Principle of Wound coverage and Flap Surgery

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Nursing symposium
Why Wounds need to be covered?

To avoid:

• Infection: Acute or Chronic
• Exposure of important tissues: nerve, vessels, tendon, bone, joint
• Electrolyte loss
• Protein loss
Consequence of poor wound coverage

- Uncontrolled sepsis – life threatening
- Extensive scarring – cosmetic and functional deficit

- Ideally, wound coverage should be achieved within 1 week after injury
## Management of Severe limb injury

### Primary Goal
*(initial healing and infection control)*

- **Skeletal stability**
- **Adequate blood supply**
- **Soft tissue coverage**

### Secondary goal
*(functional reconstruction)*

- **Nerve repair/graft**
- **Muscle & tendon repair/transfer**
- **Bone & Joint reconstruction**
Adverse Factors for wound healing

- Infection
- Retained foreign bodies
- Retained devitalized tissue
- Poor circulation
- Radiation or chemotherapy
- Systemic factors: malnutrition, immunosuppression, medical diseases e.g. DM, PVD, smoking, obesity
- Wrong choice of treatment
Patient preparation

• Local:
  – adequate debridement
  – Dressing care: keep wound clean and tissue viability, barrier to infection

• Systemic:
  – Nutritional support
  – Antibiotics
  – Pain control
  – Stress relief
Dressing

• Debridement (of non viable tissue)
  – e.g. Iroxol

• Decontamination (of infective agents)
  – Seasorb silver (contain alginate to trap water)
  – Anticoat (silver only)
  – Aquacel (hydrofiber)

• Promotion of healing
  – Solcoseryl
  – Actovergin
  – Collagen

• External stimulation:
  – Hyphecan

• Optimal Environment

• Local tissue circulation
Bacteriology

- All wounds are colonized by bacteria
- Presence of bacteria $\neq$ infection
- Established infection does not preclude wound coverage surgery
  - Except certain bacteria
  - Streptococcus
    - Streptolysin
    - Clear thin exudate
  - Pseudomonas
    - Green colour exudate
Bacteriology

- Rational use of antibiotics
- Nature of wounds
- Intelligent guess
- Avoid prolonged topical antibiotics
- Surgical debridement of dead and infected tissues
Anatomy

• What structures are missing
  – Loss of major peripheral nerves
• What needs to be replaced
  – Cavity filling
• What tissues available nearby
  – Vascular anatomy
• What tissues available distant
  – Free tissue transfer
• Overall vascular status of the limb
WOUND PREPARATION
Topical Negative Pressure (VAC)
Vacuum Assisted Closure
VAC regime

• Negative pressure
  – Most wound : 125mmHg
  – 50-125mmHg for skin grafts

• Cycle :
  – Constant for 48 hr then intermittent (5min on/2min off)

• Dressing changes
  – Most wound : 48 hr then every 4-5 days
  – Infected : less than 48 hr
  – Clean wound : 4-5 days
Reconstruction ladder

- Primary closure
- Secondary intention “wound contraction”
- Skin graft
- Flap
  - Local
  - Distant
  - Free

- Select the simplest method that fulfill wound requirement
Skin graft

• Full thickness (including dermis) or splitted (~0.015 inches)
• Survive on vascularized bed by “imbibriton”
• May achieve sensation by ingrowth of sensory nerve into the graft
SSG preparation

Tie over
Donar site

- Keep dressing intact x 2-3 weeks unless infection is suspected
• Failed by poorly vascularized bed, infection, shearing
• Bulky dressing, “Tie over dressing”, VAC, plaster immobilization
• For SSG : inspect after D5, FTSG : D7
• Skin contracture, hyperpigmentation
SSG vs FTSG

• SSG
  – Depends on the vascularity of recipient bed
  – Scars usually bad
  – Good for large areas
  – Donor sites can be used repeatedly

• FTSG
  – Limited supply
  – Good skin like quality
  – Different mechanism of recipient site incorporation
  – Can be used on bare tendon or bone
FLAP
FLAPs

• Skin flap
  – Subcutaneous tissues
  – Random pattern 1:1 length to width ratio
  – Pedicle
    • Major artery
    • Perforator
    • Could be of high length to width ratio
    • Venous drainage of flap
  – Free
    • microsurgery
Choices

- Muscle flap
  - Cavity to fill
  - Bring in vascularity
- Myocutaneous flap
  - Donor site morbidity
- Composite tissue transfer
  - Skin, Muscles, Fascia, Tendons, Nerves, Blood vessels, Periosteum, Bone, Whole digits
Decision Making

- Tissues required
- Scarring and flap appearance
- Donor site morbidity
- Patient acceptance
- Surgeon factor
How to choose the correct flap?
Recipient site:

- Where
- Size
- Shape
- Presence of contracture
- Nature
Nature of recipient site

- Clean / contaminated / infected?
- Fresh / Granulation bed?
- Tissue lost: muscle, tendon, nerve, bone
  - Thickness
  - Support
  - Sensation
  - Motion
- Tissue status surrounding the wound: circulation, adjacent joint
Choice of Donar

• Healthy with no previous surgery, injury, irradiation
• Minimal disturbance in appearance and function after flap harvest
• Stable arterial supply, few variation
• Diameter of artery, length of pedicle
• Cutaneous nerve
Different categories of FLAPs

- Blood supply
  - Random or Axial
- Method of transfer
  - Pedicle or Free
- Location
  - Local, regional, distant
VY Advancement
Local lateral arm flap
Muscle flaps
Gastronemius Muscle flap
Flap for NF
Latissimus dorsi myocutaneous flap
Pedicle flap
PIA (posterior interosseous flap)
Radial Forearm Flap
Radial Forearm Flap
Foucher (1st DMA flap)
Saphenous flap
Lateral supramalleolar flap
Free flaps
Dorsalis pedes flap
LD + SA flap
Vascularized fibula bone graft
Free gracilis flap
Flaps may fail!

- No pressure/compression on pedicle
- Elevation
- Hydration
- Anticoagulation
- Close monitoring of circulation
- Haematoma
- Infection
Thank you