Podo-Plastic Surgery

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8th IWGDF
The Hague, 2019

DISCLOSURES:

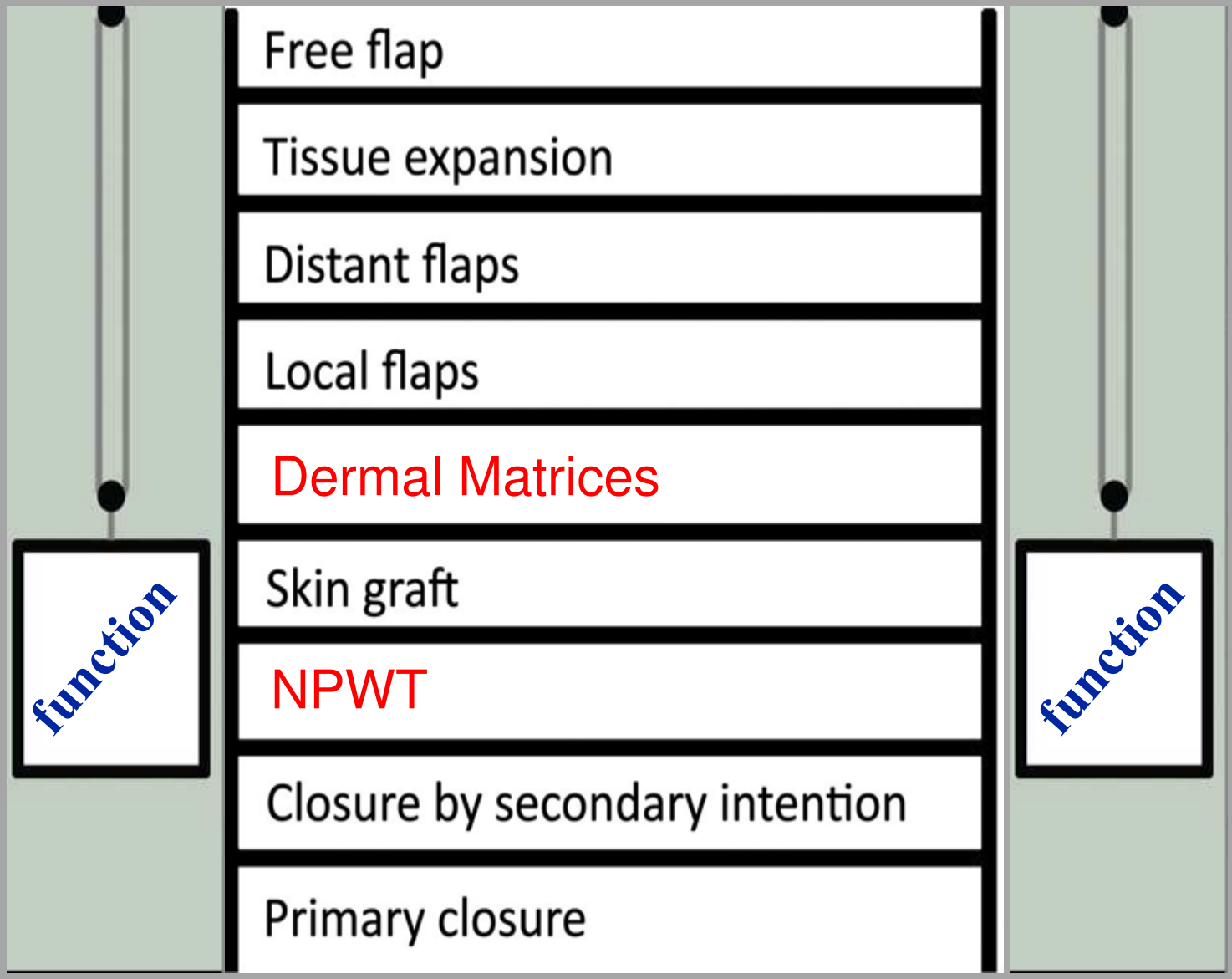
NONE

Outline: F&A wounds

- **Wound bed preparation**
  - **Blood flow**
  - **Infection**
  - **Healthy wound base**
- **Reconstruction**
  - **Think function first**
- **Reconstructive ladder**
  - **Think function first**

Reconstructive Ladder:

function determines where you stop



The MOST Relevant Reconstructive Questions Today Are:

- **Will the reconstruction hold up over the long term?**

- **Will the reconstruction meet the realistic functional goals of the patient?**

Wound closure:

- 90% simple closure:
  - Usually when there is enough tissue between skin surface & underlying bone
  - Heal by 2nd intention +/- adjuncts
  - Delayed primary closure
  - Skin graft
- 10% complex closure:
  - Usually when soft tissue is missing to cover vital structures or pressure points
  - Local flaps
  - Pedicle flaps
  - Free flaps

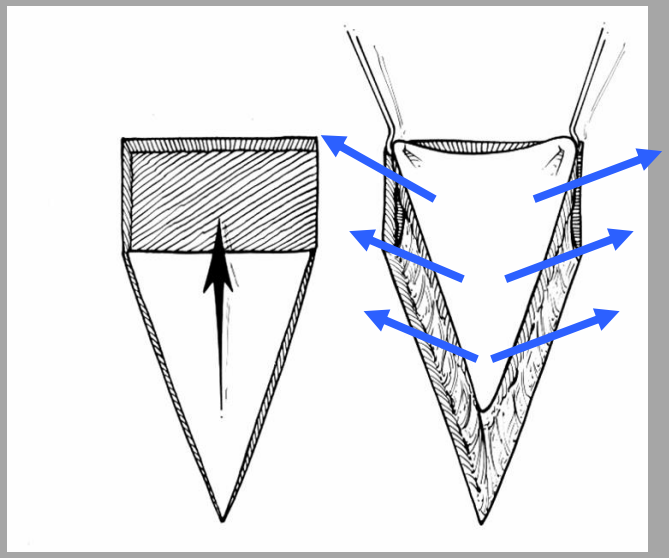
Local Flaps:

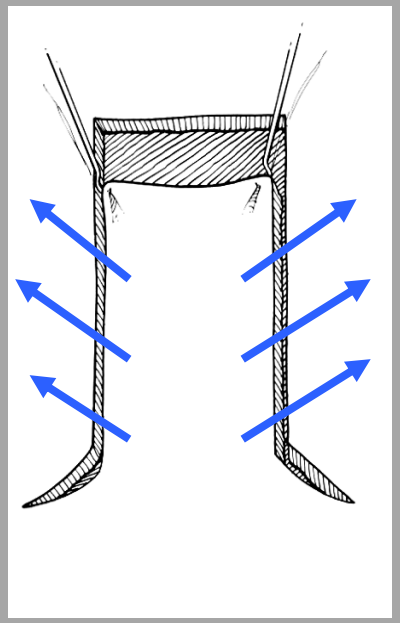
principles

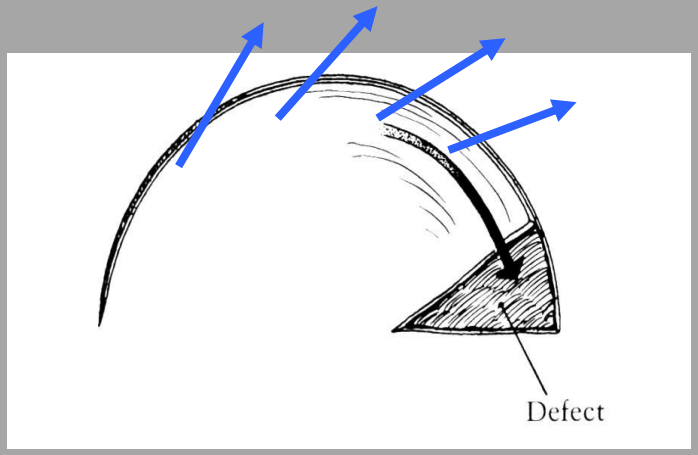
- Random blood flow
  - Length to width ratio 1 : 1
- Defined blood flow
  - Doppler perforator at base
  - Can extend 1 : 1 length to width ratio
- Design flap within most lax soft tissue area
- Design flap longer than you think you need
- Bias stitches to remove tension from the tip

Local Flap:

bias stitches to ↓ tension at tip







Local Flap:

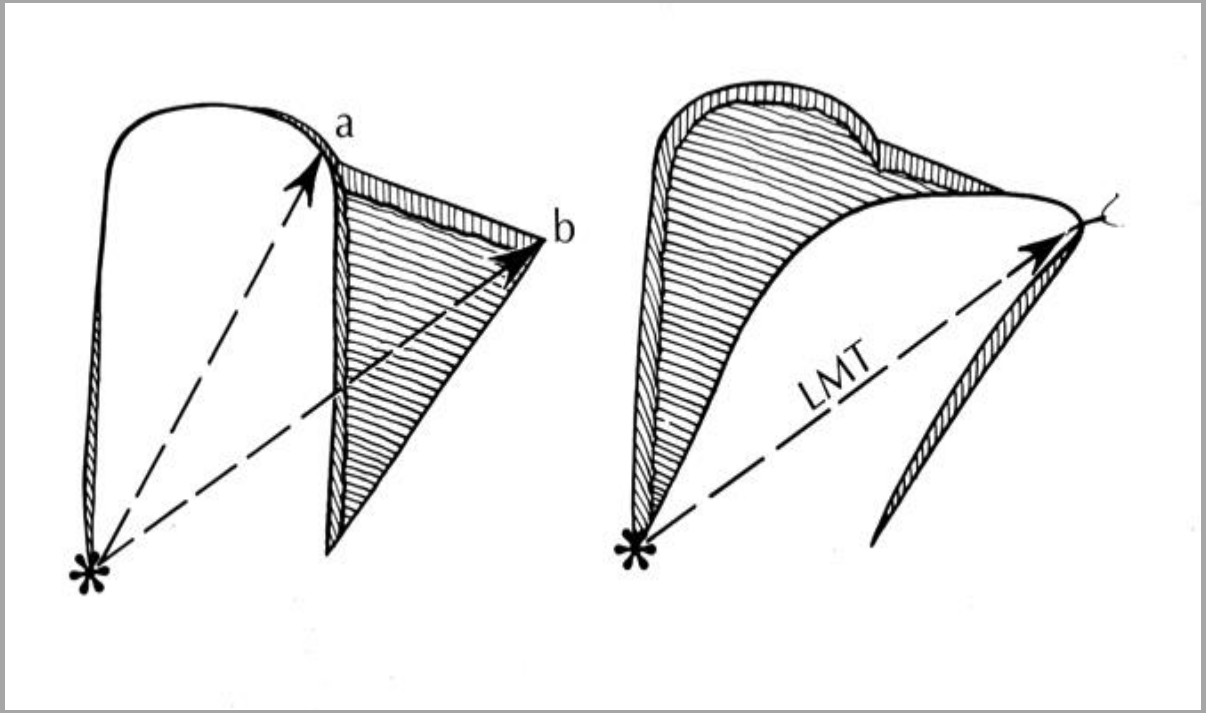
Rotation Flap

Local Flap:

Rotation Flap

Local Flap:

Transposition Flap

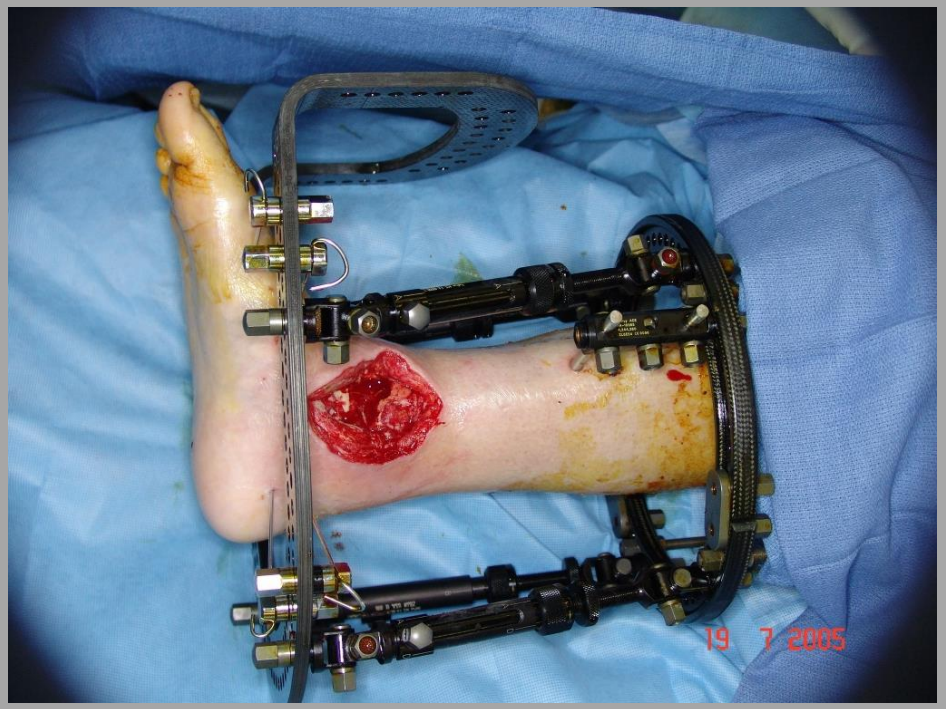


Dehisced Ankle Incision:

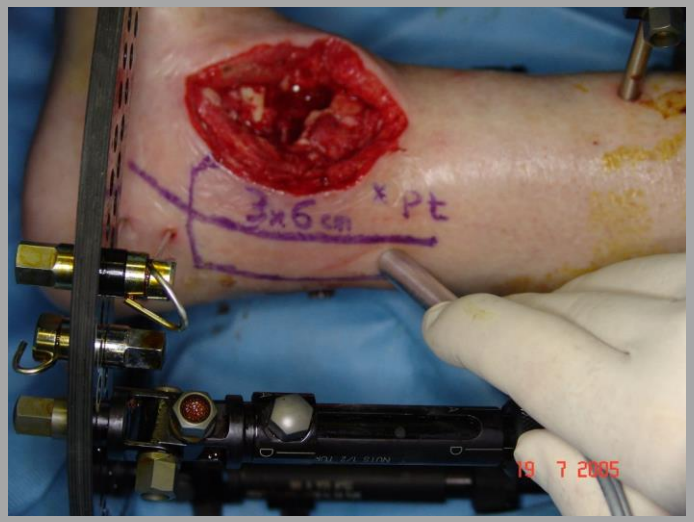
Immobilization Key

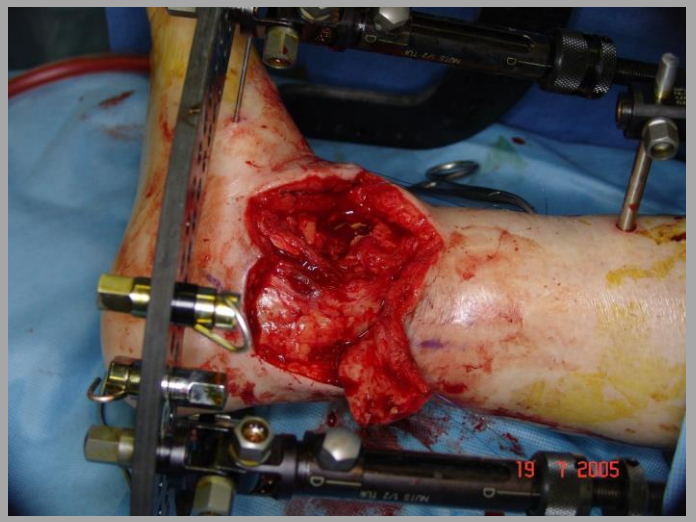


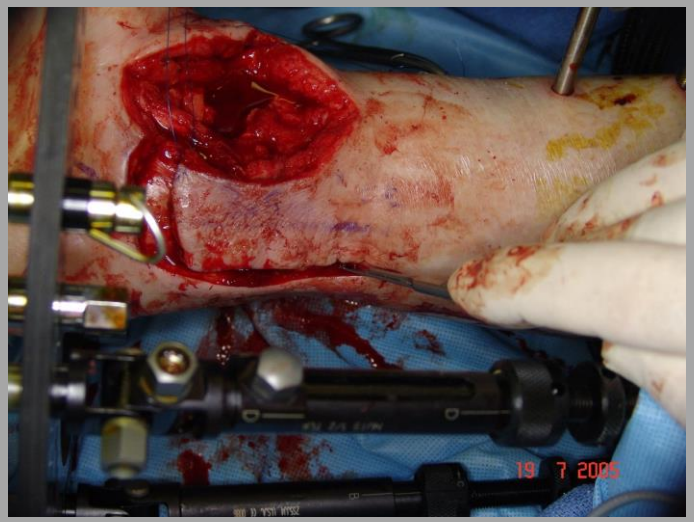

Infected Non-union Ankle Fx:
Debride & Ilizarov

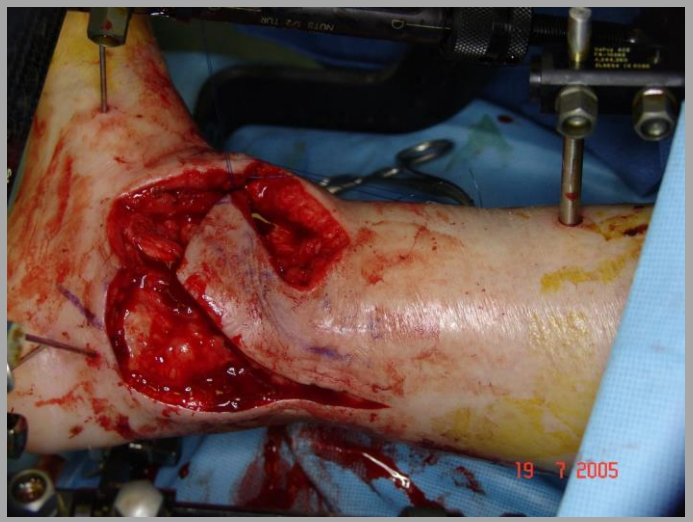


Infected Non-union:
Ilizarov & Local Flap

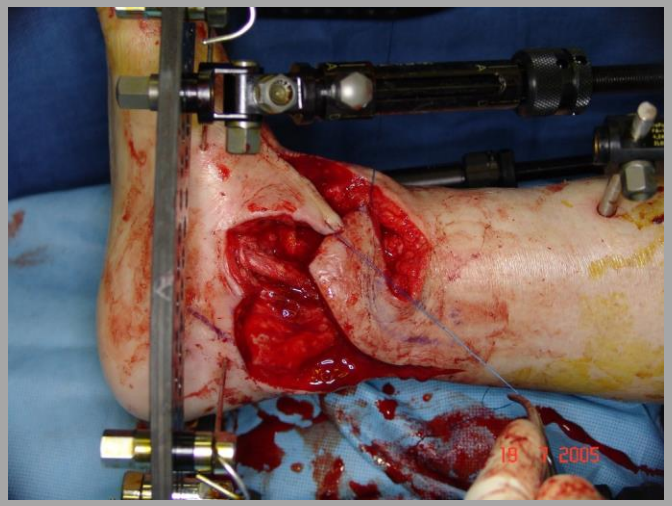


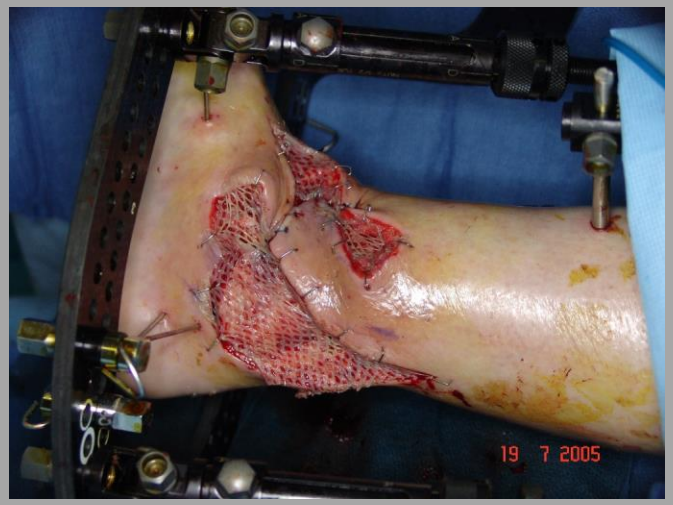


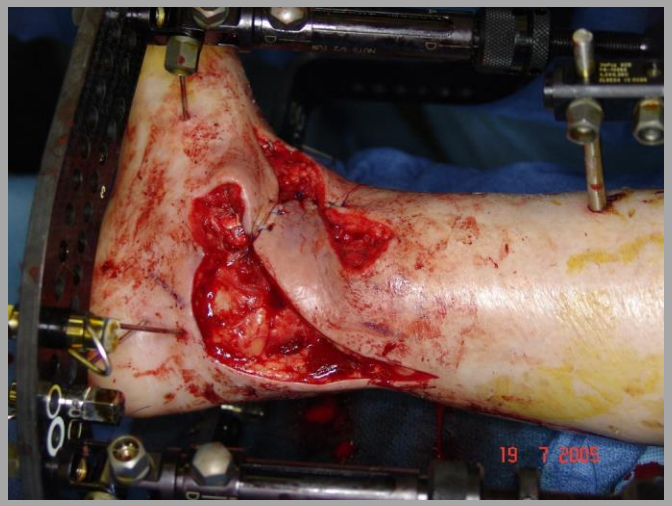




Infected Non-union:
Local Flap & STSG

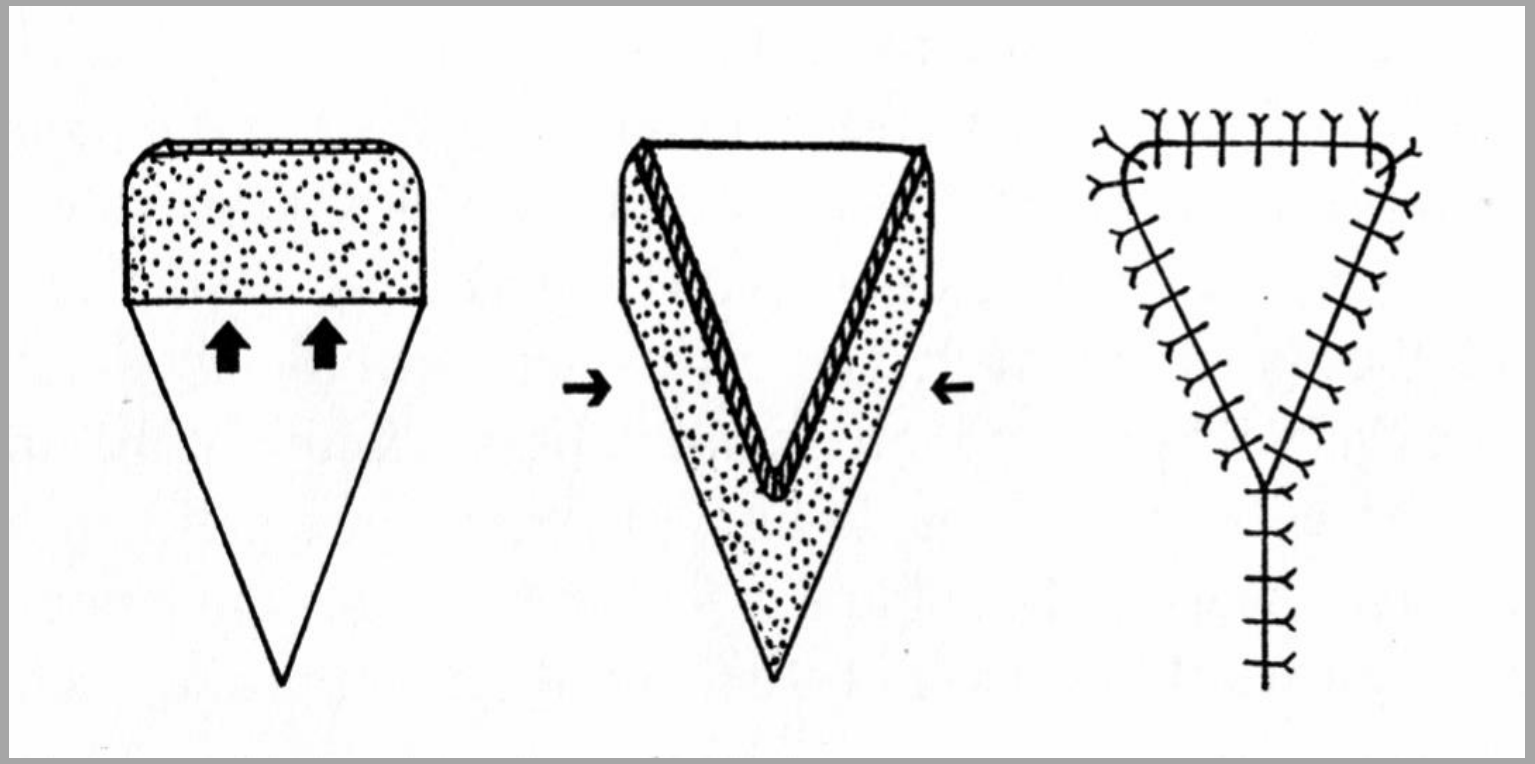






Local Flap:

V to Y Flap

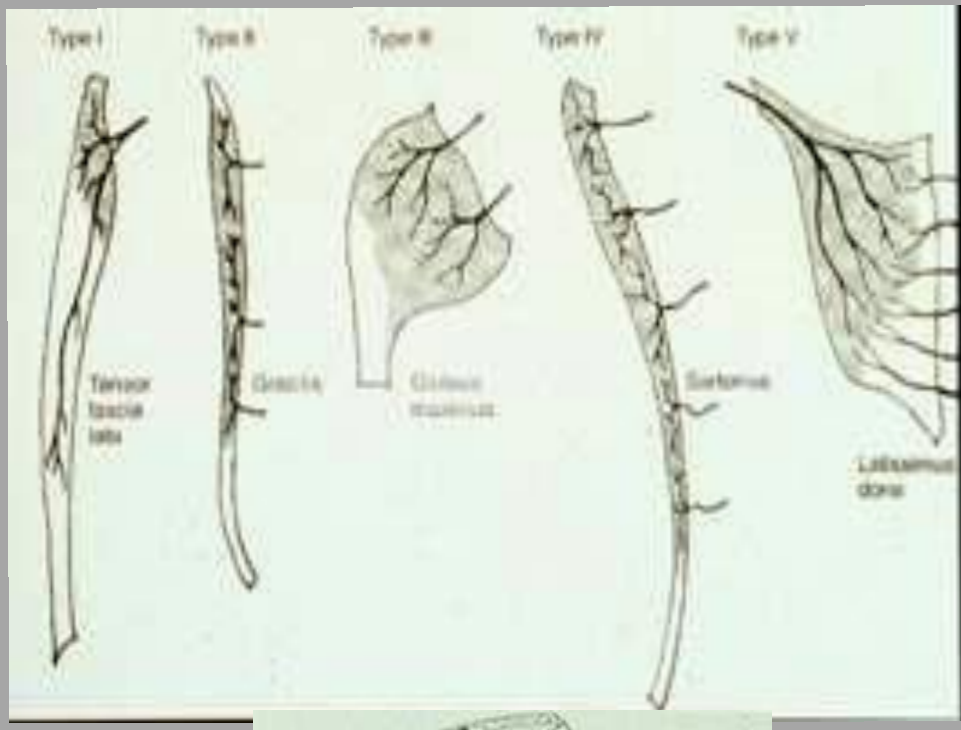


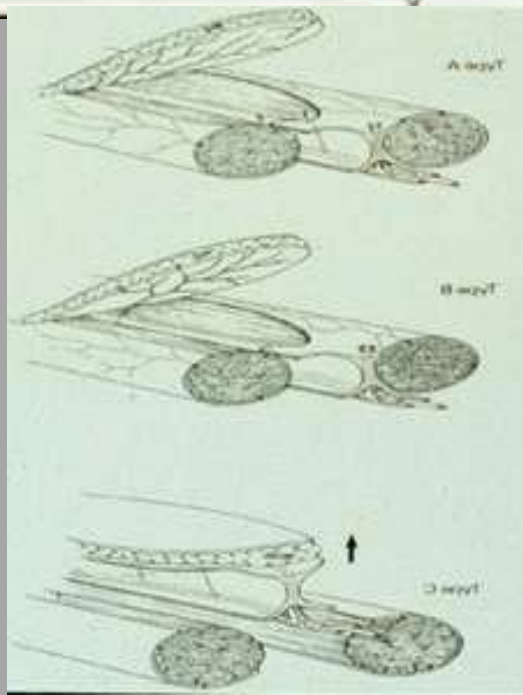
Max advancement 1.5 cm on plantar foot

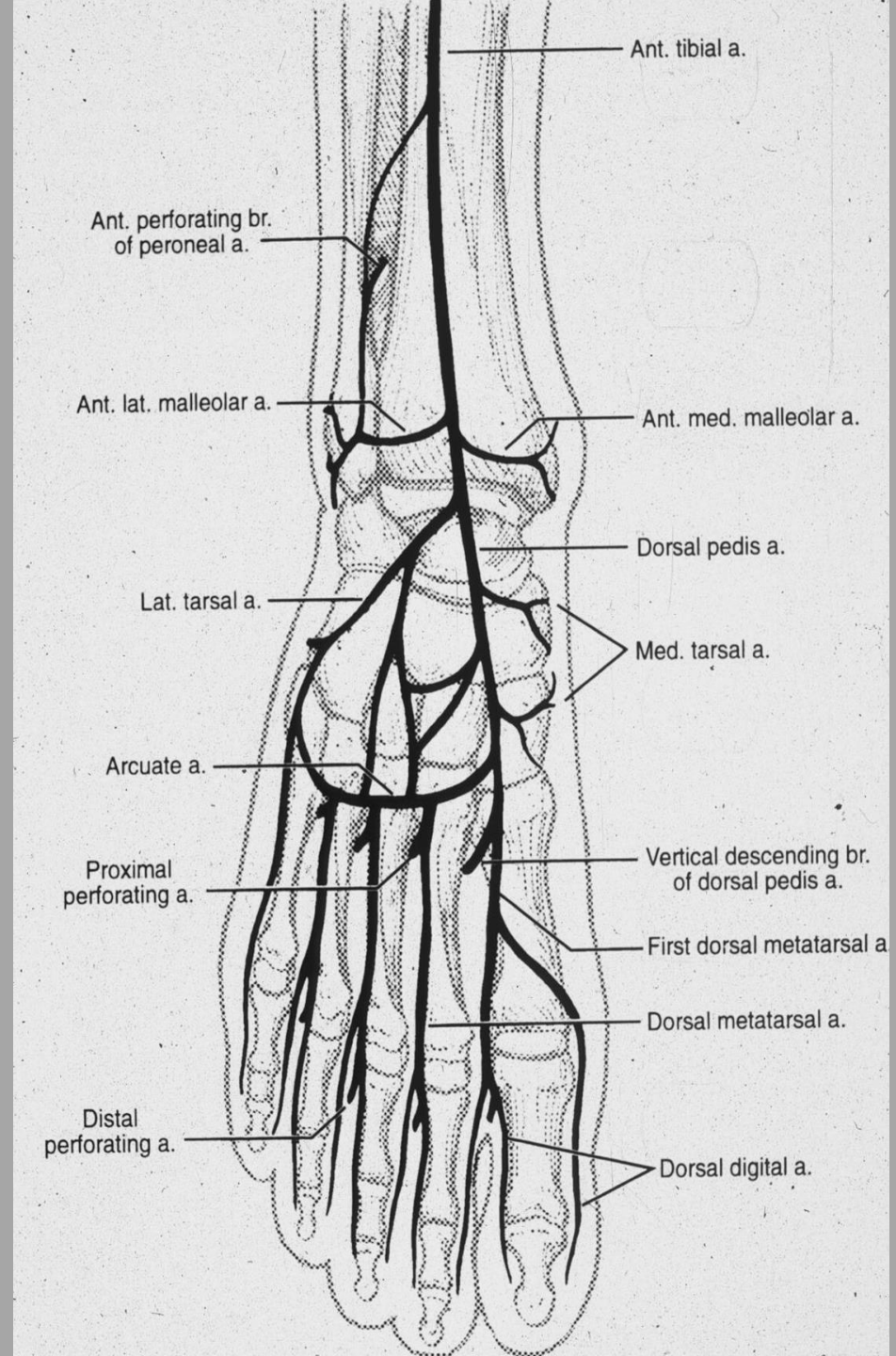


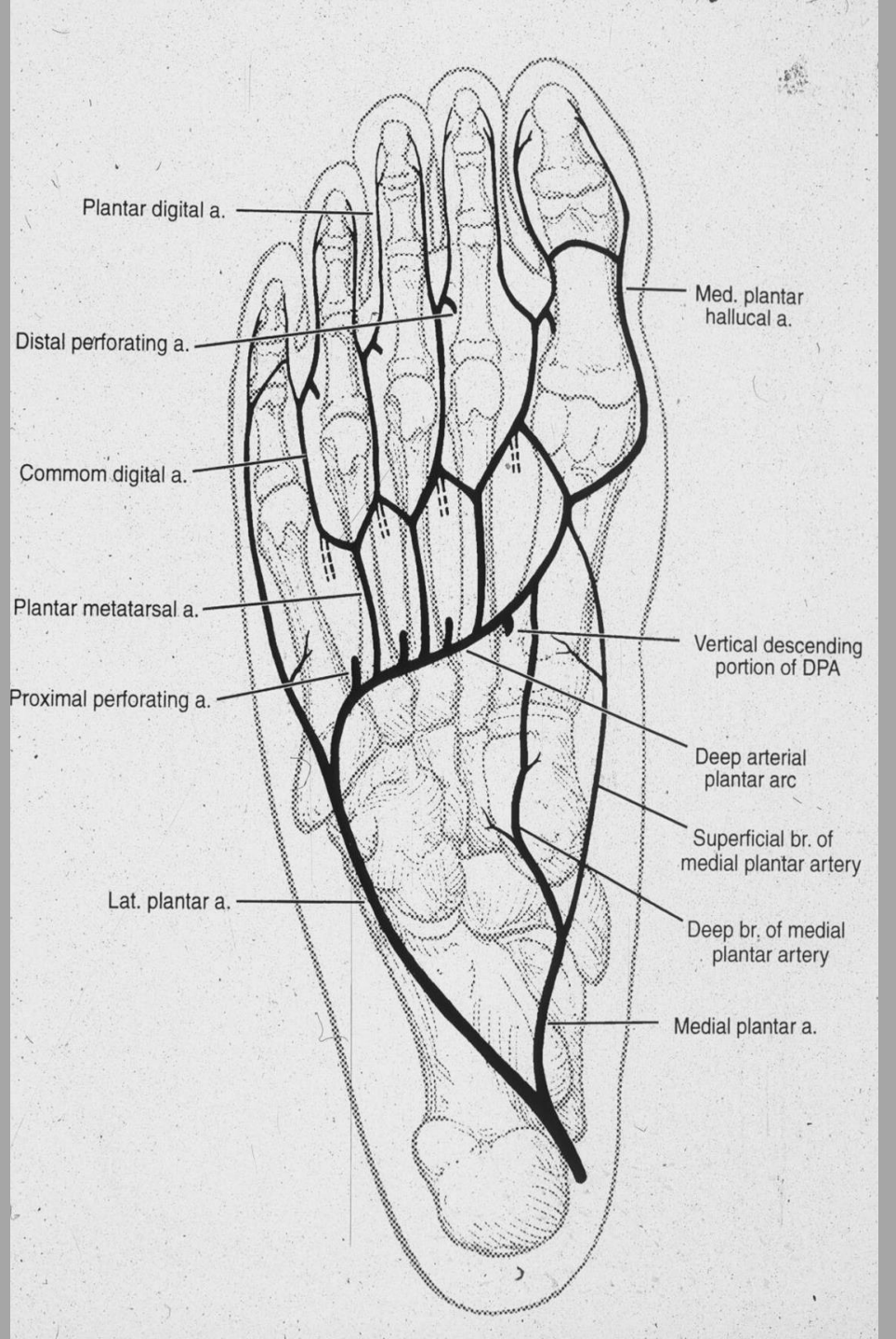
Pedicle Flap:

- Flap With Defined Blood Supply
- Consists Of Any Combination Of
  - Skin
  - Fascia
  - Muscle
  - Bone






Ant. tibial a.
Ant. perforating br. of peroneal a.
Ant. lat. malleolar a.
Ant. med. malleolar a.
Dorsal pedis a.
Lat. tarsal a.
Med. tarsal a.
Arcuate a.
Proximal perforating a.
Vertical descending br. of dorsal pedis a.
First dorsal metatarsal a
Dorsal metatarsal a.
Distal perforating a.
Dorsal digital a.


Plantar digital a.
Med. plantar hallucal a.
Distal perforating a.
Commom digital a.
Plantar metatarsal a.
Vertical descending portion of DPA
Proximal perforating a.
Deep arterial plantar arc
Superficial br. of medial plantar artery
Lat. plantar a.
Deep br. of medial plantar artery
Medial plantar a.

Doppler:

open source artery & direction of flow

Only need to cover vital structures

STSG do the rest

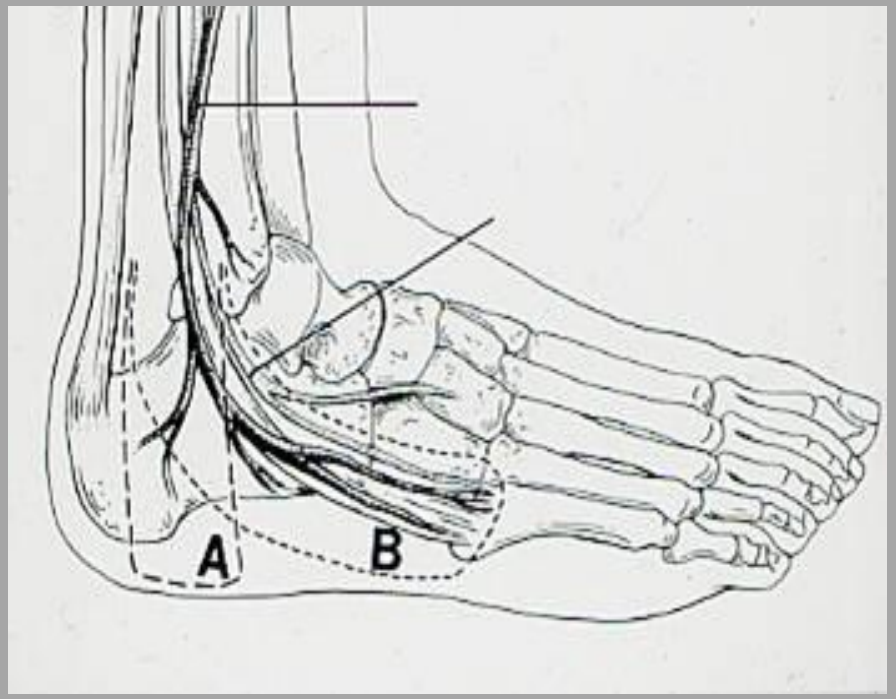
Lateral Calcaneal Flap:

Blood supply:

Lateral calcaneal artery

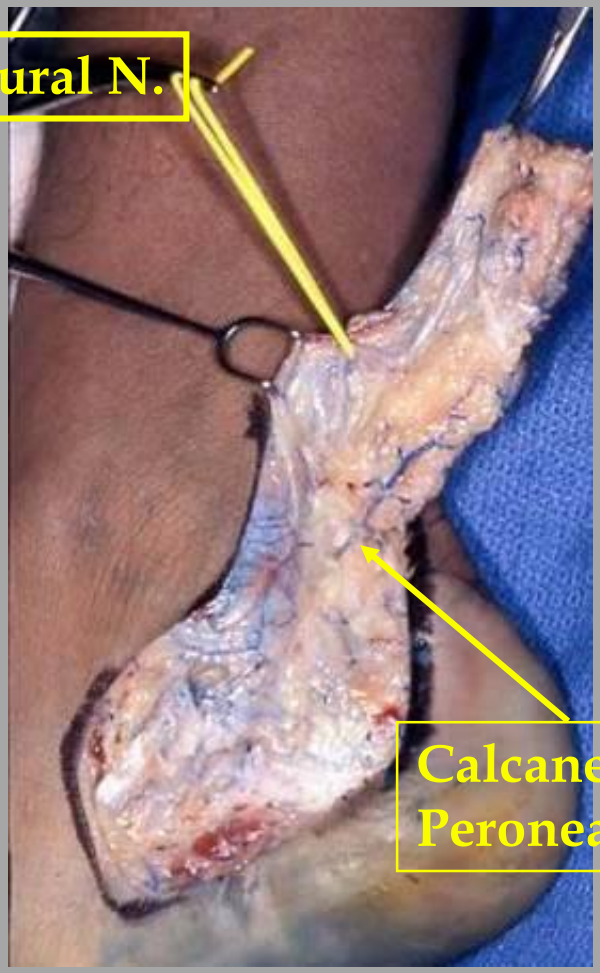
Pivot point:

Upper lateral malleolus



Lateral Calcaneal Flap:

anatomy



Dissection: need to lift vascular pedicle off of periosteum !!!

Lateral Calcaneal Flap:




Non-healing Achilles Tendon Wound
In Renal Failure Diabetic Pt.

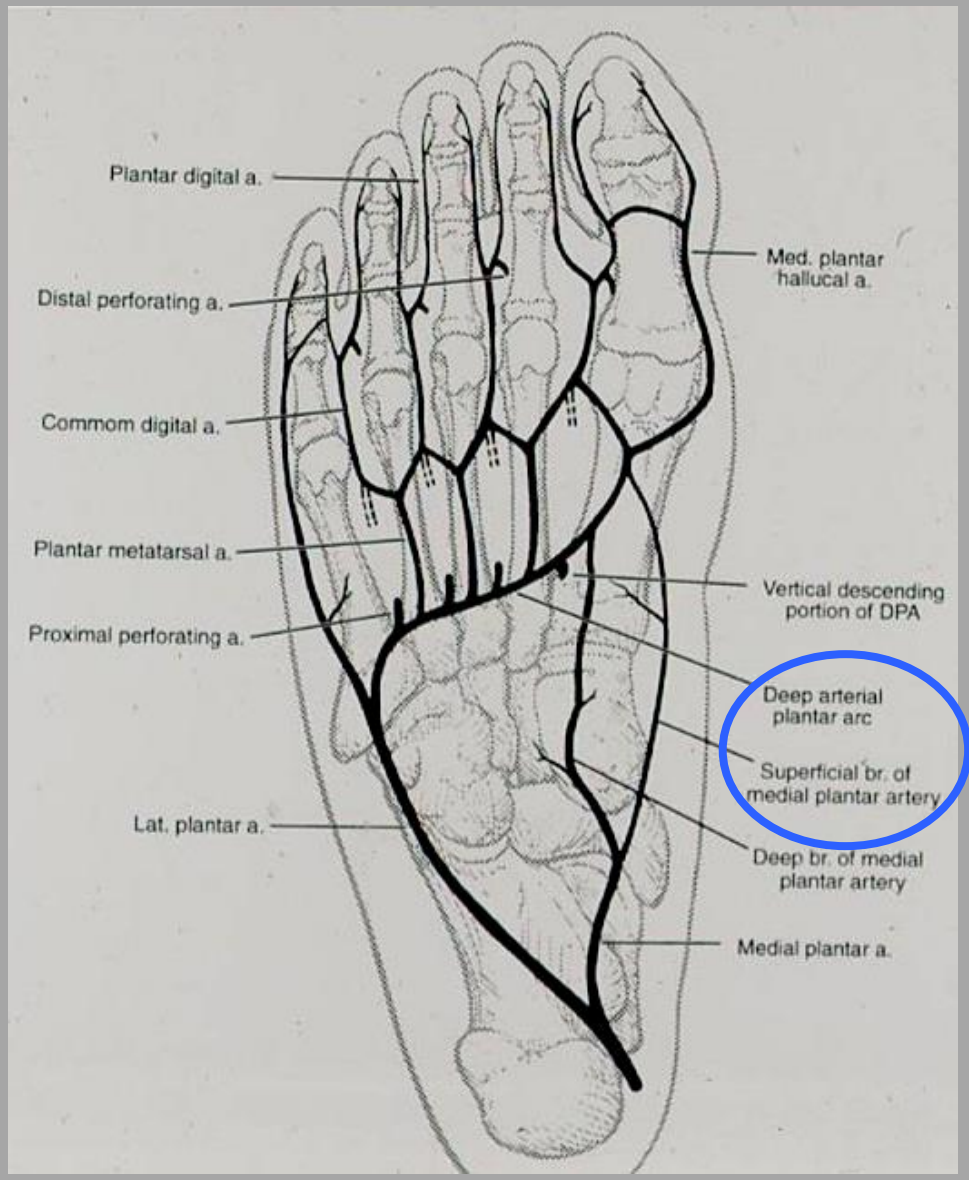
Medial Plantar Flap

Artery:

medial plantar artery (superficial or deep branch)

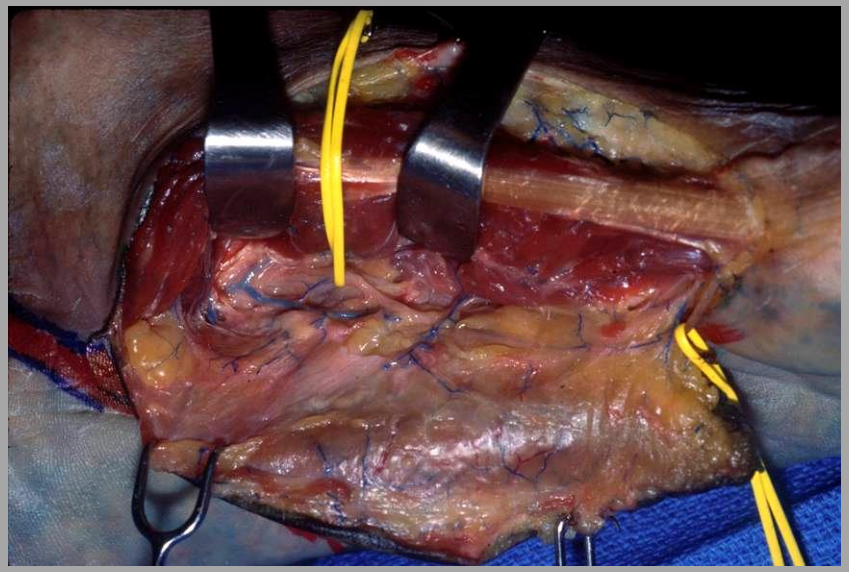
Pivot point:

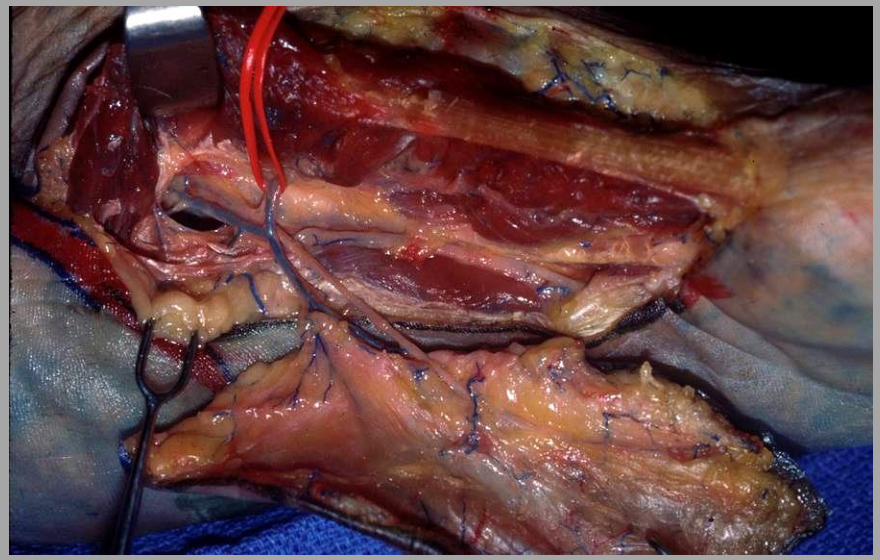
Distal tarsal tunnel



Medial Plantar Flap:

fascia-cutaneous flap

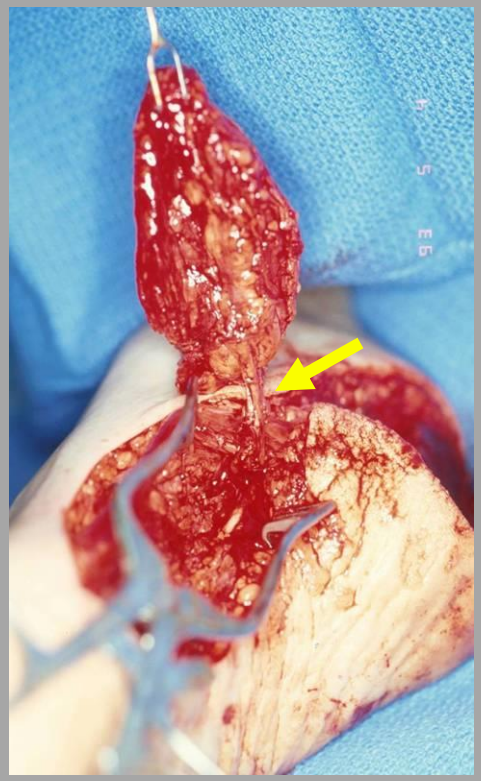




Medial plantar flap:

anatomy

Medial Plantar Flap:



Dx: marjolin's ulcer on heel

Medial Plantar Flap:




Dx: Melanoma Of Heel

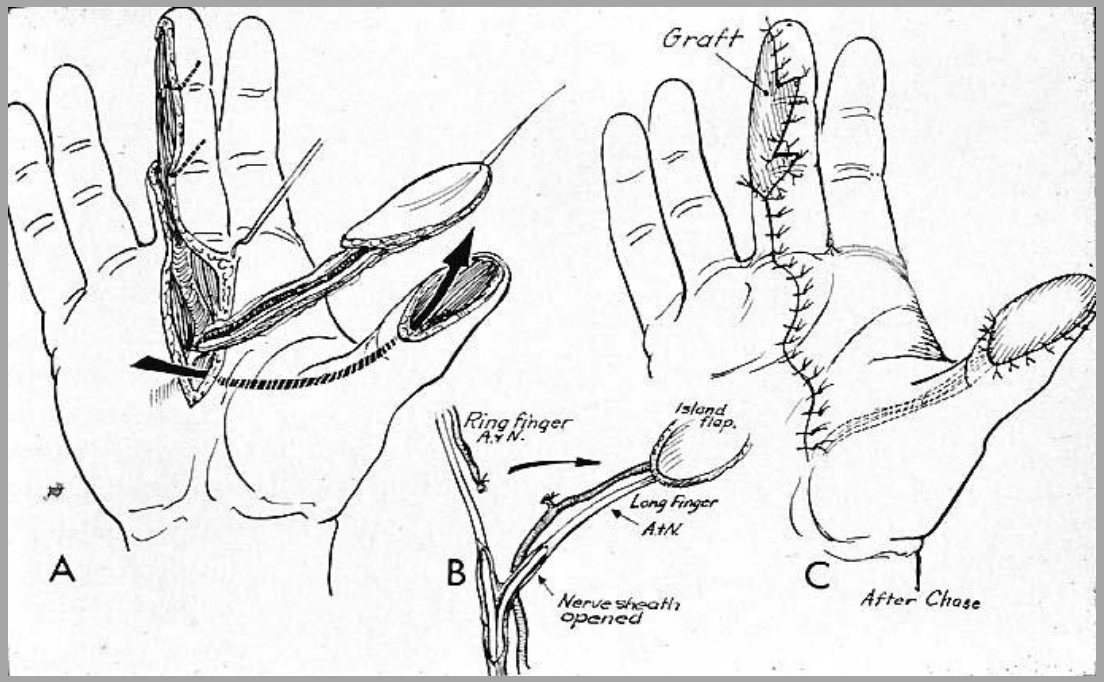
Toe Flaps:

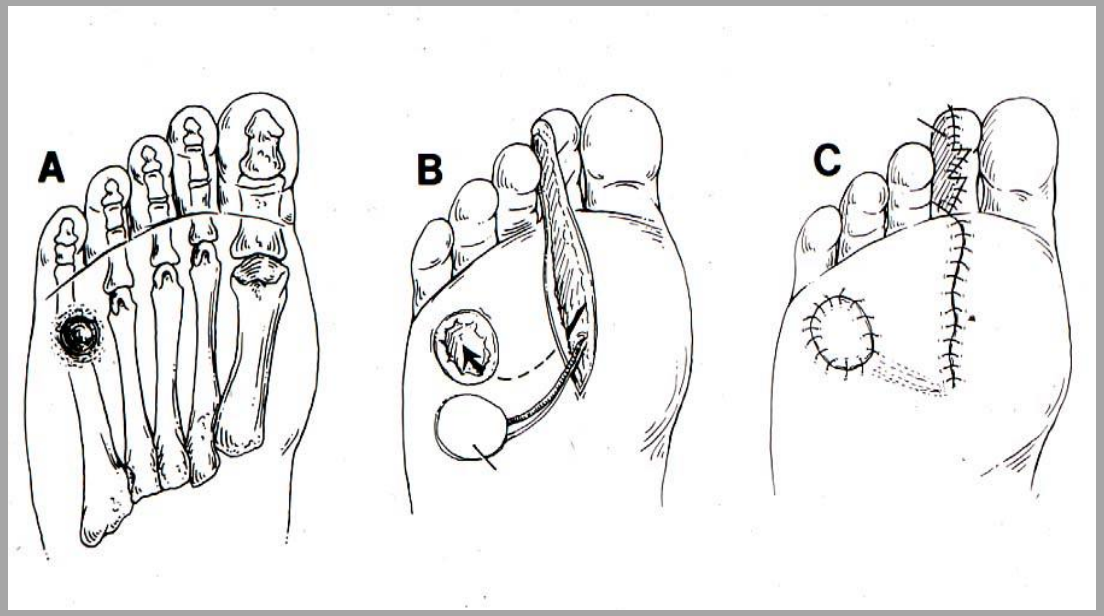
Artery:

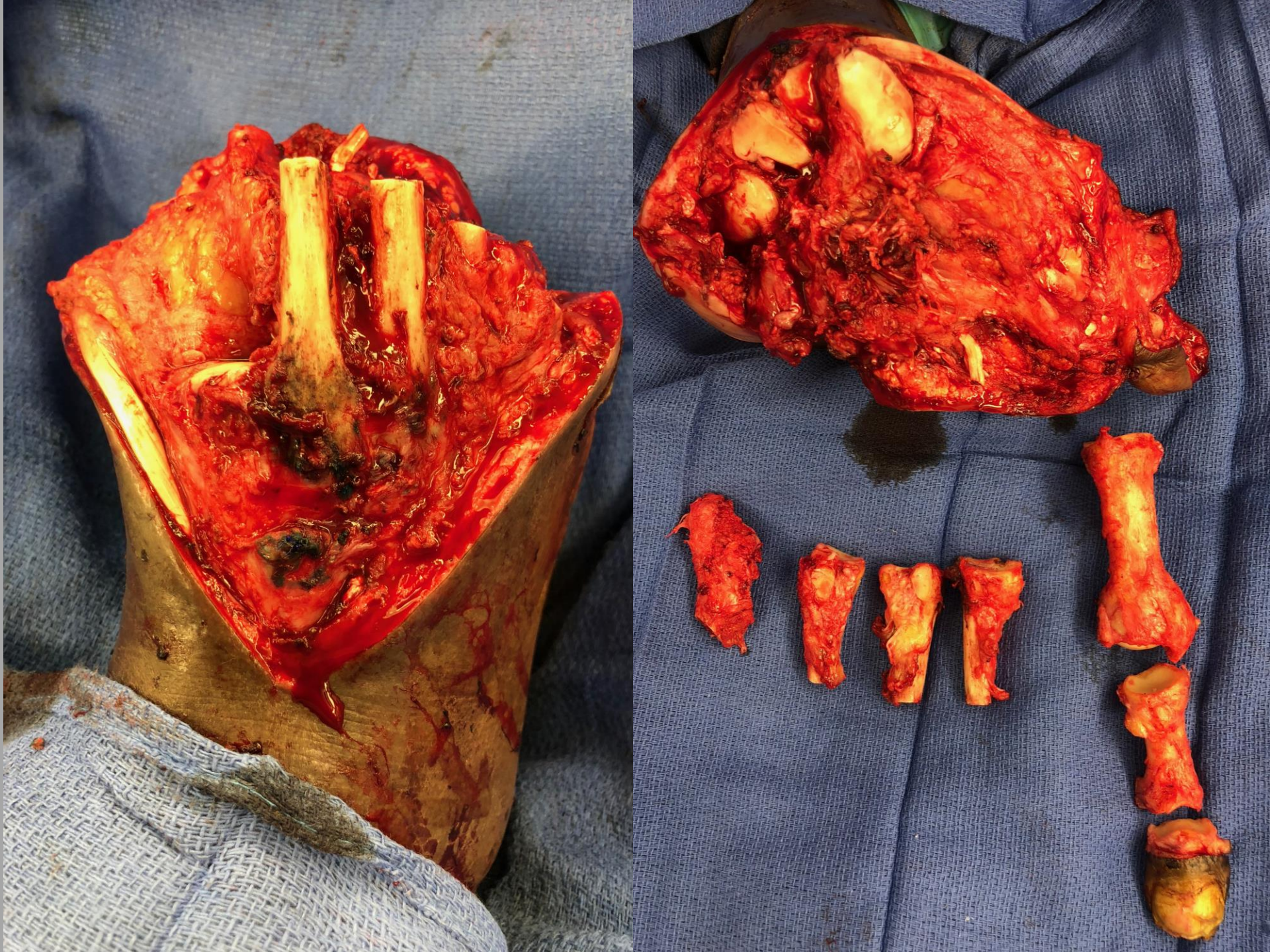
Digital artery

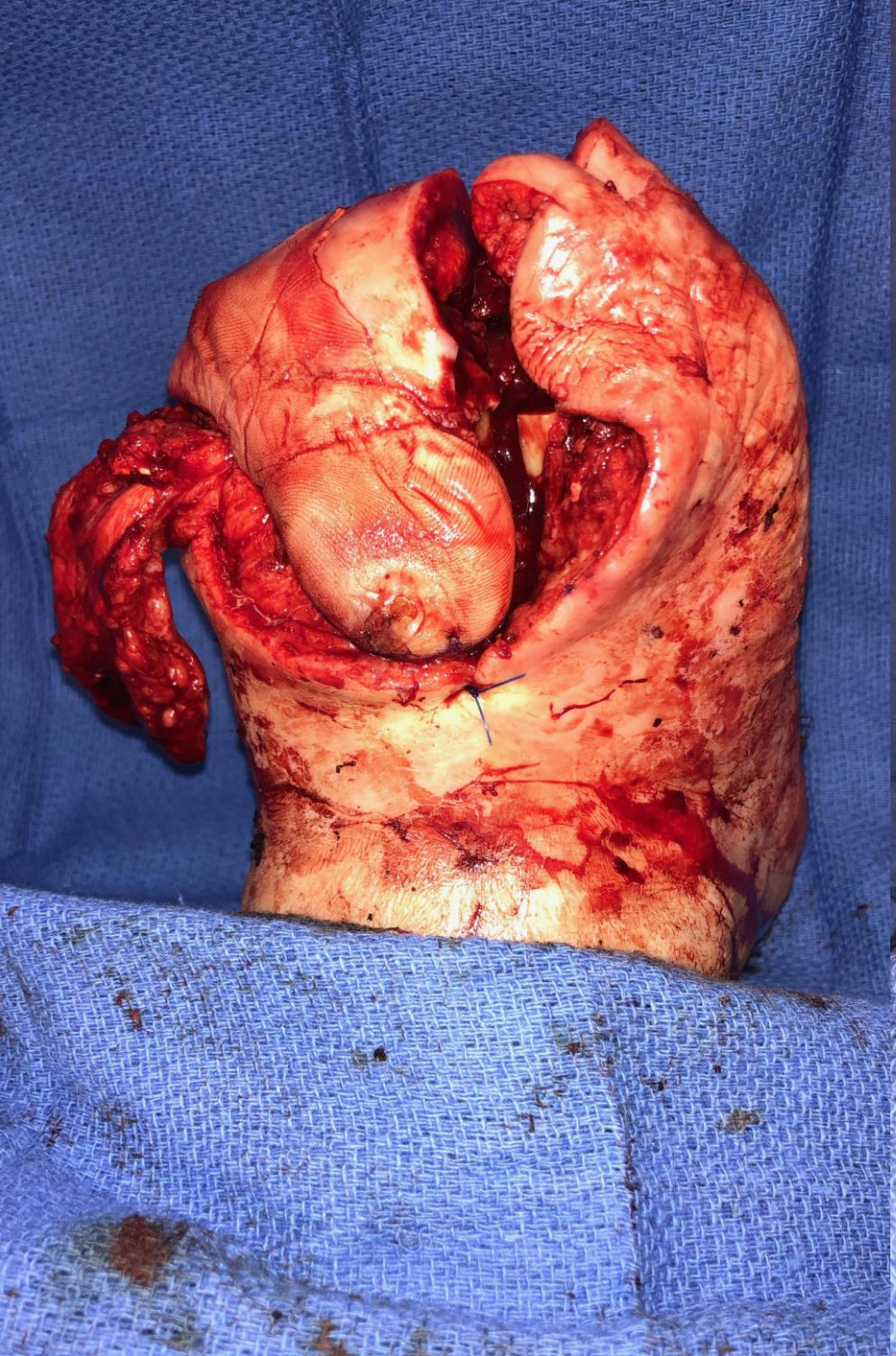
Pivot point:

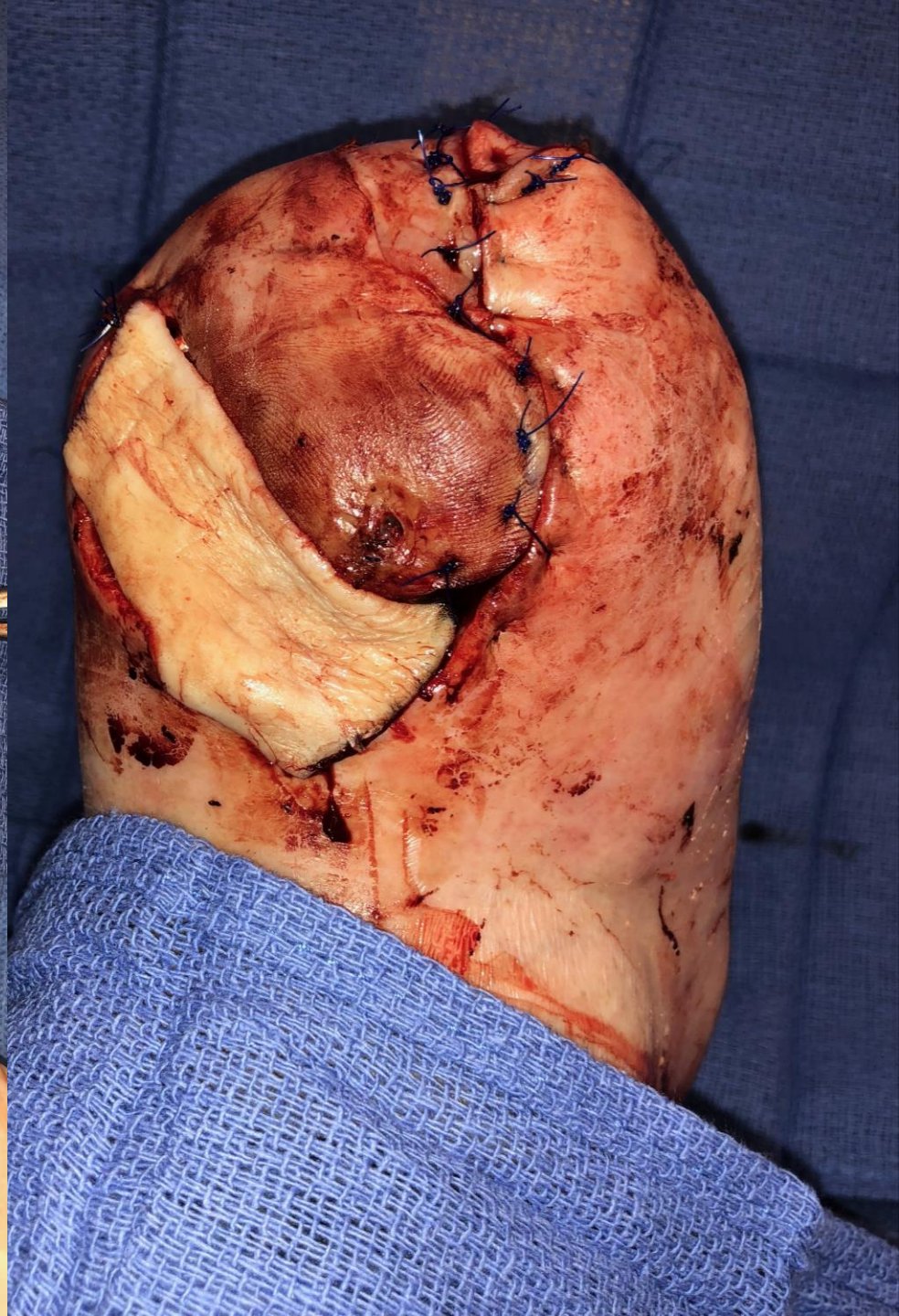
Distal plantar transverse crease









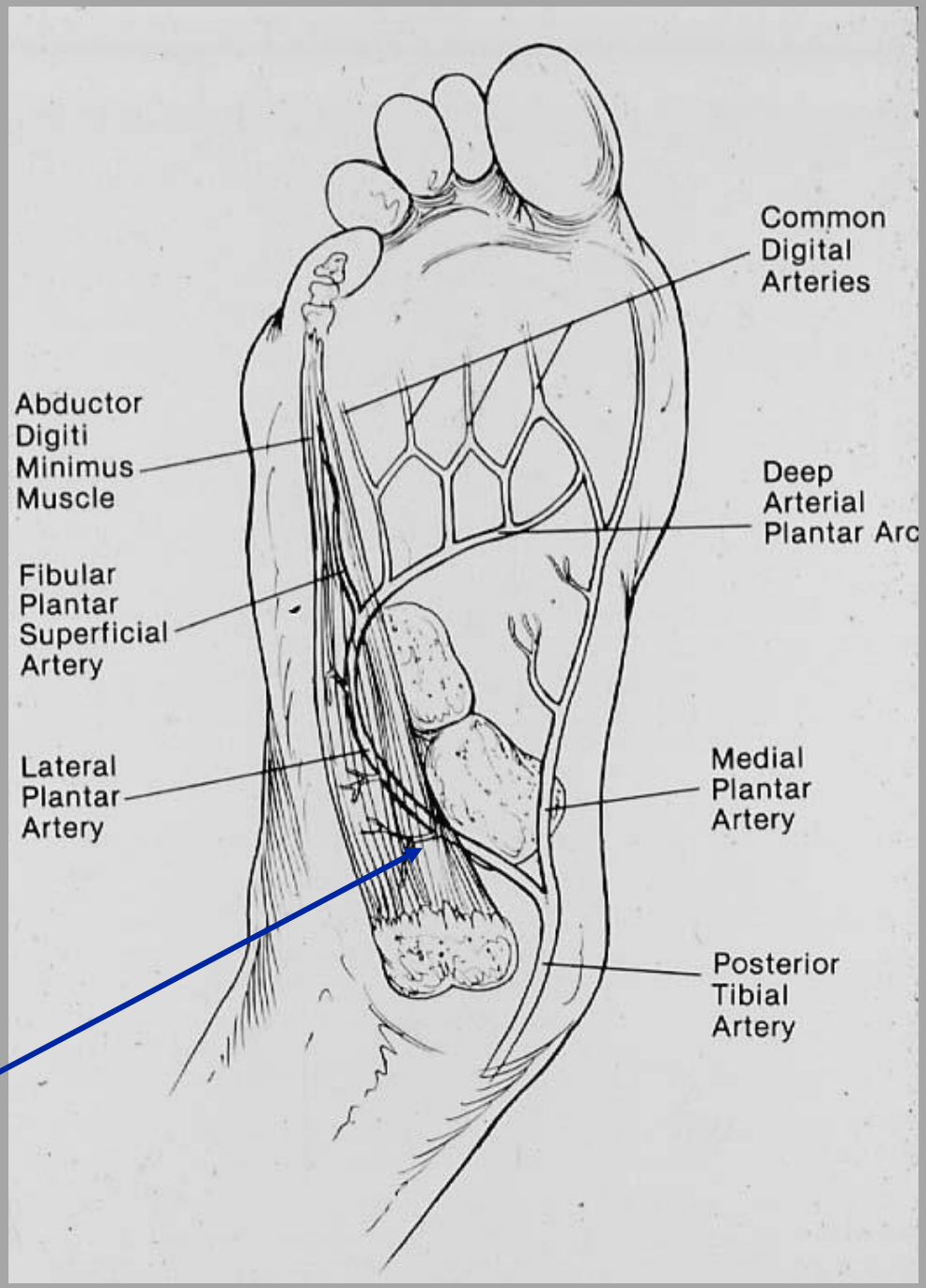
Abductor Digiti Minimi Flap:

Artery:

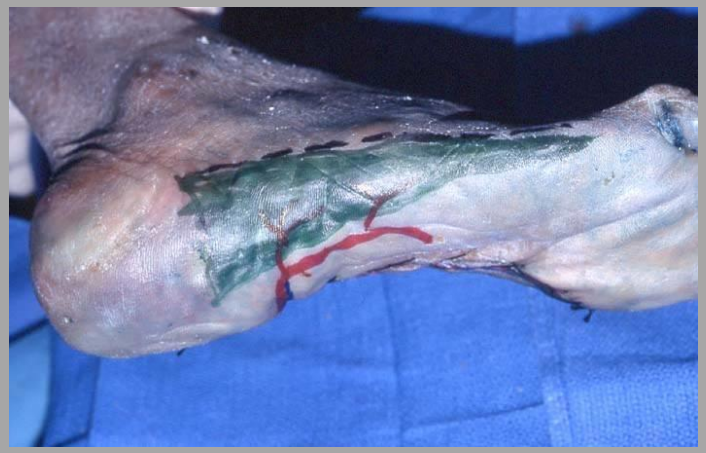
Lateral plantar artery

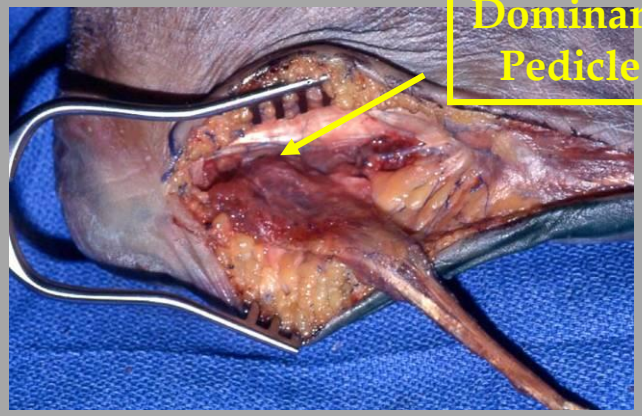
Pivot point:

Distal tarsal tunnel



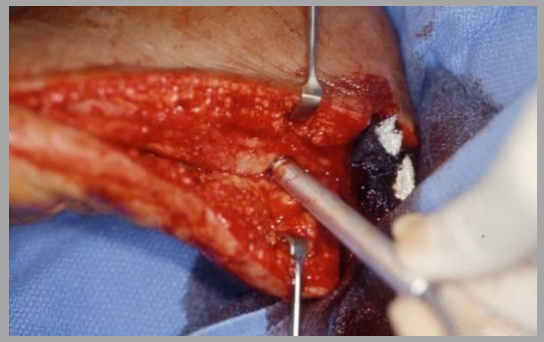
Abductor Digiti Minimi Flap:





Note Small
Distal Bulk

Abductor Digiti Minimi Flap:



Dx: Osteomyelitis Of Calcaneus

Abductor Digiti Minimi Flap:

Dx: Osteo Calcaneus

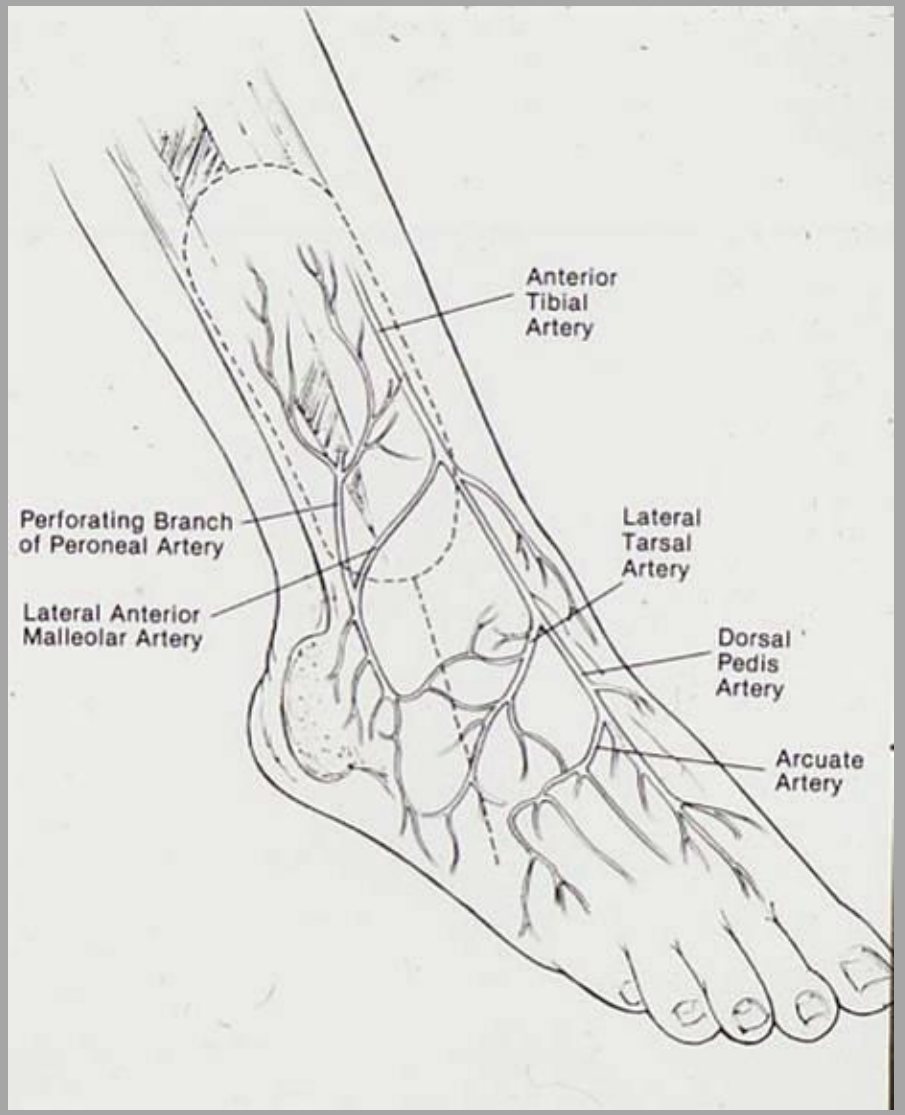
Supra-malleolar Flap:

Blood supply:

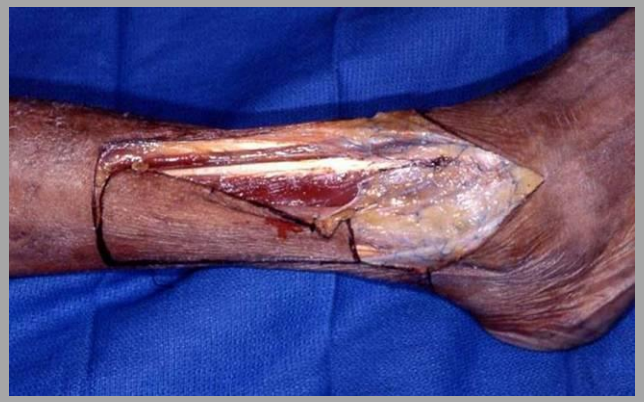
Anterior perforating branch of peroneal artery

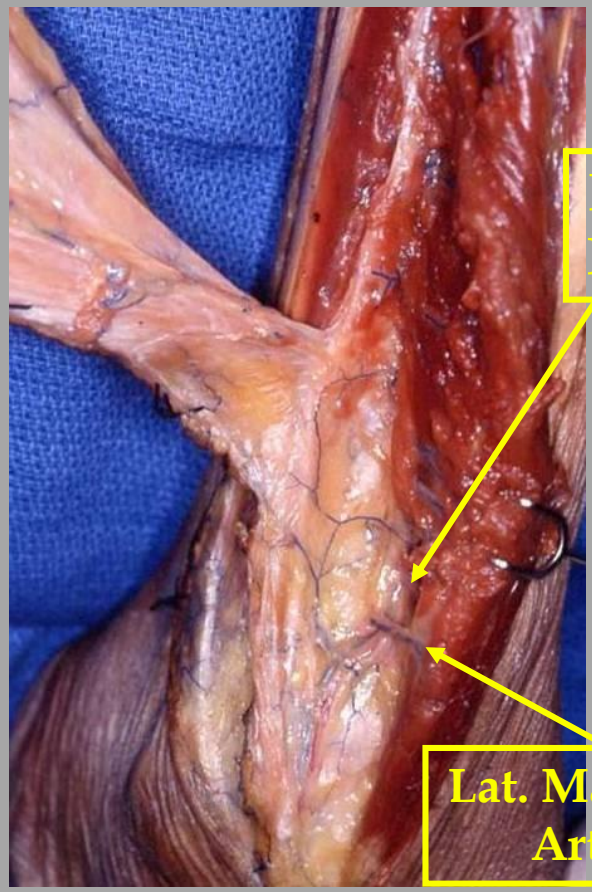
Pivot point:

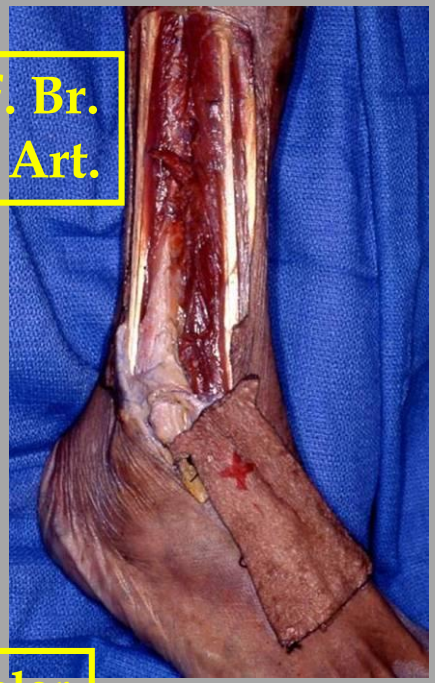
Anterior portion of lateral malleolus



Supra-malleolar Flap:







Supra-malleolar Flap:



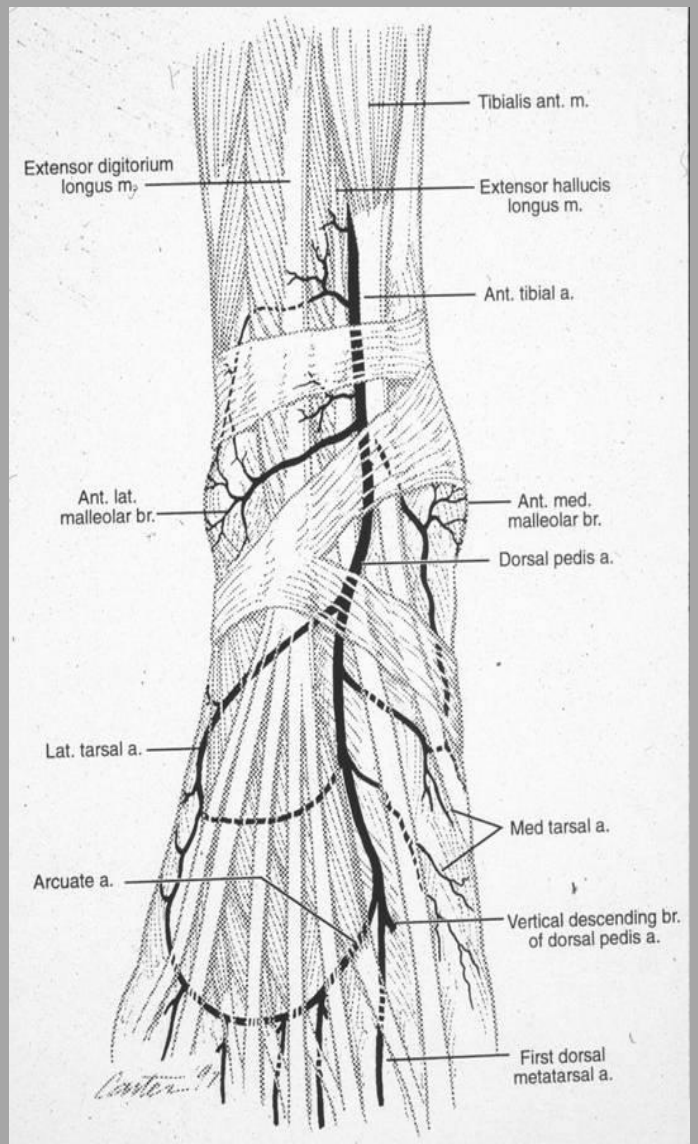

Recurrent Squamous Cell Cancer
In A 94 Yr. Old Ambulator

Fascial Supra-Malleolar Flap (1a)

Non-healing Ulcer Left Malleolus

Fascial Supra-malleolar Flap (1b)

Extensor Digitorum Brevis Muscle:



Extensor Digitorum Brevis Muscle:

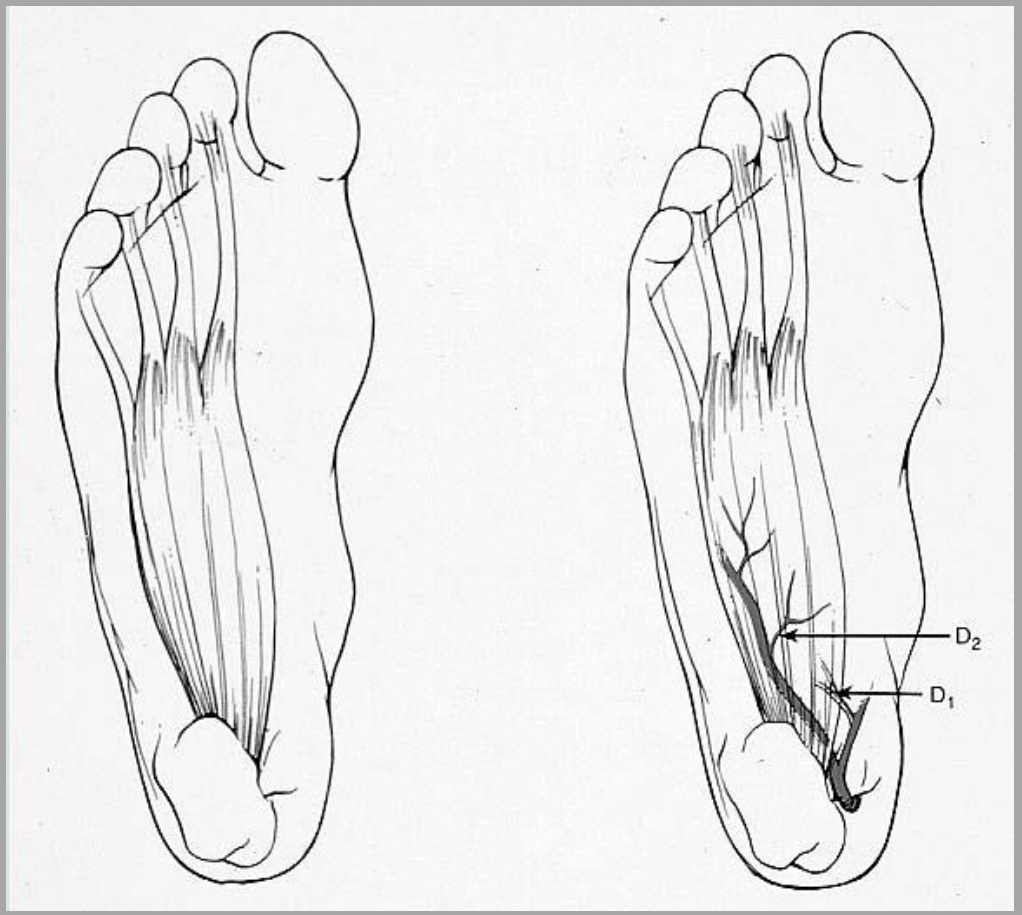
Flexor Digitorum Brevis Flap:

Artery:

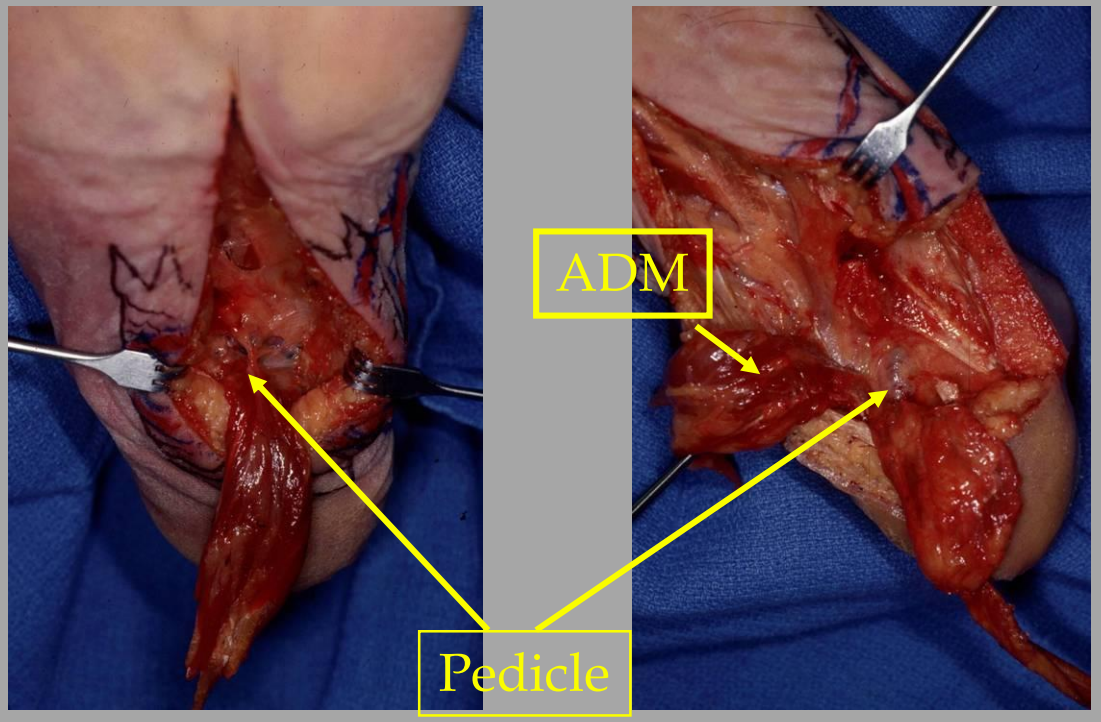
Lateral Plantar Artery

Pivot Point:

Distal Plantar Heel

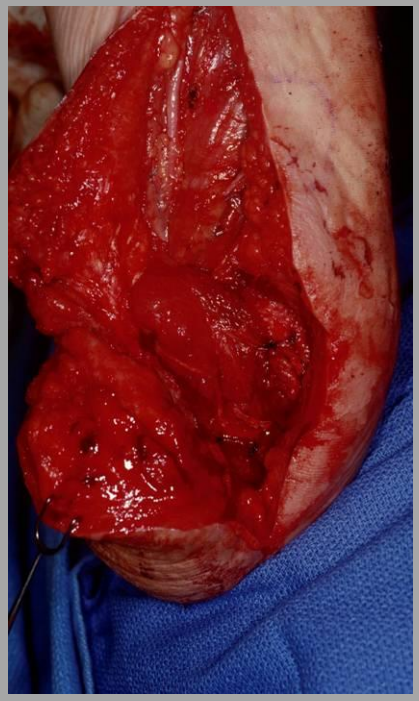


Flexor Digitorum Brevis Flap:



Flexor Digitorum Brevis Flap:



Dx: Non Healing Ulcer Plantar Foot Secondary To Over lengthening Of Achilles Tendon

Flexor Digitorum Brevis Flap:

Poor Compliance With Non-wt. Bearing
Healed After 3 Months S/p Casting In Equinus

Abductor Hallucis Muscle Flap:

Artery:

Medial plantar artery

Pivot point:

Distal tarsal tunnel

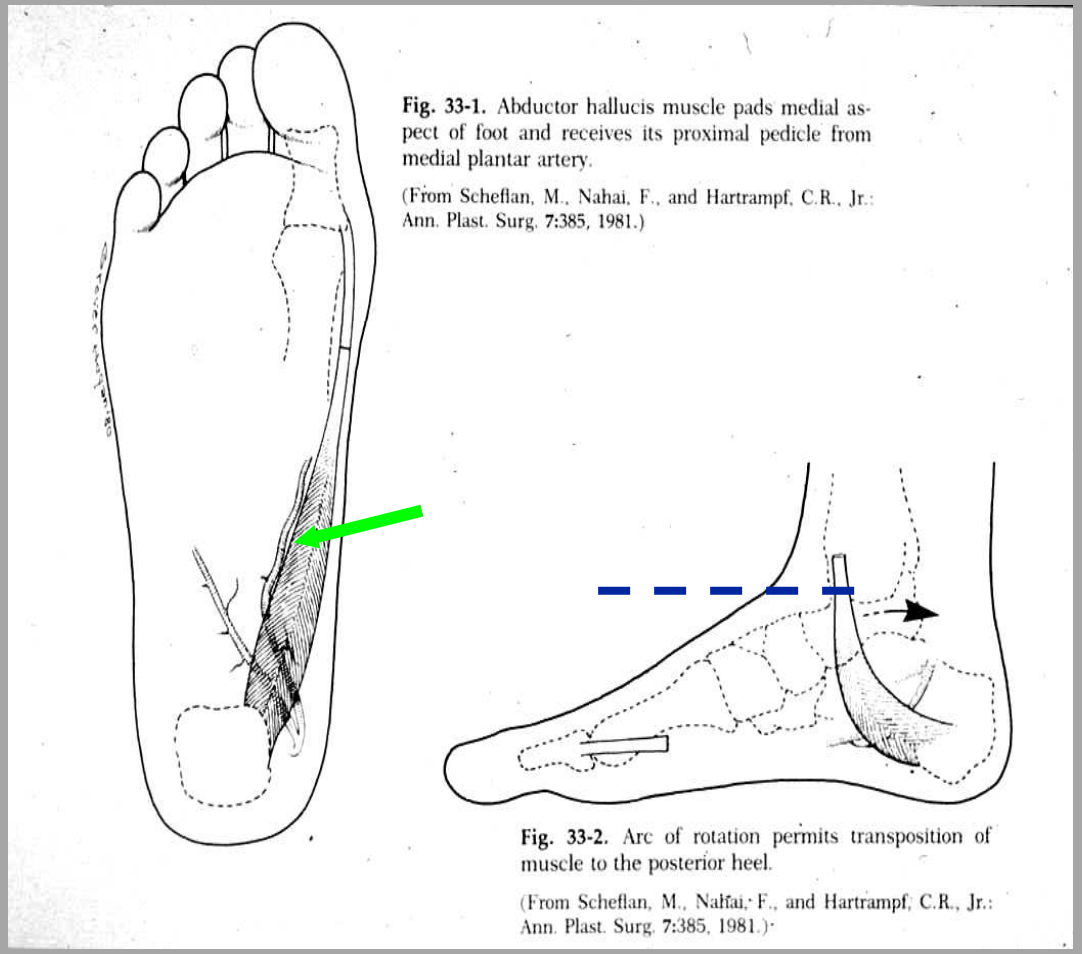


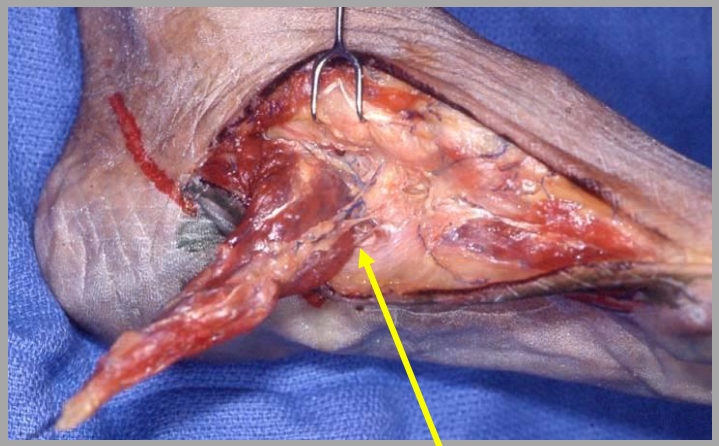
Fig. 33-1. Abductor hallucis muscle pads medial aspect of foot and receives its proximal pedicle from medial plantar artery.

(From Scheflan, M., Nahai, F., and Hartrampf, C.R., Jr.: Ann. Plast. Surg. 7:385, 1981.)

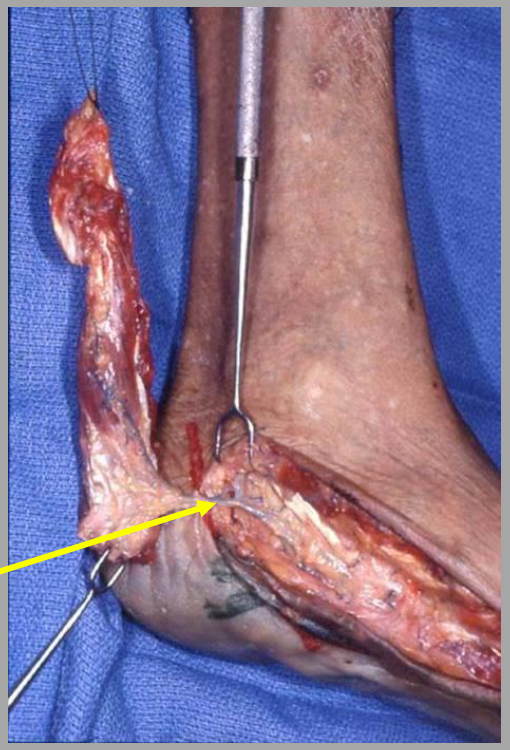
Fig. 33-2. Arc of rotation permits transposition of muscle to the posterior heel.

(From Scheflan, M., Nahai, F., and Hartrampf, C.R., Jr.: Ann. Plast. Surg. 7:385, 1981.)

Abductor Hallucis Muscle Flap:



Pedicle

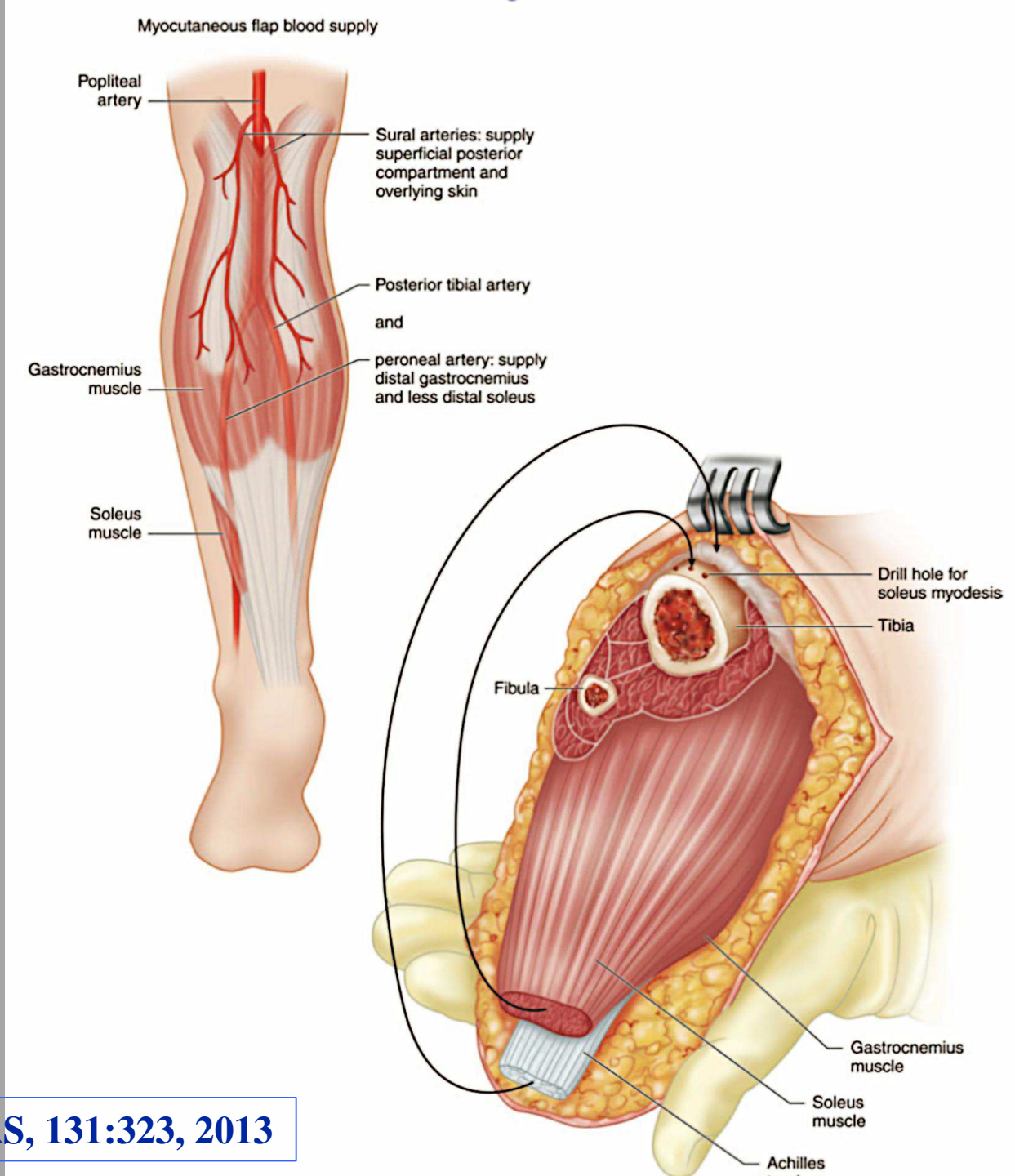


Abductor Hallucis Muscle Flap:

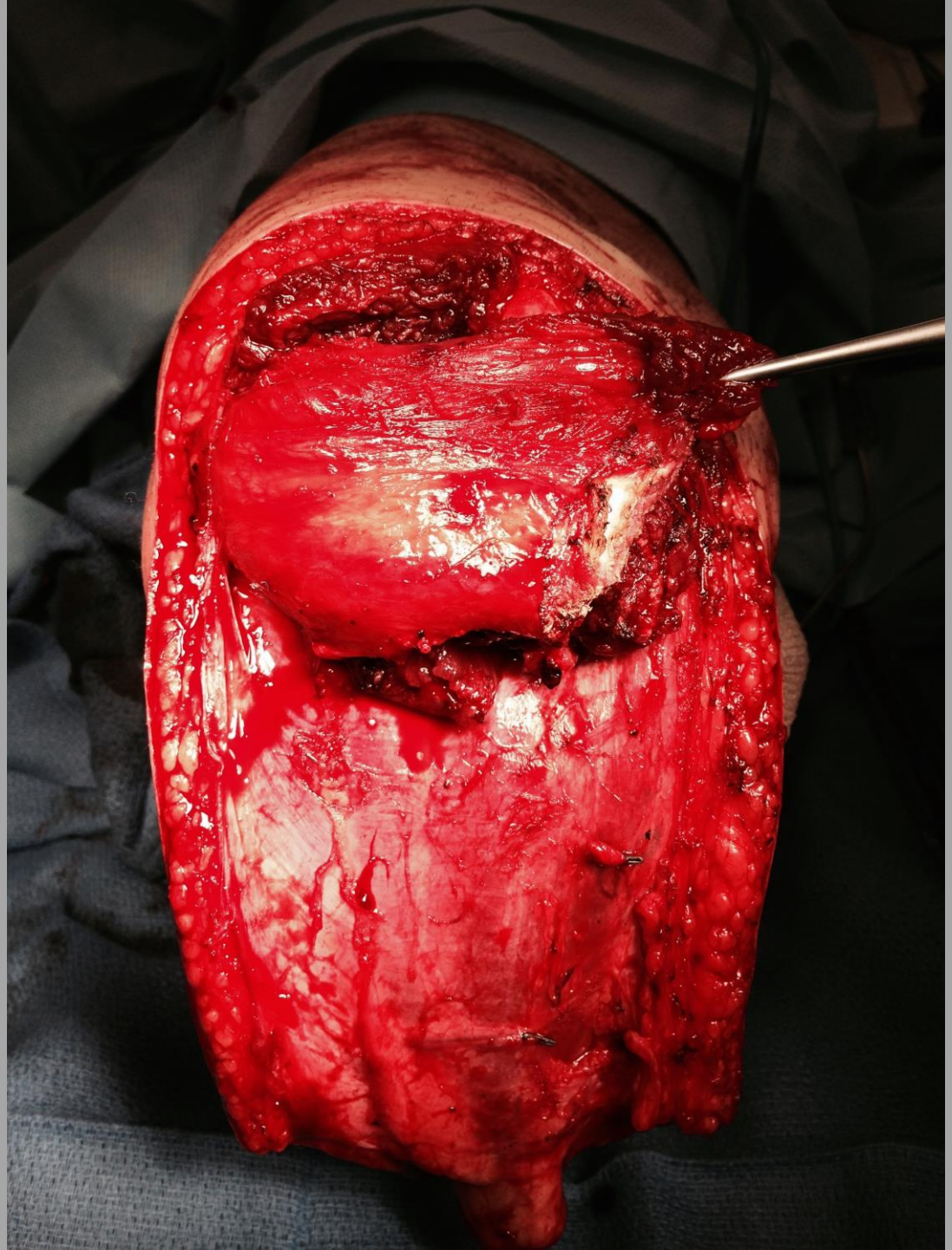
Dx: Non-healing Ulcer
Over Achilles

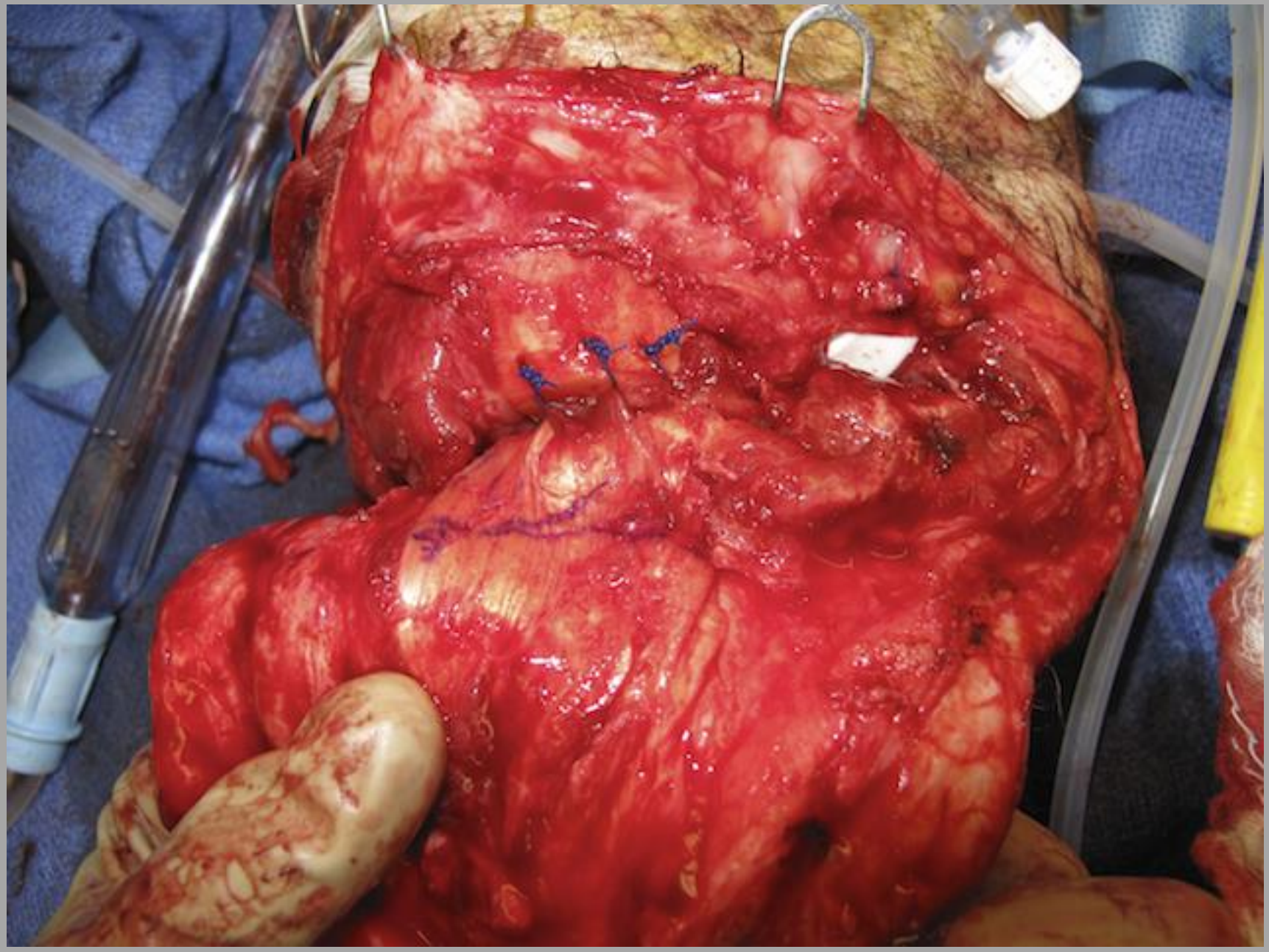
Abductor Hallucis Muscle Flap:

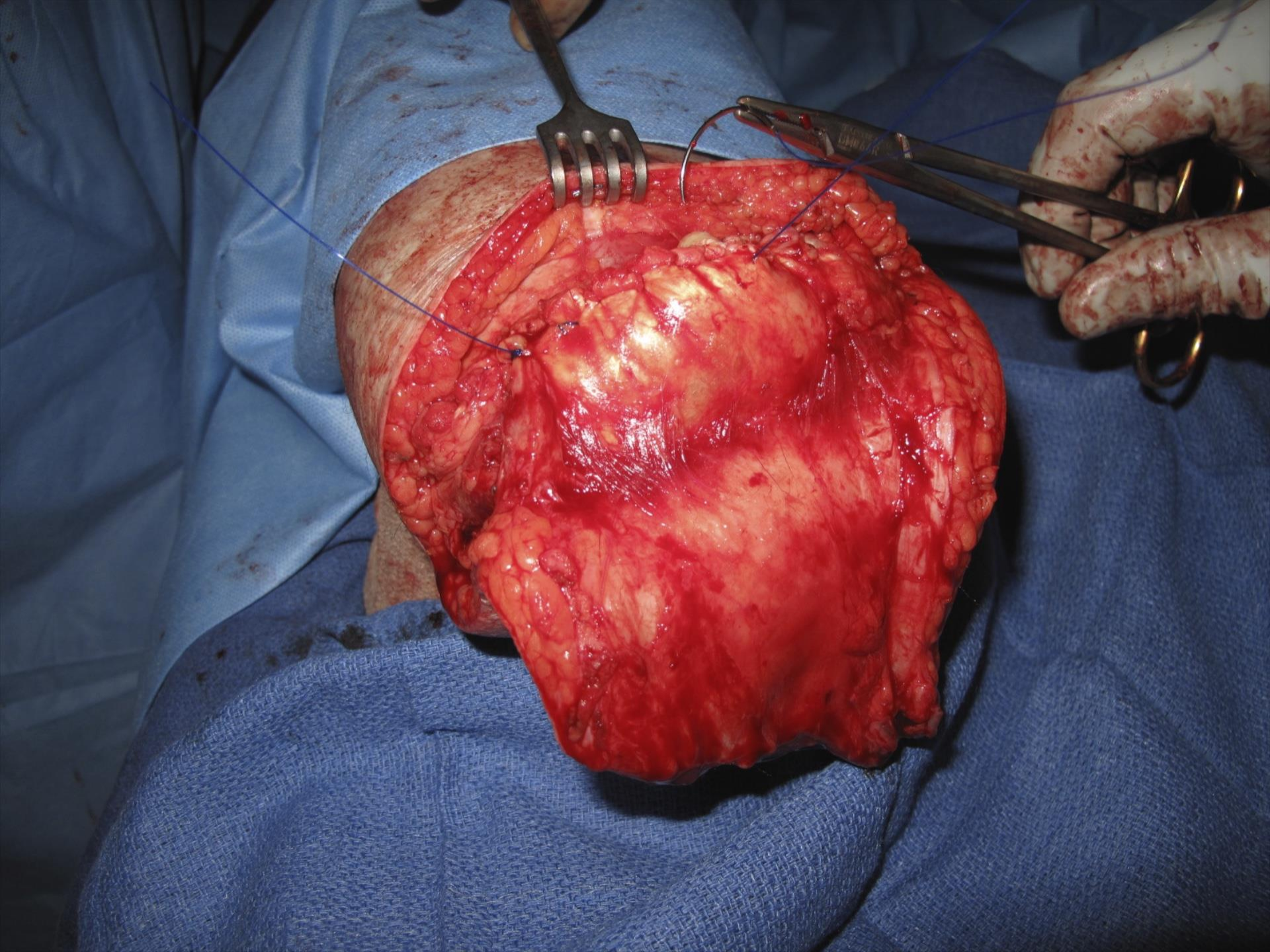
Abductor Hallucis Muscle Flap:



Brown BJ, PRS, 131:323, 2013



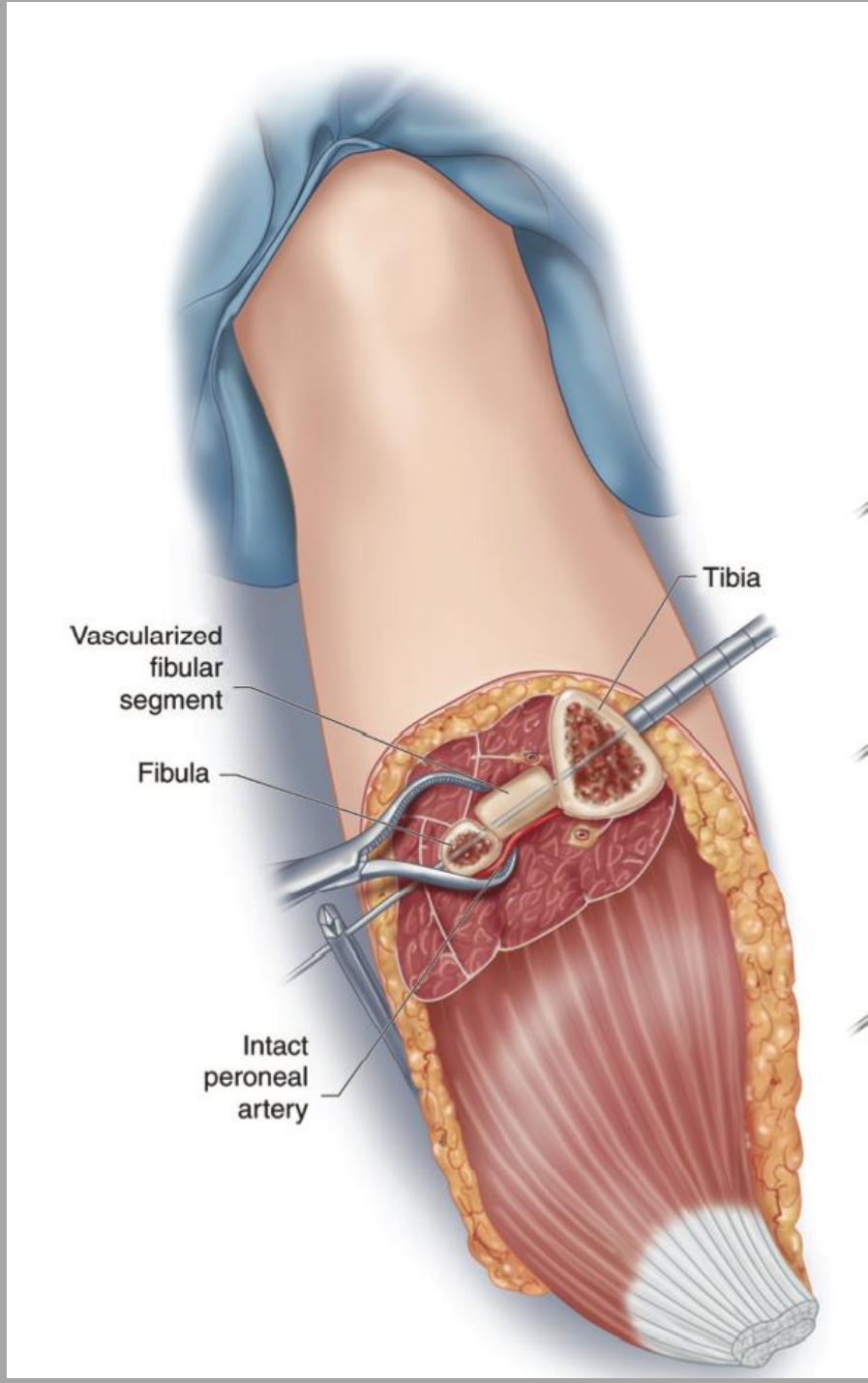




ERTL:

fusion of tibia and fibula using bone graft

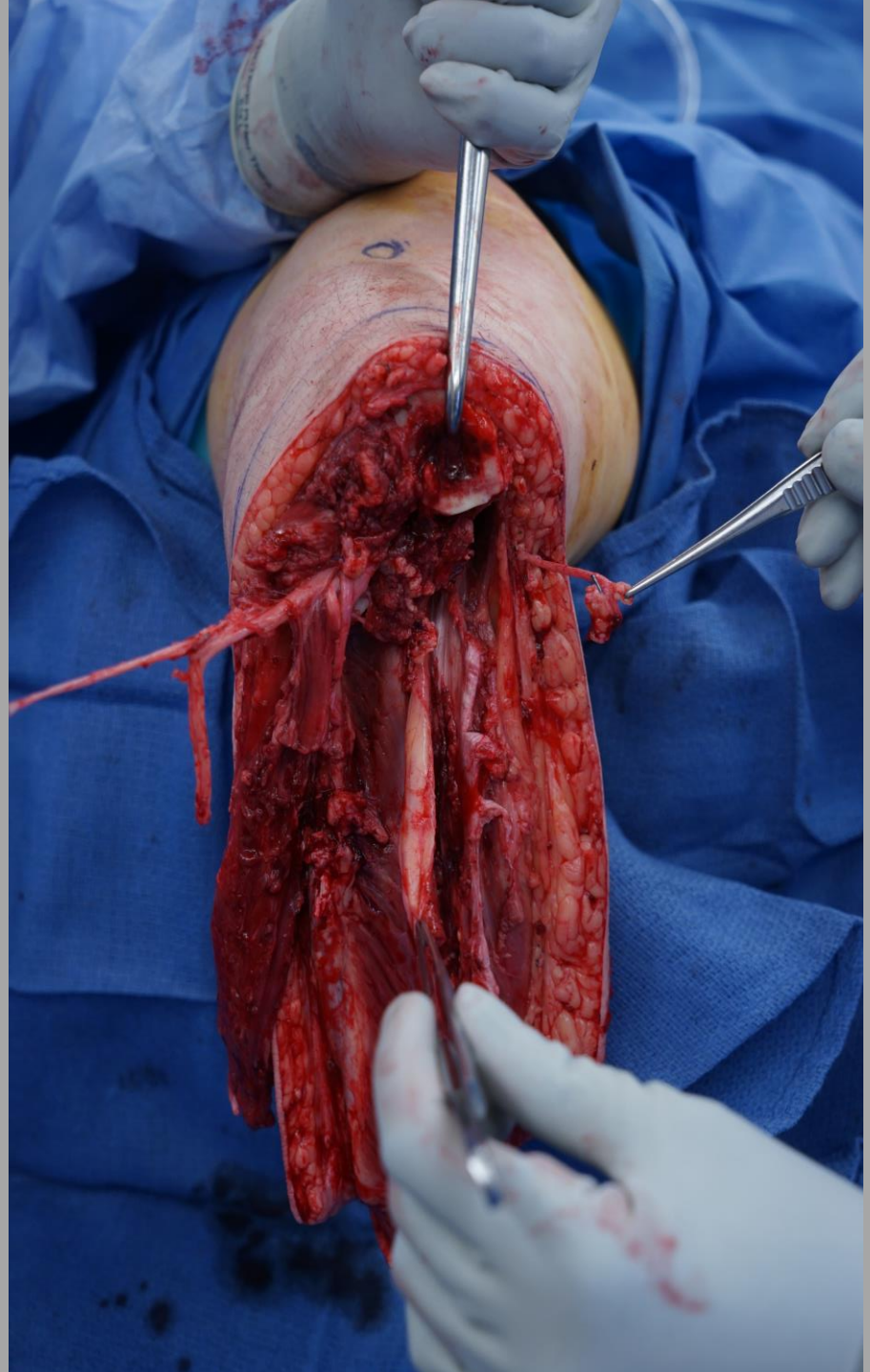
1) Osteo - periosteal free grafts
    1) Von ERTL JW, Z Plast Chir. 1981 5(3):184
2) Fibular bone graft
    1) Pinto MA, Prosthet Orthot Int. 2004, 28 (3), 220
3) Vascularized fibular bone graft
    1) Brown BJ, PRS, 2013, 131:323



ERTL Using Vascularized Fibular flap

Nerves & Major Amputations:

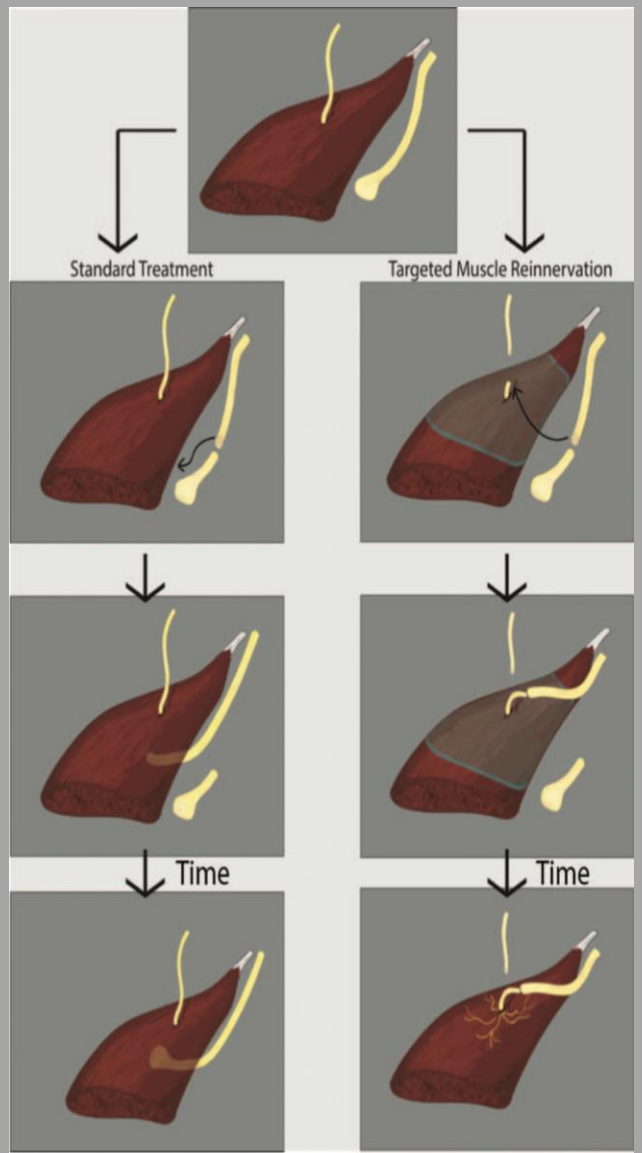
- Prevent neuromas
- Prevent phantom pain



Targeted Muscle Re-innervation:

Concept

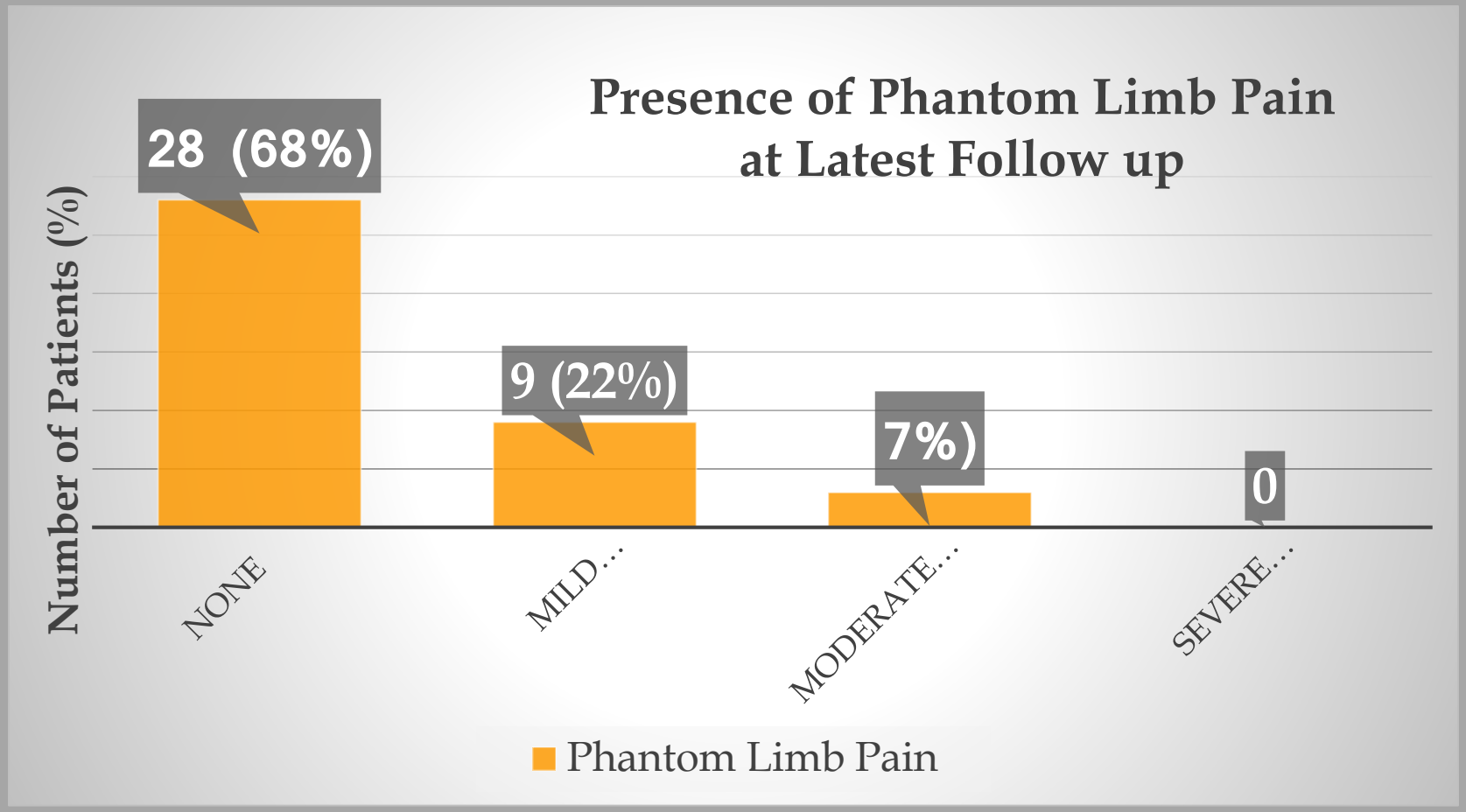
- A cut nerve end will attempt axonal sprouting
- Burying a cut nerve in muscle does **not** prevent this
  - Innervated muscle will not accept new innervation
- **Denervated** muscle will accept new innervation
  - **RPNI**
  - **TMR**



Dumanian G, Ann Surg. 2018 Nov (epub)

Slide Courtesy Dr. Grant Kleiber

Results with TMR:



Slide Courtesy Dr. Grant Kleiber

Current Ambulation Data:

combining posterior flap design with a 4 compartment myodesis & TMR +/- ERTL

- **Last 100 pts. discharged from National Rehab Hospital**
  - **6 lost to f/u**
  - **93 ambulating**
  - **1 non-ambulator**

Conclusion:

- **Ensure good blood flow and clean wound bed**
- **Think function FIRST when considering a reconstructive option**
- **Will the reconstruction hold up for the long term???**

Conclusion:

- **Most wounds can be closed with simple techniques**
- **Use simple techniques if there is enough tissue between the healed wound and underlying bone not to breakdown**
- **Use flaps to cover vital structures or bulk to pad the area between the exterior skin and underlying bone**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