

Wound Management  
and  
Soft Tissue Reconstruction

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- Topics
- Evaluation
  - Initial surgical management
  - Dressings and wound coverings
  - Definitive closure

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- Evaluation
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|-----------------|------------------|
| • Wound:        | • Extremity      |
| – Size          | – Pulses         |
| – Shape         | – Perfusion      |
| – Location      | – Sensation      |
| – Edges         | – Motor          |
| – contamination | – Other injuries |

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Define at risk injuries...

- High energy tibial plateau
- Pilon
  
- These are cases that almost always require spanning/bridging external fixation and delayed ORIF

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Soft tissue issues at the time of ORIF...

- Tourniquet...?
- Full thickness flaps
- Minimize self retainers
- Soft tissue friendly closure

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Open fractures/traumatic wounds

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Is it Salvageable?

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**Indications for early amputation**

- “Absolute”
  - complete disruption of the posterior tibial nerve
  - warm ischemia > 6 hours in a crush injury
- “Relative”
  - life-threatening hemorrhage in multi-trauma
  - ipsilateral complex foot trauma
  - prolonged reconstructive course beyond patient tolerance

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**Predicting survival**

- Scoring systems
  - MESI 1985
  - PSI 1987
  - MESS 1990
  - LSI 1991
  - NISSA 1994

Dirschl and Dahners  
JAAOS 4: 182-190, 1996

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**LEAP - predictive indices**

Bosse et al. JBJS 83A(1):3-14, 2001

èMESS, PSI, LSI  
èSensitivity = 46%  
èSpecificity = 87% (PSI) - 97% (LSI)

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**Timing**

- Delay increases risk of infection past a certain point....?24 hrs?
- The single most important factor is time to IV antibiotics
- Complete D+I is more important than early poorly done one.

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**Surgical Treatment**

- Debridement
- irrigation
- stabilization
- peri-operative antibiotics

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**Debridement**

- Initial procedure is most important
- Goals:
  - remove all foreign material
  - remove nonviable host tissue
  - decrease bacterial load
  - create clean, living wound

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**Debridement**

- Principles
  - experienced surgeon
  - limit tourniquet
  - extend wound – longitudinal!
  - systematic, layer by layer
  - save skin in key areas
  - fat and fascia are expendable
  - dead muscle has to go

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**Wound Irrigation**

- Volume
- Delivery Method
  - high or low pressure
  - pulsatile or continuous
- Choice of Solution
  - Antiseptics
  - Antibiotics
  - detergents

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**After the I&D...**

- Primary closure (Temporary?)
- Immediate Flap or graft
- Open
  - Wet-to-Dry Dressings
  - Hydrocolloid Gels
  - Semipermeable membranes
  - Bead Pouch
  - VAC

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**Antibiotic Bead Pouch Rationale**

Seligson, Henry, Osterman and others – University of Louisville

- Deliver a high local concentration of antibiotics with low systemic levels
- Reduce wound dessication
- Reduce dressing changes
  - lessen contamination
  - lessen patient discomfort

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**Antibiotic Bead Pouch Effectiveness**

- Animal Studies
  - equally or more effective than systemic antibiotics
- Human Studies
  - mostly retrospective
  - used in conjunction with systemic antibiotics
  - see the handout for details

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Technique: *Making the Beads*

- Molds vs. Handmade
- Recipe
  - What antibiotic
  - How much
- Mix the Powders
- Wire vs. Suture

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Technique: *Making the Pouch*

- Bead placement
- How many?
- Covering the Pouch
- To drain or not to drain?

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Technique: *wound management*

- Change beads q24-72 hours - with re-debridement
- wound coverage when clean, living wound achieved
- Planned bone grafting at 6 weeks for defects or stripped bone

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FDA status



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Vacuum Assisted Closure

“The VAC”



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New Techniques in wound Management:  
Vacuum-Assisted Wound closure  
*Lawrence X. Webb*  
*JAAOS 10(5):303-311, 2002*

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- Introduced by Argenta and Morykwas,  
*Ann Plast Surg 1997*
- **Constant or intermittent negative pressure**
  - Removes fluid
  - Decreases edema
  - Prevents desiccation and contamination
  - Improves local circulation
  - Promotes granulation
  - Traction on wound edges and surfaces

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- ### Components
- Polyurethane sponge
  - Tubing
  - Adhesive plastic sheets
  - Reservoir
  - Programmable Pump

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- ### Technique
- Complete debridement
  - Sponge cut to fit wound
  - Tubing placed in hole in sponge
  - Adhesive sheets applied
  - Seal tested
  - Connected to pump
  - Change under clean conditions q2-3 days

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**Complications and  
Contra-indications**

- Skin rash
- Skin tear or shearing
- Ingrowth of granulation into sponge
- Use with caution in:
  - Bleeding disorder
  - Large surface area (fluid loss)
  - Large exposed bone or plates
  - Exposed vessels
  - Neoplasia?

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**Definitive coverage**

Traditional teaching for open tibias:

Proximal 1/3 → Gastrocnemius rotation

Middle 1/3 → Soleus flap

Distal 1/3 → Free Flap

Now:

Proximal, Middle, Distal → Fasciocutaneous  
Rotation  
Flap

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