The Reconstructive Ladder of Soft Tissue Injury

Elizabeth Erickson, PA-C
Borealis Plastic Surgery
AASPA conference October 4, 2013

- PA training in Michigan at Central Michigan University 2006-2009
- Surgical residency at Montefiore Medical Center in New York City 2009-2010
- Trauma Service in Traverse City, MI 2010-present
- Physician Assistant at Plastic Surgery practice in TC 2012-present

Home of Good Morning America's Most Beautiful Place Sleeping Bear Dunes
Objectives

- Describe the tiers and standardized applicability of the reconstructive ladder
- Discuss the decision tree for surgical wound and excision management
- Present secondary management options when initial options have failed or not feasible
- Apply plastic surgical principals to wound closure and suture choice for common procedures
Disclosures

- I have no fiduciary relationships with any product or company mentioned in the course of this presentation.

The Reconstructive Ladder

- The ladder exists to guide us in which direction to move forward with repair!
Closure by Secondary Intention

Debridement
- The second a wound hits the air, it is colonized with microbes
- How quickly the wound progresses from colonized to infected is dependent on multiple factors
- Debridement removes any necrotic debris or tissue which can harbor microbes thus accelerating the potential for infection
  - Surgical Debridement
  - Chemical/Enzymatic Debridement
  - Autolytic Debridement
  - Mechanical Debridement

Optimizing Wound Healing
- To stop the interrupting or offending circumstances that lead to acute or chronic wounding
- For example: The most common difficulty is with pressure ulcers causing chronic wounds. The pressure needs to be relieved AND redistributed.
- Edema, contact with caustic substances, repeated trauma, infection, nutrition status, allergic reactions and malignancy are other common issues
Know your limitations!

Dressings

- No dressings
- Moist to dry
- Moist to Moist
- Ointments
- Colloids, silver dressings, Hydrogels
- Wound vac
The basic premise behind wound care is divided into three main areas:
1. Removal of infection or potential infectious source
2. Correction of the offending process
3. Nutrition and energy supply to the wound

Closure by Primary Intention

Langer's lines
Relaxed skin tension lines
Methods of Excision

- Type of skin
- Location
- Tension of closure
- Direction of wound
- Systemic issues
- Timeliness & Eversion
- TECHNIQUE!

Closure by Primary Intention

- Type of skin
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Suture choice and technique

- Simple interrupted
- Vertical/Horizontal mattress
- Subcuticular
- Running
- Use of other closure products

Delayed Primary Closure
Closure by Skin Grafting
Skin Grafts

- Grafts are classically defined as tissue that is completely removed from the body and devascularized prior to reimplantation.
- They derive their nutrients from the recipient bed which they are implanted in and thus depend on the adequate vascularity of those underlying structures.

Skin Grafts

- Skin grafts consist of all of the epidermis and some or all of the dermis.
- Classically they are divided into split-thickness and full-thickness skin grafts.
- Split thickness skin grafts can vary in their depth of dermal removal and therefore can be adapted to specialty situations.
Split Thickness Skin Graft

- Split thickness skin grafts are harvested leaving a portion of the original dermis at the donor site intact.

- The advantages of this method are that the donor site will regenerate epidermis fairly rapidly depending on the depth of the graft.

- However, the dermis does not completely regenerate and this limits multiple harvesting of the same site.
Full Thickness Skin Graft

- Full thickness skin grafts require complete removal of the dermis and epidermis and transplantation to another area of the body.
- The donor site must be closed or use STSG over the donor site, as no epidermal regeneration can occur.
- Full thickness grafts contract more primarily versus split thickness grafts that contract secondarily.

Aesthetic Differences

- FTSG will typically provide better skin match and concealment than STSG.
- Both the donor and the graft site exhibit aesthetic changes when harvesting split grafts versus direct closure possibility with full thickness grafts.
- If the grafts are meshed, there can be a “cobblestoning” appearance to the healed wound in many cases.
Facial FTSG are typically harvested from the upper eyelid, pre- and postauricular regions, and the supraclavicular fossa.

- Thick skin may be harvested from the hypothenar eminence, Antecubital fossa and pigmented skin from the genital areas.

- Split-thickness skin grafts may be harvested from any surface of the body, but should be easily concealed in clothing. Common sites include the upper anterior and lateral thigh.

Common Donor Sites

Flap Coverage

- When simple skin grafts will not suffice and more tissue is required as in pressure ulcers, local flaps can be employed.

- In some cases a flap may be the only option for coverage, no matter how difficult it may be.
Tissue Expansion

• Can really run in any shape.
  • Most common are round and rectangular
  • Size
    • Most run 100ml-1000ml
    • Can be custom
  • Integrated ports versus connected by tubing

Types of Expanders

• Can really run in any shape.
  • Most common are round and rectangular

How does it work?

• When a constant mechanical stress (the expander) is applied to skin over time, mechanical and biological creep occur
• Growth of the tissue by cell proliferation restores resting tension of the stretched tissue to baseline
• The Epidermis gets thicker with concurrent thinning of the dermis and alignment of collagen fibril
Who is a candidate?
- Anyone who would benefit from a local tissue flap that doesn’t have enough tissue now to support a flap
- Can cooperate with the regimen
- Doesn’t have a lot of co-morbidities
- Non-smokers (Ideally)

Where can you put them?
- Most commonly placed:
  - Scalp
  - Forehead
  - Face
  - Neck
  - Breasts
  - Trunk
  - Extremities

Complications
- Site specific
- Infection
- Implant exposure
- Flap Ischemia
- Radiation
- Contracture
Distant/Tunneled flaps

- Free tissue transfer
- Local tissues transfer
- Tissue expansion
- Skin grafts
- Delayed primary closure
- Primary intention
- Secondary intention
Free Tissue Transfer

- Free flaps are physically detached from their native blood supply and then reattached to vessels at the recipient site.
- This anastomosis typically is performed using a microscope, thus is known as a microsurgical anastomosis.
- Types can include:
  - Functioning free muscle transfer
  - Structural transfers
  - Specific tissue transfers

Who is a Candidate?

- Lower third of leg reconstruction
- Massive soft tissue injuries
- Head and neck issues
- Open tendon/bone issues
- Cancer reconstruction
Who is a Candidate?

Common Donor Sites

- Tensor Fascia Lata
- Gracilis
- Gluteus Maximus
- Sartorius
- Latissimus Dorsi
- Transverse Rectus Abdominis
- Radial forearm
- Etc...etc....etc....
8 months later!!!
Complications with flaps

- Partial/full flap ischemia
- Infection
- Certain patient population
- Specific site complications

Conclusions

- As complexity of the wounds increases, so does the method of repair
- Always remember the number one rule of medicine
- In order for wounds to heal you must eliminate the offending process, remove infection/necrotic tissue, optimize nutrition and energy to the wound
References

- Minas T Chrysopoulo, Jorge I de la Torre. Tissue Flap Classification. Medscape. Article 1284474