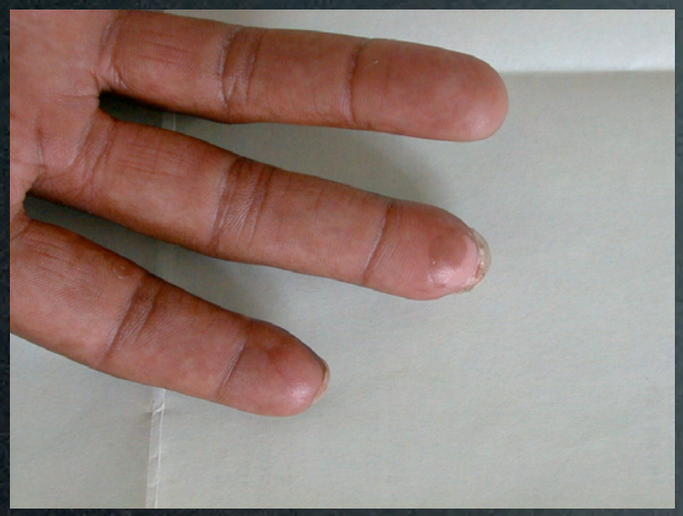
	Literature	French study
Advancement	NP	7,2 mm
Healing (d)	NP	19 d
Necrosis	3%	1,4 %
Infection	< 1%	3%
Exclusion	10%	4%
Stiffness	20%	2%
Nail dystrophy	33%	?
Cold intol.	29%	16%
Hypertrophic scar	6%	?
Out of work	39 d	30-50 d
Weber	6,5 mm	4-7 mm

Thenar flap

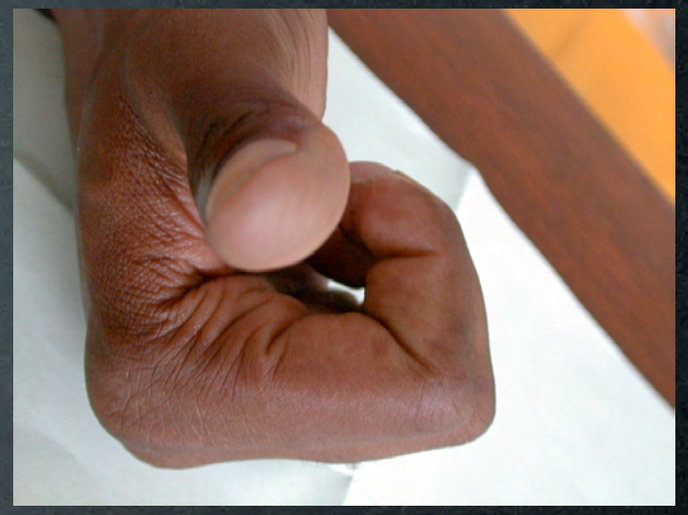
- L x l ≤ 1,5 x 1 cm
- Index or Middle



- 2 operative session
- Possible PIP stiffness



Results

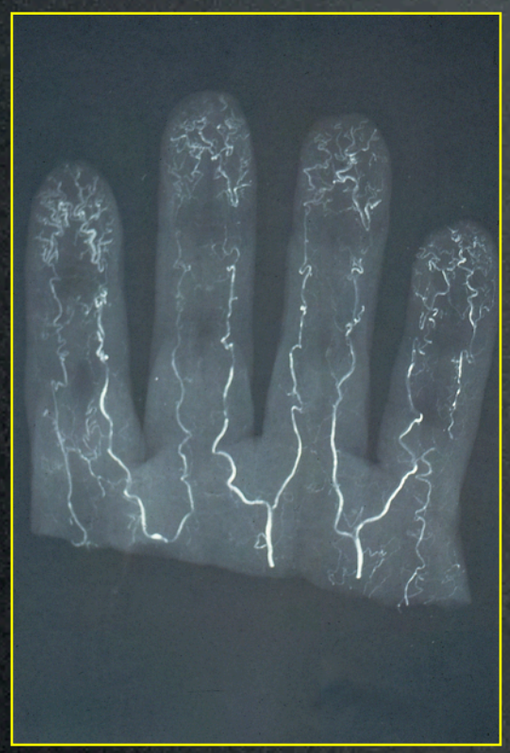


- Melone, JHS 1982;7:291-297
- No necrosis, satisfaction 98%
- Weber mean: 7 mm
- No exclusion of fingers, 4% PIP stiffness
- 4/150 thenar skin sequelae

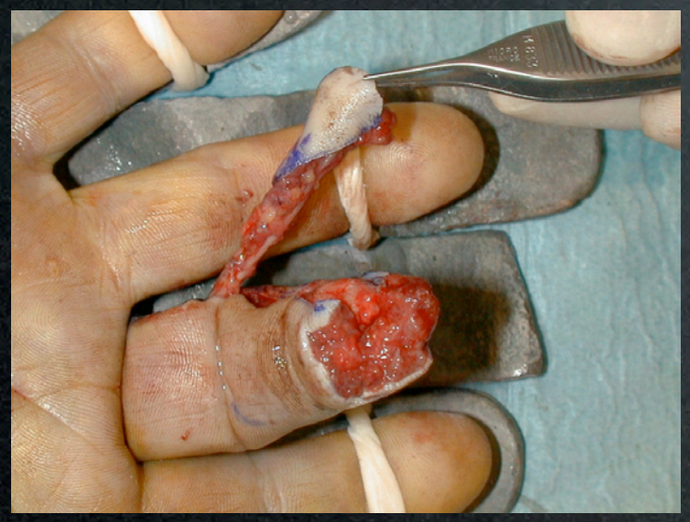
See also Barbato et al.

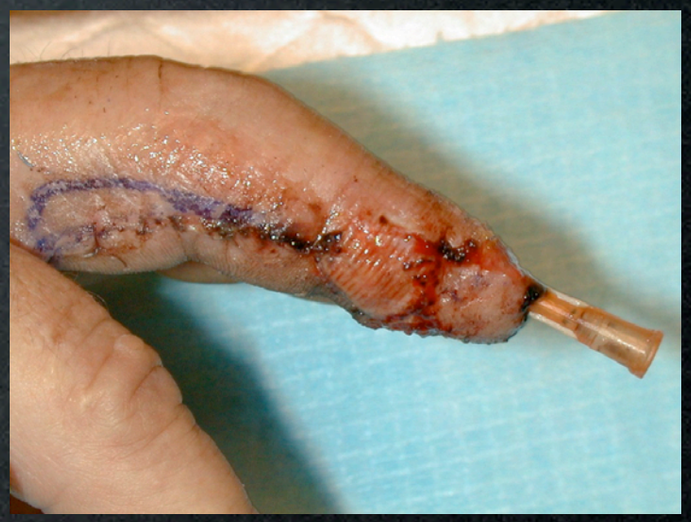
Direct Island Flap

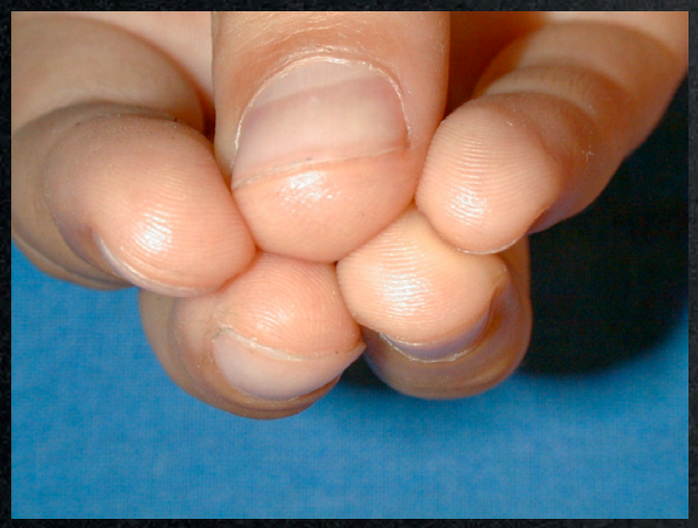
- Is based on the double arterial inflow of fingers
- One should take care of variations on index and little finger (10%)

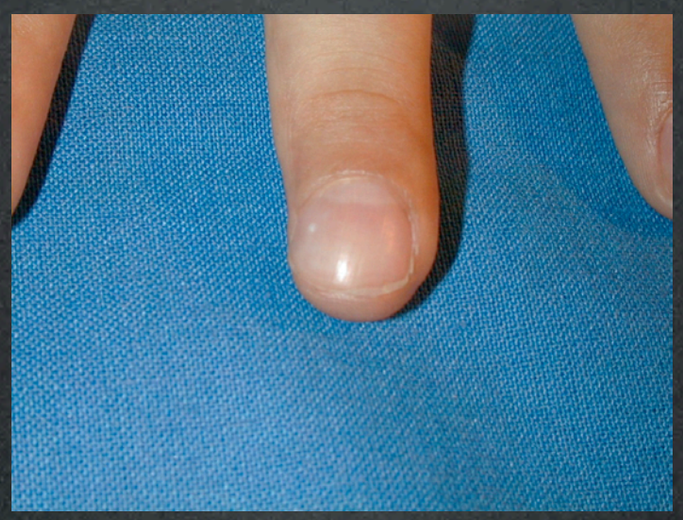


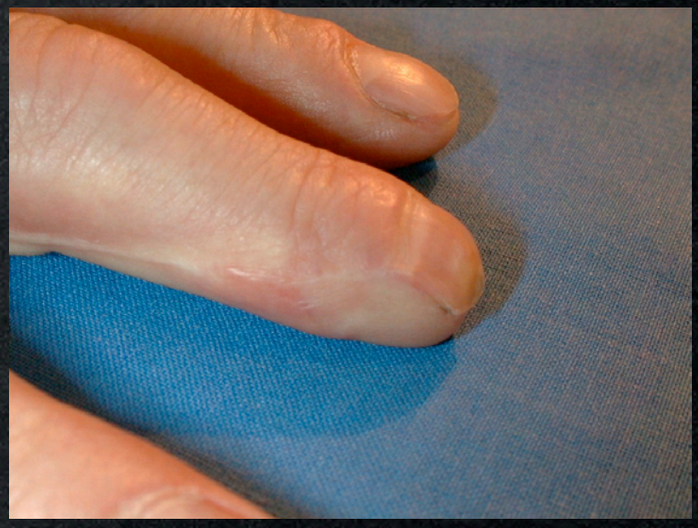
- Dissection is carried out along the pedicle (difficult)
- Advancement flap = tension relieved by PIP flexion



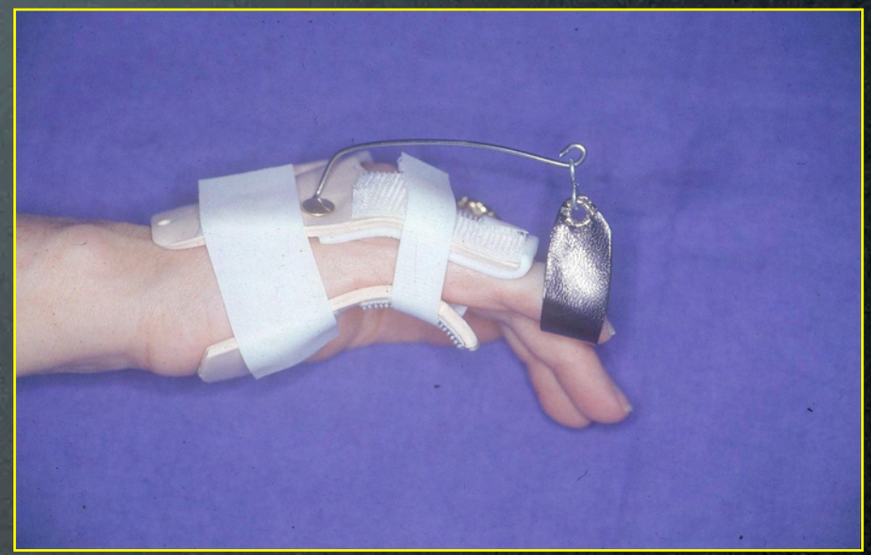






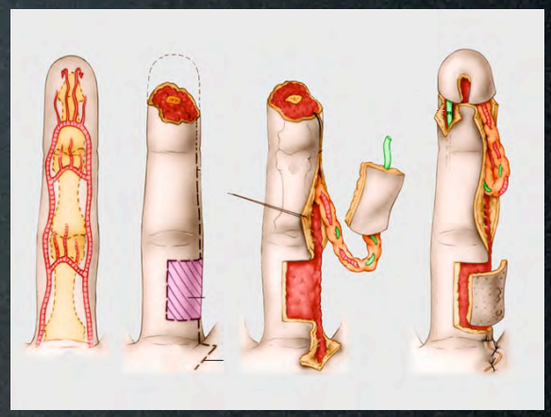


- Extension splint is used in most cases

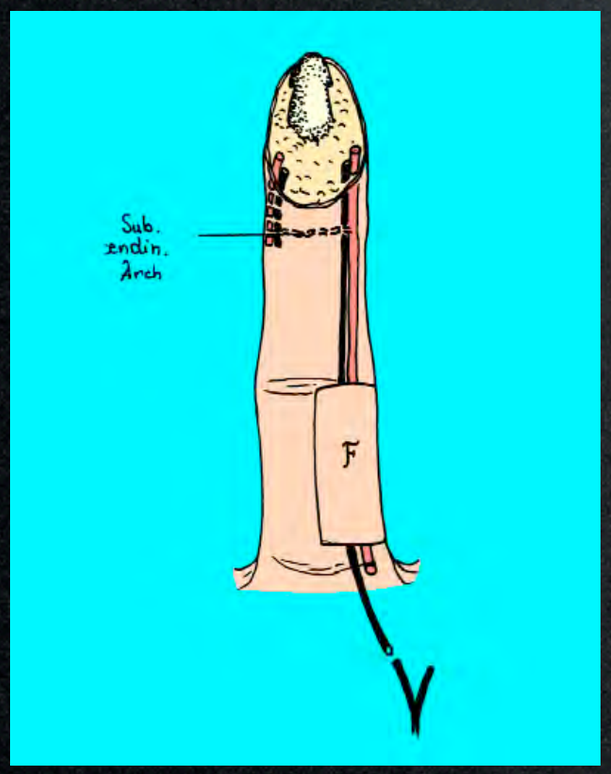


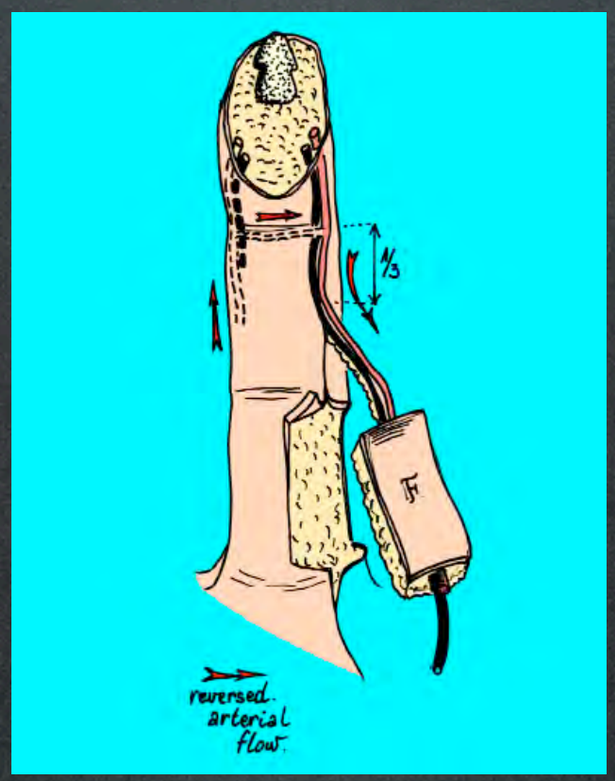
Advancement	13 mm
Healing	30 d (15-120)
Necrosis	0-8%
Infection	1-7%
Finger exclusion	12-50%
Cold intolerance	20-100%
PIP stiffness	0-33%
Pulp instability	0-13%
Nail dystrophy	0-73%
Weber	4- >7 mm
Out of work	0-730 j

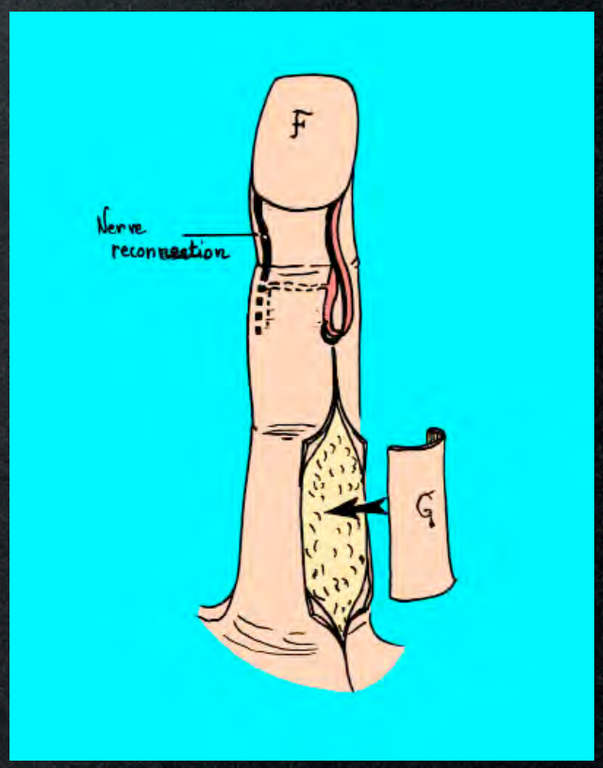
Reverse island flap

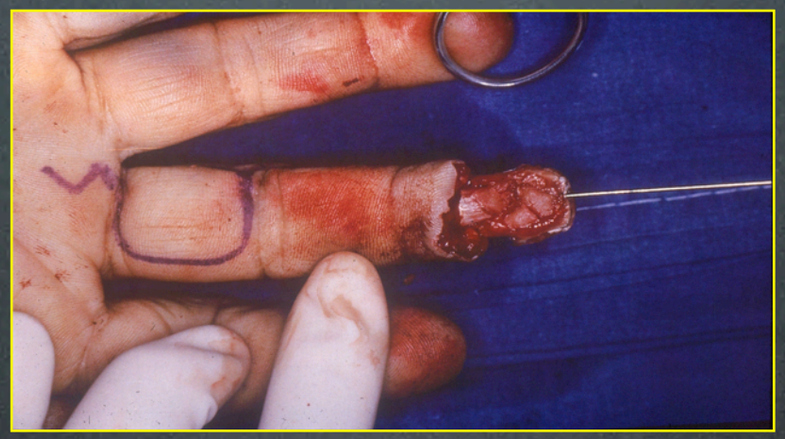


- Can cover the whole pulp without immobilization
- Sacrifice one main artery (and nerve)





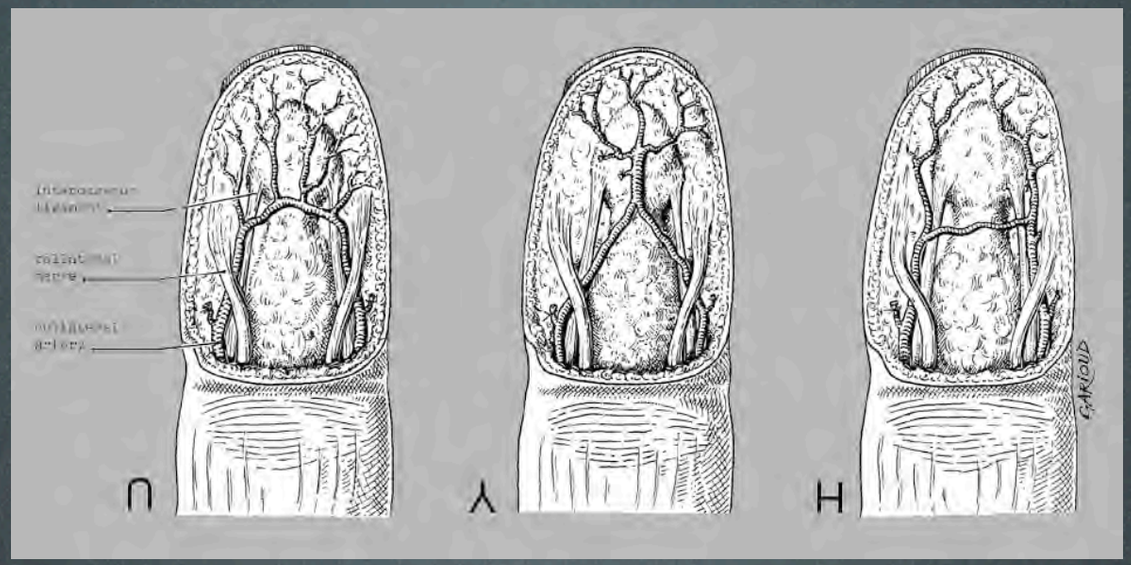




Surface	4,65 cm2
Healing time	?
Necrosis	1-29%
Infection	20%
Finger exclusion	?
Cold intolerance	21-36%
PIP stifness	0%
Pulp instability	?
Weber	6-12 mm
Out of work	?

Replantation

- Best solution, best results
- Technically difficult
- Ishikawa's classification may help to precise the technical possibilities

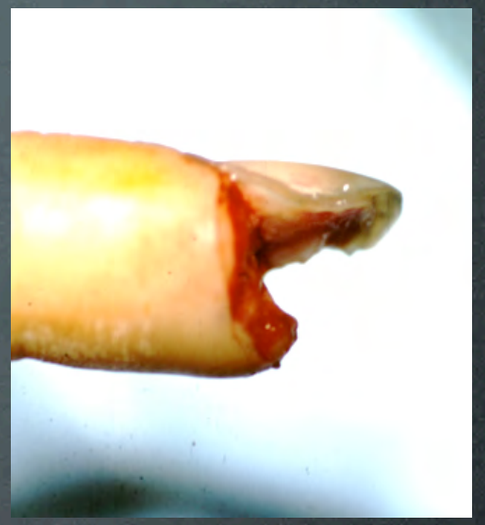


- I: distal to the terminal artery = no replantation

- IIa/IIb = possible arterial repair without venous drainage (no K-wire)
- III = a+v sutures

Survival rate= 91,5% (Hirase)

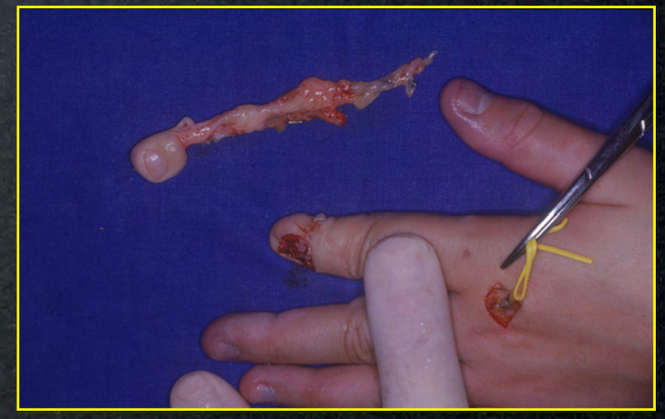
Salvage techniques



- Reposition + flap
- Reposition (Cap technique, Hirase's cooling,...)
- Terminalization (flaps)
- Pocketting (Brent's)

Toe transfer

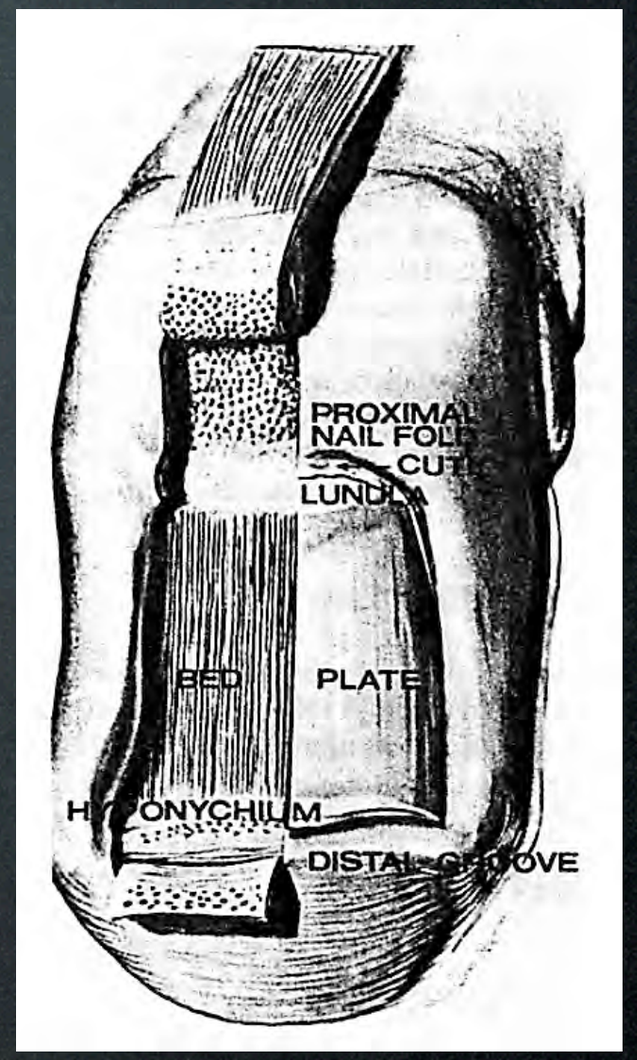
- Rarely done as an emergency

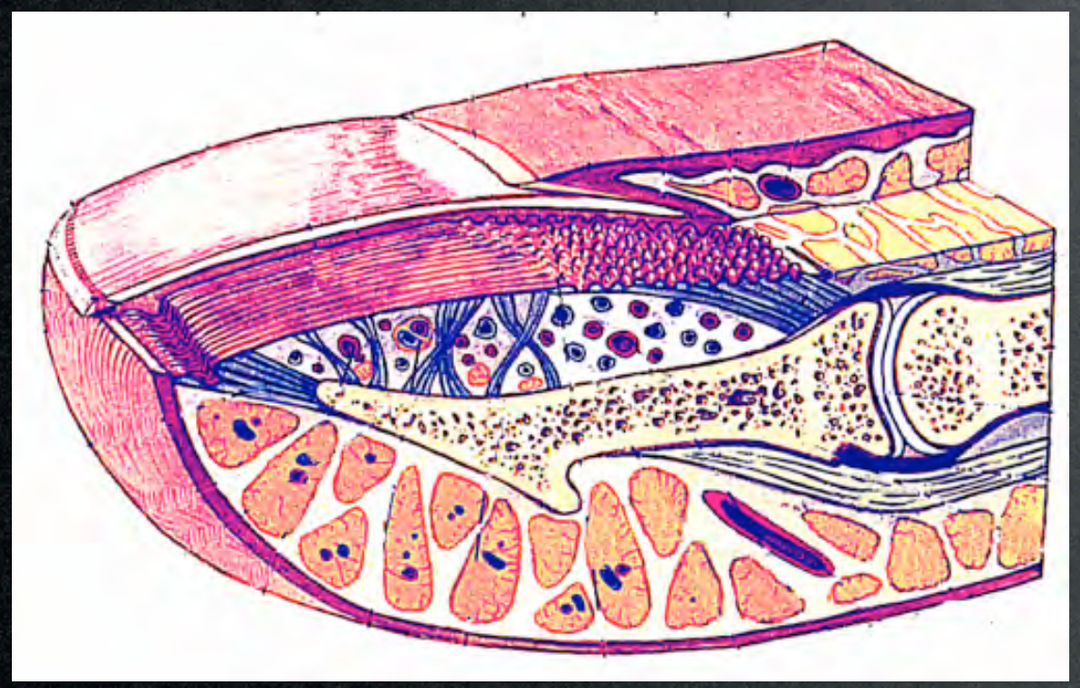


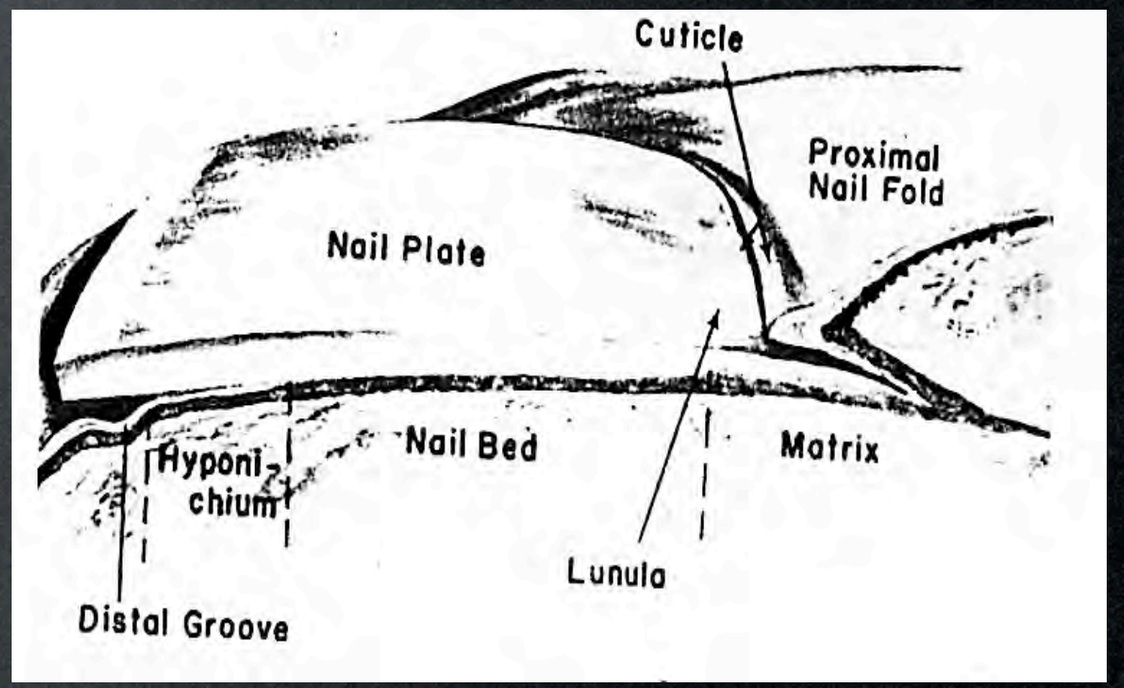
- The only way to reconstruct a near normal fingertip if replantation was not possible or successful

The nail apparatus

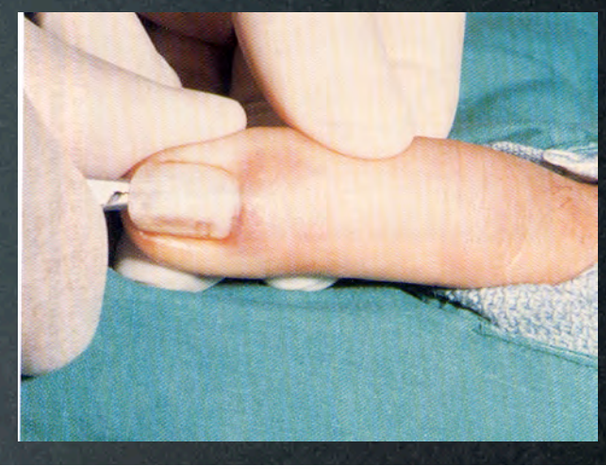
- A specialized organ
- All structures must be repaired



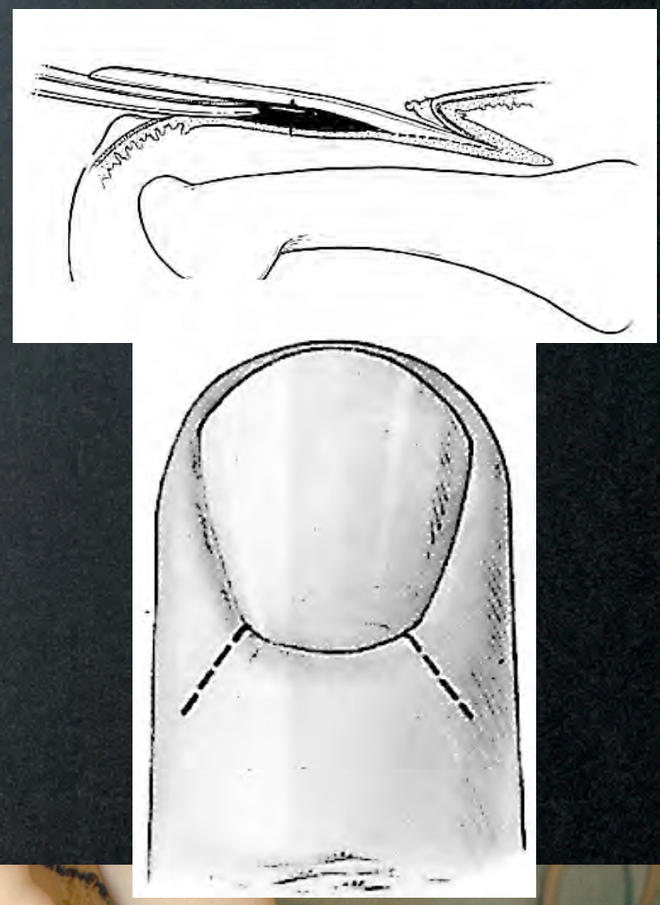


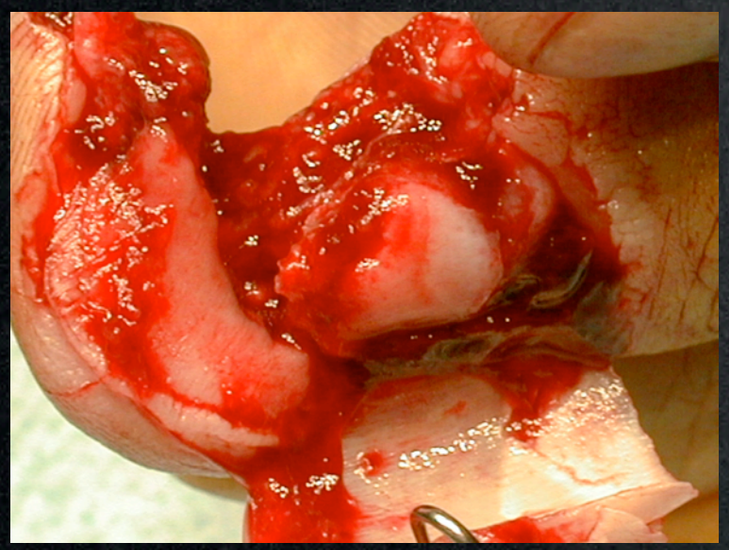


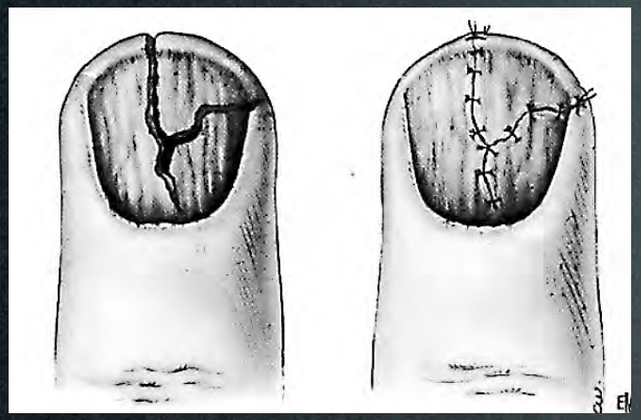
Nail surgery



- Remove the nail plate to expose all underlying lesions
- Extend the incisions to expose and repair the nail matrix

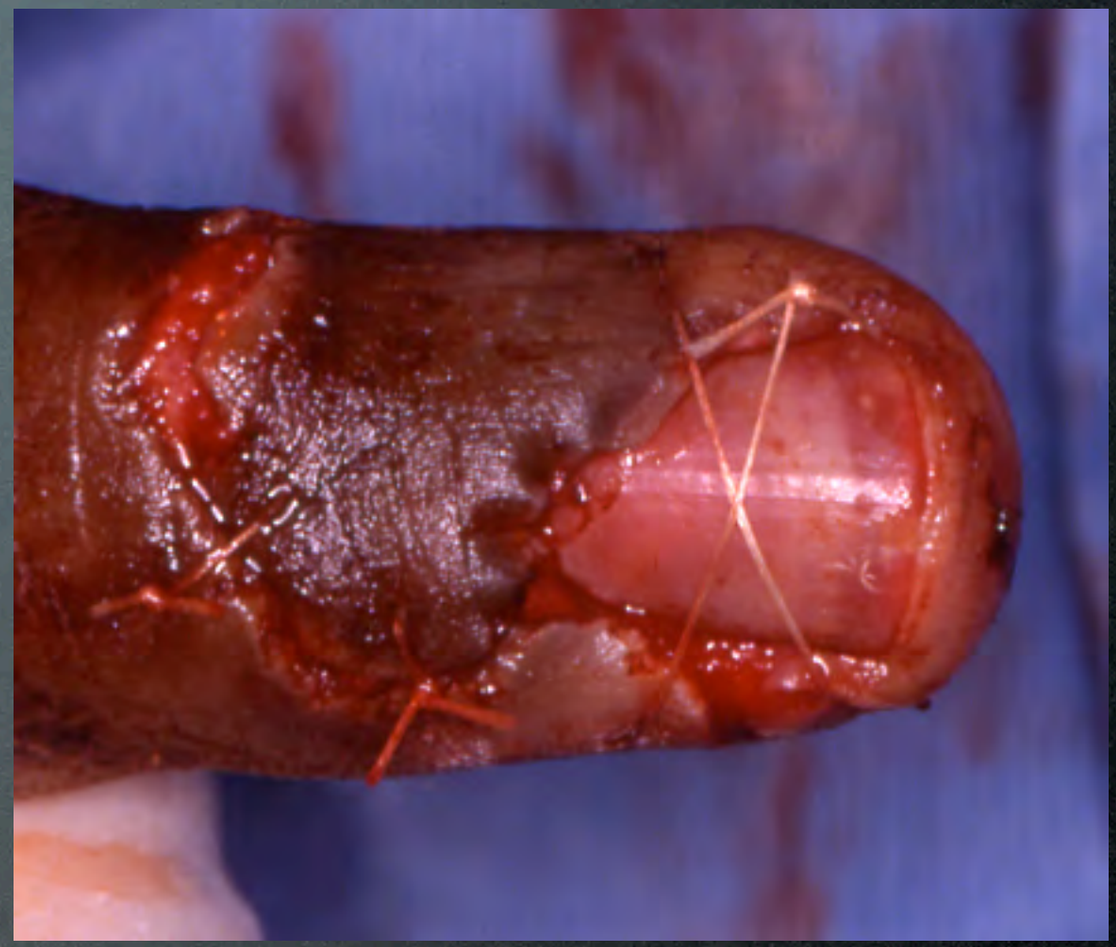






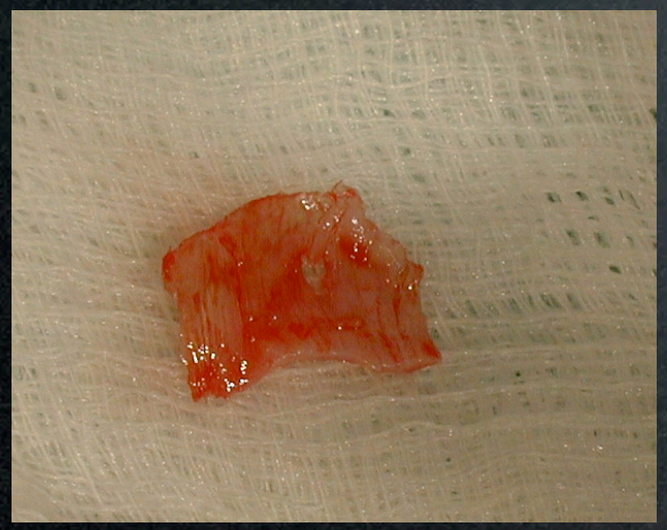
Nail injuries

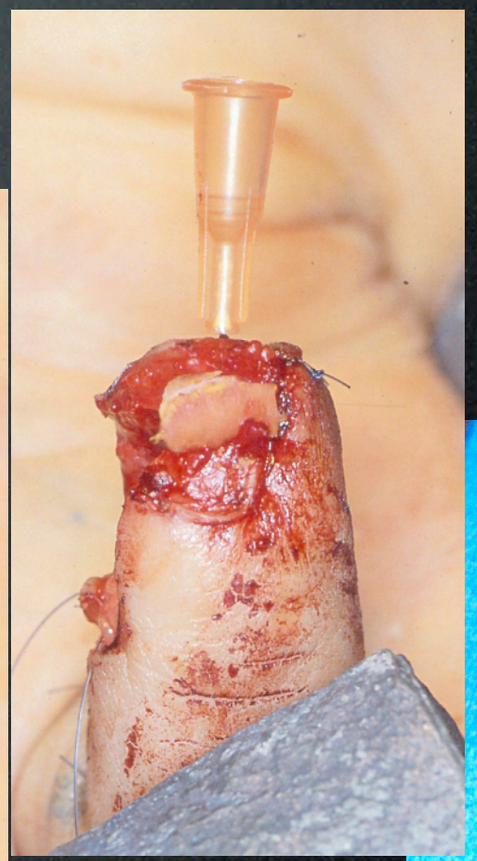
- Débridement should be minimal
- Use 6/0 absorbable sutures
- Replace the nail plate to mold and protect the repair



In case of nail bed loss of subtance

- Use nail bed graft from either a finger-bank or from the big toe





Desepidermized advancement flap for nail bed reconstruction

In case of nail matrix loss of subtance

- Use matrix flaps to limit the loss of substance and sequelae

Conclusion

- Repair all lesions i.e. pulp AND nail
- In case of doubt, the simplest treatment should be chosen
- Between flaps, choose the simplest and/or the one that allows for early mobilization
- Replantation give the best results

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