Disclosure Statement

I have no current affiliation or financial arrangement with any grantor or commercial interests that would have direct interest in the subject matter of this CE Program.

Objectives

- Review of Key Factors in Wound Care.
- Review of Anatomy of Wound Repair.
- Review of Injury Pathophysiology & Healing.
Objectives

• Review of Anesthesia & Suturing Instrumentation.
• Review of Special Wounds & Aftercare.
• Instruction of Simple Interrupted Suturing.
• Instruction of Running Suture Closure.

Key Factors in Wound Care

• Cleaning the Wound
• Hair removal
• Irrigation
• Debridement
• Prophylactic antibiotics

Patient Evaluation of Wounds

• Initial Evaluation: patient assessment determines proper management and preparation of a wound or laceration
• Apply direct pressure over the site to help control external bleeding.
• Remove all rings or jewelry that may constrict the injured body part when edema progresses
So you want to sew

- Lacerations can be repaired with:

- **Stitches**
- **Steri-strips**
- **Staples**

Pertinent Medical History

- Allergies and current medications
- Intentional vs unintentional injury
- Occupational injury
- Assault or self-inflicted
- Type of force
- Human or animal bites or punctures
- Symptoms

Pertinent Medical History

- Foreign body potential: foreign body sensation
- Contamination: how much time has elapsed since the time of the until injury until initial cleansing of the wound?
- Time from the initial injury until presentation
- Wound care performed prior to arrival
- What object caused the injury?
Considerations for Suturing

• Wound location and etiology of injury
• Time from injury until presentation
• Degree of contamination
• Importance of cosmetic appearance
• Wound examination should be done with minimal residual bleeding

Patient Preparation

• Obtain verbal and written informed consent after explaining the extent of the laceration and proposed treatment

• Advise the patient about risks of bleeding, pain, infection, scarring, and dehiscence.

• Offer the option of a plastic surgeon to an area that is cosmetically important

Equipment

• Adequate lighting
• Anesthetic: 1% or 2% Lidocaine with or without epinephrine (or other agent)
• Sterile drapes or surgical sterile towels
• A ruler in centimeters and a marking pen
• 18 & 27 gauge 1 ¼ inch needle to administer anesthetic:
• Irrigation device 30ml syringe and sterile saline
**Equipment**

- Sutures
- 4x4 gauze pads
- Sterile gloves
- PPE: protective mask with shield for eyes and gown
- Sterile suture kit with: 4 ½ in needle holder; curved or straight iris scissors; Adson forceps

**Instrumentation**

- Iris Scissors
- Suture Scissors
- Scalpel (no. 11 or 15)
- Cleansing agents
- Splash shields
Phases of Wound Healing

- **Vascular phase:** vasoconstriction, vasodilation
- **Inflammatory:** immediate greater than 3-5 days erythema, edema, warmth, and pain
- **Proliferative or healing:** up to the 14th day
- **Maturation:** remodeling: collagen fibers are replaced from day 14 on
Anatomy of Wound Repair

• Cosmetic results are better with minimal tension placed on wound edges at the time of repair. The sutures should be placed parallel to the natural skin tension lines (Langer’s Lines).
Wound Healing by Stage

• Primary
• Secondary
• Tertiary

Complications in Healing

• Technical Factors
  – Inadequate wound preparation
  – Excessive suture tension
  – Reactive suture materials
  – Local anesthetic
• Anatomic Factors
  – Static skin tension
  – Dynamic skin tension
  – Pigmented skin
  – Oily skin
  – Body Region
• Associated Conditions
  – Advanced age
  – Alcoholism
  – Uremia
  – Diabetes
  – PVD
  – Malnutrition
• Drugs
  – Steroids
  – NSAID
  – Anticoagulants
  – Antineoplastic agents

Injury Pathophysiology

• Shearing
• Tension
• Compression
Scarring

Cleansing
- Betadine
- Hibiclens
- Shur-Clens
- PharmClens
- Soap
- Sterile Water
- Isotonic Saline
- Tap Water
- Hydrogen Peroxide?

Preparing for Wound Closure
- Hand Washing
- Universal Precautions
- Hair Removal
- Anesthesia
- Removal of Foreign Material
- Wound Soaking
- Periphery Cleansing
- Irrigation

NEVER SHAVE EYEBROWS
Animal Bites

Bite Wound ABX Recommendations

<table>
<thead>
<tr>
<th>Established Infections—Bite Wounds</th>
<th>Prophylaxis—Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin/clavulanic acid</td>
<td>Amoxicillin/clavulanic acid</td>
</tr>
<tr>
<td>Cephalosporin</td>
<td>Cephalosporin</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>Ceftriaxone</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>Tetracycline</td>
</tr>
<tr>
<td>Clindamycin plus fluoroquinolone</td>
<td>Clindamycin plus fluoroquinolone</td>
</tr>
</tbody>
</table>

CDC Guide to Td / Tdap

Tetanus Wound Management

<table>
<thead>
<tr>
<th>Vaccination History</th>
<th>Clean, minor wounds</th>
<th>All other wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown or less than 3 doses</td>
<td>Td* TdG</td>
<td>Td* TdG</td>
</tr>
<tr>
<td>3 or more doses</td>
<td>No* Yes** No** No</td>
<td>Yes* No** No** No</td>
</tr>
</tbody>
</table>

* TdG may be substituted for Td if the person has not previously received Tdap and is 10 years or older
+ Yes, if more than 10 years since last dose
** Yes, if more than 5 years since last dose
Referral?

Non-Absorbable Suture

<table>
<thead>
<tr>
<th>Material</th>
<th>Structure</th>
<th>Tissue Reaction</th>
<th>Tensile Strength</th>
<th>Knot Security</th>
<th>Users and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silk</td>
<td>Braided</td>
<td>++++</td>
<td>++</td>
<td>++++</td>
<td>Easy to handle; has excellent potential for suturing.</td>
</tr>
<tr>
<td>Nylon (Ethicon, Dermalon)</td>
<td>Monofilament</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>Commonly used in skin closure; has high degree of memory, requires several throws for secure closure.</td>
</tr>
<tr>
<td>Polypropylene (Prolene)</td>
<td>Monofilament</td>
<td>+</td>
<td>++++</td>
<td>+</td>
<td>High degree of memory, low tissue adherence; good for absorbable pull-out technique.</td>
</tr>
<tr>
<td>Dacron (Ethicon)</td>
<td>Braided</td>
<td>++++</td>
<td>+</td>
<td>+++</td>
<td>Easy to handle, good knot security, similar to silk but less risk of tissue irritation and infection.</td>
</tr>
<tr>
<td>Polyethylene (Nytrel)</td>
<td>Monofilament</td>
<td>+</td>
<td>++++</td>
<td>+++</td>
<td>Excellent handling, strength, and security; expands and contracts with changes in tissue culture.</td>
</tr>
</tbody>
</table>

Absorbable Suture

<table>
<thead>
<tr>
<th>Material</th>
<th>Strength</th>
<th>Tissue Reaction</th>
<th>Tensile Strength</th>
<th>Knot Strength</th>
<th>Users and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>Strong</td>
<td>++++</td>
<td>+</td>
<td>+</td>
<td>For surgical procedures.</td>
</tr>
<tr>
<td>Dacron (Gore-Tex)</td>
<td>Strong</td>
<td>++++</td>
<td>+</td>
<td>+</td>
<td>For surgical procedures.</td>
</tr>
<tr>
<td>Polyester (Braided)</td>
<td>Strong</td>
<td>++++</td>
<td>+</td>
<td>+</td>
<td>For surgical procedures.</td>
</tr>
<tr>
<td>Polyester (Non-Braided)</td>
<td>Strong</td>
<td>++++</td>
<td>+</td>
<td>+</td>
<td>For surgical procedures.</td>
</tr>
<tr>
<td>Polyester (Chrom)</td>
<td>Strong</td>
<td>++++</td>
<td>+</td>
<td>+</td>
<td>For surgical procedures.</td>
</tr>
</tbody>
</table>
Suture Selection

- 0: Fascia closure in surgery
- 2-0: as in 3
- 3-0: Skin of foot, Chest, Abdomen, Back, extremities
- 4-0: Scalp, chest, abdomen, foot, extremities
- 5-0: Scalp, brow, oral, abdomen, hand, penis, brow, nose, lip, face, hand
- 6-0: Ear, eyelid, nose, lip, face, penis
- 7-0: Eyelid, lip, face

- Mucosal Lacs
  - Absorbable Suture: 3-0 or 4-0
- Scalp, Torso, Extremities
  - Non-absorbable: 4-0 or 5-0
- Face, Eyebrow, Nose, Lip
  - Non-absorbable: 6-0
- Ear, Eyelid
  - Non-absorbable: 6-0
- Hand
  - Non-absorbable: 5-0
- Foot or Sole
  - Non-absorbable: 3-0 or 4-0
- Penis
  - Non-absorbable: 5-0 or 6-0

Needle Selection

Ready for Anesthesia
Anesthesia

Alternatives

- No anesthetic.
- Ice
- Check your allergy
- Diphenhydramine
- Topical Anesthesia
- Nitrous Oxide
- Sedation

Direct Wound Infiltration
Running Suture

Questions

Bibliography