Wound closure and the reconstructive ladder

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Plastic surgery and wounds?

Don’t plastic surgeons just think about two things?
a noble specialty?
a problem solving specialty
Plastikos- to shape and mold
all over the body
for all ages
Plastic Surgery encompasses many disciplines.
to answer one question...
Problem

Fell down a well. Sludge and dirt in hand required debridement of all carpal bones.
Goals
Identify
Measurements
Clean/Dirty
Infection
Granulation
Condition of surrounding tissues
Identify
Absent structures
Exposed structures
Patient condition
Function expected
Optimize

- Wound bed
- Soilage
- Spasticity
- Cushions/beds/prosthetics
- Nutrition
- Patient condition
- Patient understanding
- Patient cooperation
- Aftercare
- Home situation
- Provider relationship
Flap

Free tissue transfer

Delayed primary closure

Flap delay

Secondary intention

ALT

Tissue expander

ORAM
VRAM
TRAM

STSG
FTSG

graft

DIEP

VAC

Tubed pedicled flap

Close
Keep it simple

Each procedure sits on a rung
Goal
is not to climb to the top
Balance

ascend to just the right level of complexity to close the wound
The Reconstructive Ladder

Free flap
Distant flap
Regional flap
Local flap
Skin graft
Primary closure
Secondary intention
Disclaimer
All photos you see here are from real people in the Great Falls area. They have consented to the use of their photos. Please respect their confidentiality.
Secondary intention

Yes if:

- Contaminated wound/puncture
- Will heal within 3 weeks on its own
- No vital structures exposed
- Contraction will not cause functional or cosmetic defect

**Works very well in small concave areas**
Primary closure

Yes if:

- Wound is clean or can be cleaned
- Tissue approximates without undue tension
- Tissue edges healthy
Primary closure
Primary closure
Skin graft

Yes if:

- Clean wound
- Good granulation
- No white structures exposed
- Low shear forces
Full thickness burn

Excision to bleeding wound bed

Graft taken at 15 one-thousandth of an inch, sewn into place with 5-0 Monocryl
Donor site dressings

Semi-occlusive Tegederm preferred
• Faster re-epithelialization
• Better pain control
• Easily reinforced

Downsides
• Invariably leaks on bed
• Hard to place on some areas

Other choices
• Silvadene
• Xeroform
Skin graft dressings

Step 1: Conformant (shown), Mepetel or nothing over graft...
Skin graft dressings

Step 2: VAC sponge applied, careful not to shear on application. Set to 125 mmHg continuous suction.
Skin graft dressings

Step 3: Threatening note written to make sure no well-meaning person changes, unplugs, or clamps VAC.
Skin graft dressings

Step 4: Remove VAC sponge on day 5. Healthy graft??
Skin graft disaster

Two days later... dead, infected graft
Why does a graft die?

- Poor wound bed
- Infection
- Shear
- Hematoma
- Seroma
Why does a graft die?

• Poor wound bed

• Infection

• Shear

• Hematoma

• Seroma
Re-excite to fascia

VAC until granulation

Re-graft

Success?
Two weeks later...
Local flap

Yes if:

- White structures exposed
- Unique tissue
- Local tissue laxity
- Surgeon likes geometry
What is a flap?

Well...
Flaps have a blood supply, grafts don’t.

Random pattern

Axial pattern
Local flap

Yes if:

- White structures exposed
- Unique tissue
- Local tissue laxity
- The surgeon likes geometry
Local flap

Bi-lobe flap
Local flap

You can just pull this together, right Doc?
Local flap

Rotation flap
Local flap
Local flap

Transposition flap
Local flap

Transposition flap
Local flap
Regional flap

Yes if:

• White structures exposed

• No local tissue laxity

• Undamaged muscle/facial flaps within area
Before you get to the table...

Global assessment of patient

- Wound care
- Infection
- Co-morbid conditions
- Offloading
- Spasticity
- Soilage
- Seats/beds/cushions/clothes
- Nutrition
- Smoking
Why did this happen?
And why won’t it happen again?
Before you get to the table...

Nutrition

Pre-albumin

- $t_{1/2}$ 3 days
  - Acceptable > 15

Albumin

- $t_{1/2}$ 3 weeks
  - Acceptable > 2.8
Before you get to the table...

Nicotine

1 cigarette = 90 minutes ischemia

Wound healing problems

Active smokers  67%

<4wks cessation  53%

>4wks cessation  33%
Before you get to the table...

If all factors are optimized, the wound should be getting smaller, not bigger!
Regional flap

Debride the ulcer and bone
Regional flap

Inferior gluteal island flap
Regional flap

Lots of examples...
Regional flap

Forehead flap
Regional flap

Forehead flap
Regional flap

Medial gastrocnemius flap
Regional flap

Medial gastrocnemius flap
Distant flap

Yes if:

- White structures exposed
- No local or regional tissue available
- Compliant patient
Distant flap

Mostly obsolete
Free flap

Yes if:

- White structures exposed
- Large volume needed
- No local or regional tissue available
- Intact recipient vessels
- Surgeon enjoys standing for 8+ hours
Free flap
Higher on the ladder...
The Reconstructive Ladder

Free flap
Distant flap
Regional flap
Local flap
Skin graft
Primary closure
Secondary intention
Spiegel der Wundergney.

Der Landesknecht Ebenbild ich bin
Und trug auch diesen Sold imynn.
Ich wags vff/Gerat wol/Bruder Diet/
Big 3 das hautsgus gar erleit.
Thank you!