2009 OTA Annual Meeting

Manchester Grand Hyatt
San Diego, CA

(#F9) Mini Symposium: Soft Tissue Coverage for the Non-Microsurgeon

Elizabeth F, Level II

1:31pm – 3:01pm
Friday, October 9, 2009

Moderators: Gregory L. DeSilva, MD

Faculty: Michael T. Archdeacon, MD
Stephen P. DeSilva, MD

Disclosure: Faculty disclosure can be found starting on page 67 of the 2009 OTA Annual Meeting program.

Soft Tissue Coverage for the Non-Microsurgeon

Objectives: Review/update the reconstructive ladder for soft tissue coverage
Familiarize the orthopaedic traumatologist with local coverage for open wounds.
Instruct on new flaps and modalities to help with coverage of open wounds

The care of wounds particularly in the face of fracture, arthroplasty, and/or infection can be problematic for the orthopaedic surgeon. Often times, consulting care is provided by plastic or general surgeons. However, sometimes these colleagues have limited understanding of orthopaedic implants and concerns. The traditional reconstructive ladder for soft tissue coverage has undergone some modifications in the past few years thanks to a greater understanding of vascular anatomy and the development of new products such as the VAC sponge. This instructional course will review/update the reconstructive ladder while presenting local pedicled flaps and other modalities that can be used by the orthopaedic surgeon without the need microsurgery.

I. Introduction from Moderator (Gregory DeSilva, MD)

II. Principles of soft tissue coverage (Stephen DeSilva, MD) 20 minutes
   a. History of soft tissue coverage
   b. Reconstructive ladder
      i. Simple vs. complex
      ii. Direct closure
      iii. Skin grafts
      iv. Local flap
      v. Distant flap
   c. Goal of coverage
      i. Form, function, safety
   d. Evolution of treatment
   e. Concept of angiosomes
   f. Vascular supply to muscles and skin
   g. Advantages of non-free flap coverage
   h. Why the orthopedic traumatologist can do this

III. Upper Extremity Flaps (Gregory DeSilva, MD or other) 20 minutes
   A. Secondary Healing
   B. Radial Forearm Flap
      a. Retrograde Fasciocutaneous flap
      b. Indications
         i. Any sized defect of hand, wrist, forearm
      c. Advantages
         i. Reliable pedicle and large flap
      d. Disadvantages

        i. Cosmesis
        ii. Sacrifice of radial artery
    e. Pedicle
    f. Reflection point
    g. Technique
C. Posterior Interosseous flap
    a. Retrograde fasciocutaneous flap
    b. Indications
        i. Small and medium sized defects of hand, wrist, distal forearm
        ii. 1st web space reconstruction
    c. Advantages
        i. No sacrifice of radial artery
        ii. Relies on anastomosis of AI/PI in distal forearm
        iii. Closeable defect
    d. Disadvantages
        i. Flap necrosis
        ii. Smaller pedicle than radial artery
        iii. Less familiar anatomy
D. Groin Flap
    a. Axial, cutaneous distant flap
    b. Indications
    c. Advantages
        i. Reliable pedicle
        ii. Abundant tissue
        iii. Primary donor site closure (up to 12 cm wide)
    d. Disadvantages
        i. Staged flap
        ii. Hand in groin for 2-3 weeks
    e. Pedicle
    f. Reflection point
    g. Technique
E. Latissimus Dorsi flap
    a. Pedicled Muscle flap
    b. Indications
        i. Irreparable rotator cuff tears
        ii. Tissue defect of arm or elbow
    c. Advantages
        i. Coverage of large wounds
    d. Disadvantages
    e. Pedicle
    f. Reflection point
    g. Technique

IV. Lower Extremity flaps (Stephen DeSilva, MD) 25 minutes

a. Gastrocnemius
    i. Proximal third coverage
    ii. Trauma
    iii. TKA
    iv. Medial vs. lateral gastroc
    v. Supplied by sural artery
    vi. Tricks for improving length
b. Soleus
    i. Middle third
    ii. Multiple perforators
c. Sural Island
    i. Expanding indications!!
    ii. For distal third tibia, hindfoot, midfoot, and forefoot coverage
    iii. Based on sural artery running with sural nerve
    iv. Distally based, retrograde flap
    v. Staged protocol
        A. If from proximal third tibia
        B. If >100 cm^2
        C. Delay inset 72 hours
    vi. Pivot point
        A. 5 cm proximal to tip of lateral maleolus
        B. anastomosis with peroneal artery

V. Cases for discussion/Questions (Panel) 30 minutes

Soft Tissue Coverage For The Non-Microsurgeon – Adjunctive Techniques

Michael T. Archdeacon, M.D., M.S.E.
Director, Division of Musculoskeletal Traumatology
Associate Professor, Department of Orthopaedic Surgery
University of Cincinnati Medical Center

I. Surgical Debridement:

- "Adequate debridement remains the most important factor in prevention of chronic sepsis in cases of massive lower limb trauma."

(1) Swiontowski; CORR 1989

B. Debridement – Double-Edged Sword

1. Imperative To Remove Devitalized Tissue
   - To Reduce The Risk Of Infection And Wound Complications
2. More Aggressive The Debridement
   - Less Likely The Wound Will Be Closed Primarily

C. Serial Excisional Debridements

1. Zone Of Devitalized Tissue May Not Be Apparent
2. Soft-tissue Injury Declares Over Time
   - 24-72 Hour Intervals
   - Only Devitalized Structures Will Be Excised

II. Soft Tissue Adjunctive Techniques

- All Wounds Are Not Amenable To Immediate Primary Closure

A. Synthetic Wound Coverage

1. Synthetic Coverage Material (Epigard®)
   - Biologic Dressing
   - Acts As A One Way Diffusion Barrier
   - Shaped To Fit Any Wound
   - Provides Some Wound Protection
   - Allows Conductive Growth Of Granulation Tissue
   - Temporary Solution

B. Tension Devices

- Skin Ability To Expand Under Tension = Creep

1. Skin Anchors
   - Aide Closure Of Wounds Based On Viscoelastic Nature Of Skin And SQ
   - Modern Adaption Of Retention Suture
2. Sure-Closure Device
   - Long Needles Placed SQ Each Side Of Wound

-
- Hooks Pull Edges Together
- Relaxation Of Skin Tension = Creep
- Cycle Repeated

C. Multiple Relaxing Incisions (MRI)

1. Series Of Pyramidal Incisions
   - Termed “Pie-crusting” Or “Relaxing Incisions,”
   - Wound Edge Tension Decreases Thru Expansion Of Relaxing Incisions
   - DiStasio; JOT 1993

D. Vacuum Assisted Closure (VAC)

- Polyurethane Ether Sterile Foam
- Adhesive Drape
- Vacuum: 50 -125 Mmhg
- Subatmospheric Pressure
- All Surfaces Of Wound
- Encourages Vascular Ingrowth / Granulation Tissue

1. VAC Sponge
   - Prevents Hematoma And Seroma Accumulation
   - ⇓’S Bacteria Colonies
   - Helps Prevent Slime Formation On The Wound Surface
2. VAC Assisted Papineau
   - Papineau Technique W/ Technology Update
   - Complete Debridement
   - Open Cancellous Bone Grafting
   - Secondary Wound Closure
   - Augmented W/ VAC Sponge
3. VAC Assisted STSG
   - Applied Directly To Graft Site W/ Interposing Adaptic Or Xeroform
   - Decreases Edema At Graft Site
   - Increases Granulation Tissue
   - Prevents Hematoma/Seroma Formation

III. Summary: Soft Tissue Coverage / Closure

A. Emergent, Aggressive Surgical Debridement Of All Non-viable & Contaminated Tissue

B. Coverage / Closure Options

- Synthetic Wound Coverage
- Tension Devices
- Multiple Relaxing Incisions (MRI)
- Vacuum Assisted Closure (VAC)