



Call To Arms #TweetsToTreat

## Hand Basics Wound Coverage Techniques

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### DISCLOSURES

- **Relevant Financial Disclosures**
  - None
- **Non-FDA approved uses**
  - None


I have no actual or potential conflicts of interest in relations to this program/presentation

### Wound Coverage Techniques

- **Assessment of Wound**
- **Evaluation of Clinical Patient Factors**
- **Reconstructive Coverage Options**
- **Post-Operative Management**


### Assessment of Wound

- **Traumatic?**
  - Adequate debridement?
  - Contamination?
  - Neuro-vascular compromise?
  - Need for internal vs external fixation?
  - Additional life-threatening injuries?



### Assessment of Wound

- **Malignancy?**
  - Clear margins?
  - Radiation Therapy?
    - Pre-Operative and/or Post-Operative?
  - Chemotherapy?



### Assessment of Wound

- **Other Mechanisms**
  - Infection
  - Chronic Wound
  - Surgical Dehiscence




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### Assessment of Wound

- **Debridement**
  - **Sharp** – scalpel, scissor, rongeur, curette
  - “Everything but the *white stuff*”
    - I.e. Tendon, Bone, Nerve, Vessels
      - ✓ Unless you need to!
  - May need multiple debridements




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### Assessment of Wound

- **Exposed Structures?**
  - Bone?
  - Vessel?
  - Nerve?
  - Tendon?
  - Hardware?



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### Assessment of Wound

- **Vascular Perfusion**
  - Tissues need adequate blood supply!
  - Injury related?
    - Arterial compromise?
    - Crush injury?
  - Peripheral Vascular Disease?
    - i.e. Atherosclerosis, Diabetes Mellitus

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### Clinical Patient Factors

- **Significant Medical Conditions**
  - Diabetes Mellitus, Liver Disease, COPD, CHF, Renal Failure (Dialysis)
- **Pre-Injury Functional Status**
- **Associated Injuries**

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### Clinical Patient Factors

- **Psychosocial Considerations**
- **Patient Motivation – Compliance!**
- **Support Network**
- **Hand Dominance**
- **Occupation**
- **Age**

“Clever operations for clever patients”

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### Wound Coverage Options

- Patient stable? Check!
- Wound debrided? Check!
- Injuries Fixated? Check!
- Healthy Wound Bed? Check!

"Ok...so, how are we going to cover *this*?"



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### Wound Coverage Options

- Algorithmic approach based on:
  - Size/Severity of Wound
  - Availability of Required Tissue Elements
    - Skin? Muscle? Bone?
  - Experience/Skills
- Goal: Reconstitution of vascularized soft tissue envelope while optimizing functional restoration

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### The Reconstructive Ladder



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### Wound Coverage Options

- Secondary Intention
  - Wound "left open"
  - Allow spontaneous healing via wound contraction and epithelialization
  - Aided by local wound care
    - Kept moist, warm and clean
  - Not applicable for exposed vital structures (i.e. bone, tendon)
  - Can lead to significant scar formation and contracture



<https://plasticsurgerykey.com/healing-response-in-acute-and-chronic-wounds/>

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### Wound Coverage Options


- Primary Intention
  - Re-approximating wound edges
    - Sutures, staples, tape, and/or skin glue
    - Single or multi-layered closure
  - Minimal scar contraction
  - Improved scar aesthetics



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### Wound Coverage Options

- Delayed Primary Closure
  - AKA Tertiary Intention
  - Re-approximation of wound edges after period of secondary healing
  - Allows for edema resolution and/or wound decontamination
    - i.e. fasciotomy wound closure



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### Wound Coverage Options

- Skin Grafts
  - Full-Thickness Skin Graft (FTSG)
    - Entire epidermis AND dermis
    - Advantages:
      - ✓ Improved texture, color, and hair growth potential
      - ✓ Less secondary wound contraction!



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### Wound Coverage Options

- Skin Grafts
  - Full-Thickness Skin Graft (FTSG)
    - Disadvantages:
      - ✓ Limited donor availability
      - ✓ Donor site requires primary closure, skin grafting, or flap
        - Common sites: groin, lower abdomen, medial brachium, supraclavicular
      - ✓ Greater risk of non-adherence/failure



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### Wound Coverage Options

- Skin Grafts
  - Split-Thickness Skin Graft (STSG)
    - Entire epidermis and variable depth of dermis
      - ✓ NO hair follicles, sweat glands and other dermal appendages
    - Advantages:
      - ✓ Abundance of donor availability
      - ✓ Quicker/Favorable Adherence



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### Wound Coverage Options

- Skin Grafts
  - Split-Thickness Skin Graft (STSG)
    - Disadvantages:
      - ✓ Greater secondary wound contraction
      - ✓ Lesser aesthetic result
      - ✓ Dry and hairless
  - Meshed?
    - Increases surface area
    - Allows for fluid egress



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### Wound Coverage Options

- Tissue Expansion
  - Staged procedure
    - 1<sup>st</sup>: placement of internal silicone "balloon" to be serially filled and "stretch" skin
    - 2<sup>nd</sup>: closure of wound by advancement or local flap design of the expanded skin
  - Disadvantages:
    - Multiple surgeries, infection, extrusion, pain



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### Wound Coverage Options

- Skin Substitutes
  - Multiple products available
    - Cultures Epithelial Autograft
    - Acellular Dermal Matrix (ADM)
      - ✓ Human, Bovine, Porcine
    - Cellular Allografts
    - Wound Matrix Bilayer



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### Wound Coverage Options

- Local Tissue Transfer (Flap)
  - Moving adjacent tissues (skin, fat, fascia, muscle, etc) into a wound
  - Supplied by its own vascular territory
    - Typically, a known arteriovenous system along its long axis, referred to as its "pedicle"
    - Some skin-only flaps can be *random pattern*, lacking a specific vessel system
  - Labeled according to layers of tissue, pattern of blood supply, and type of mobilization

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### Wound Coverage Options

- Skin Flaps
  - Rotation Flap
  - Advancement Flap
    - V-Y
    - Moberg Volar Flap
  - Transposition Flap
    - Z-Plasty
    - Rhomboid/Dufourmental
    - Bilobe



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### Wound Coverage Options


- Skin Flaps
  - Direct Flap
    - Cross-Finger
    - Thenar
  - Island Flap
    - Heterodigital Neurovascular - Littler
    - First Dorsal Metacarpal Artery (FDMA) - Kite



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### Wound Coverage Options

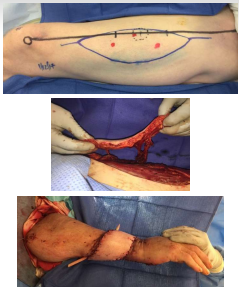
- Muscle, Musculocutaneous, and Fasciocutaneous Flaps
  - Based on known vascular "pedicle"
    - Primary or secondary blood supply
    - Reverse flow possible
  - May include variable layers, and even sensory innervation!
  - Examples:
    - Radial Forearm Flap
    - Lateral Arm Flap
    - Posterior Interosseous Flap
    - Latissimus Dorsi Flap
    - Groin Flap



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### Wound Coverage Options

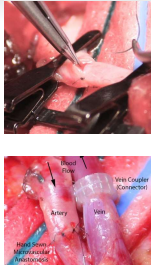
- Free Tissue Transfer
  - Combination of desired tissue layers isolated on its vascular pedicle
  - Disconnected from donor site as "free flap" and microscurgically "auto-transplanted" to recipient wound site
    - One artery and two veins



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### Wound Coverage Options

- Free Tissue Transfer
  - Requires microsurgical skillset
  - Close post-operative monitoring
    - Risk of vessel thrombosis



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### Reconstructive Elevator

(iii) Soft-tissue reconstruction in open tibial fractures. Khan, Umraz. Orthopaedics and Trauma, Volume 27, Issue 1, 15 - 24

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### Wound Coverage Techniques

Questions?

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