# Principle of Wound coverage and Flap Surgery

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# 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

# Dresssing

- 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 (5minon/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 “imbibrition”
- 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

# 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

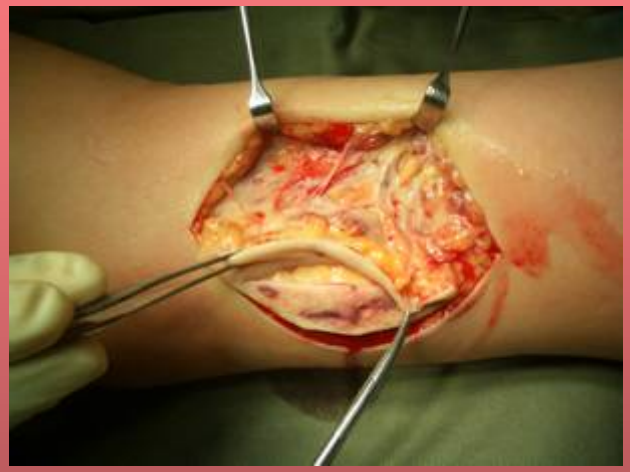
# VY Advancement

# Local lateral arm flap

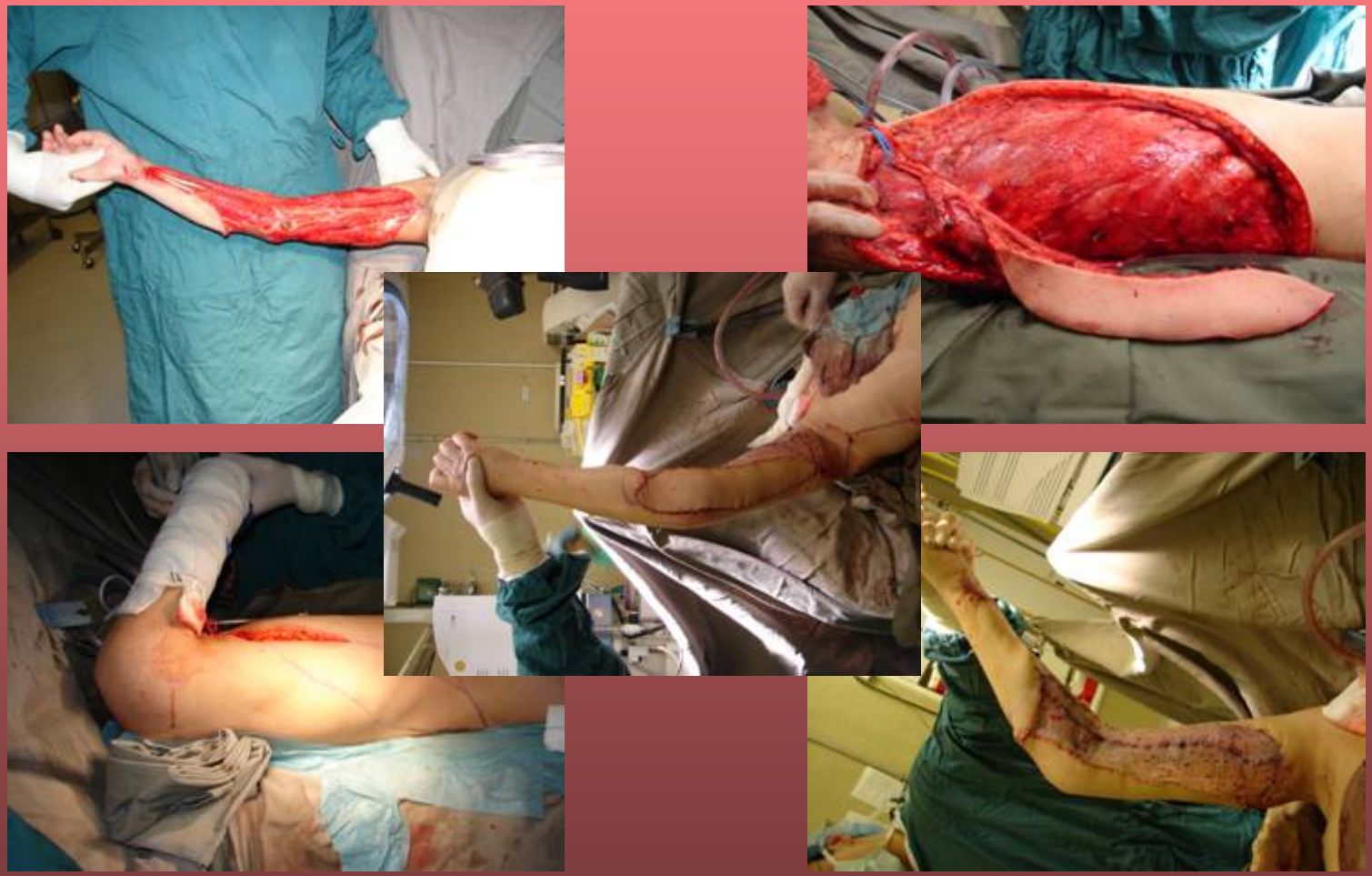
# Muscle flaps

# 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)

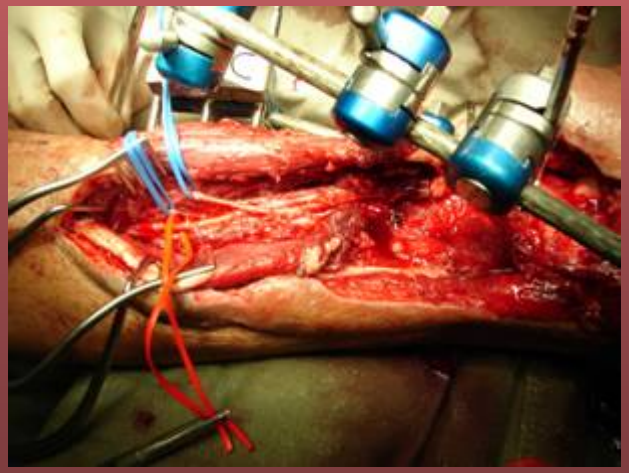
# Saphenous flap

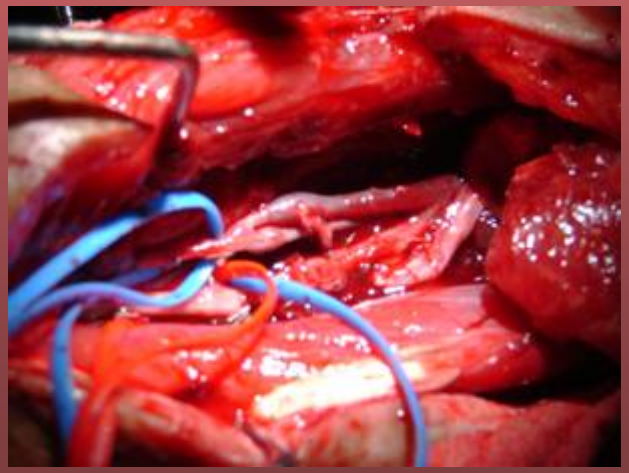
# Lateral supramalleolar flap

# Free flaps

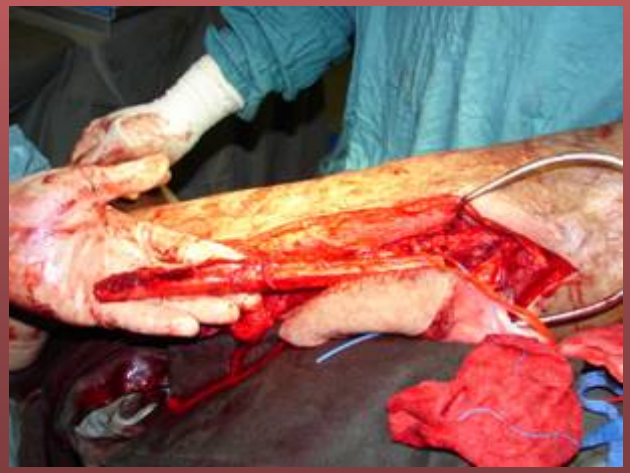
# Dorsalis pedes flap

# LD + SA flap

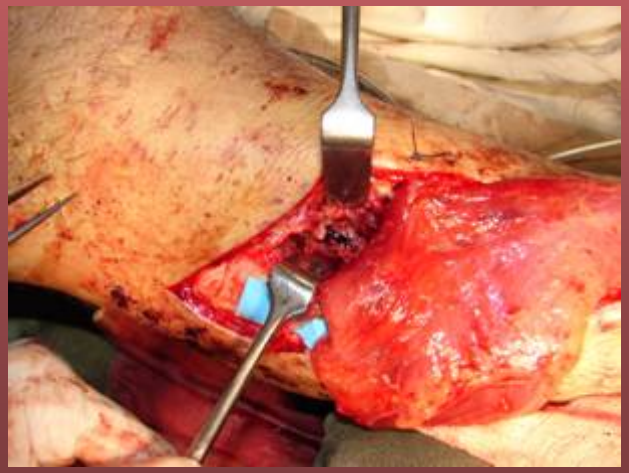


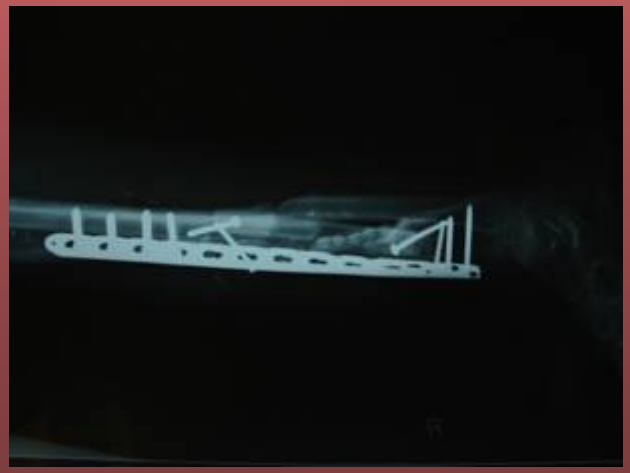


# Vascularized fibula bone graft



# Free gracilis flap





# Flaps may fail !

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

Thank you