Wound Care Workshop
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Gallery of Bad Scars
- Dot Marks
- Railroad Tracks
- Continental Shelf
- Central Necrosis
- Fresh Ground Pepper

Examination of the wound
- A detailed neurovascular exam should be performed before anesthesia and closure
- 2-point discrimination should always be documented
- Wounds adjacent to joints or tendons should be examined through full excursion
- Always place patient flat! Watch for loved ones

Local anesthetics
- Lidocaine
  - Rapid onset, short acting
  - Maximum dose for infiltration of 1% Lidocaine is 4.5 mg/kg (300 mg for 70 kg pt or 30 cc total)
- Lidocaine with epinephrine
  - Useful for hemostasis in highly vascular areas
  - Maximum dose of Lidocaine 1% with epinephrine is 7 mg/ks (total of 500 mg, or 50 cc for 70 kg patient)
- Bupivacaine
  - Slower onset, longer duration of action
  - Useful for long procedures, regional blocks
  - Maximum dose of 0.25% solution is 2 mg/kg (total of 175 mg, or 40 cc in 70 kg patient)
- Topical anesthetics
  - Useful for lacerations on scalp and face
  - Useful for kids and needle-phobic adults
  - LET (Lidocaine, epinephrine, and Tetracaine) cheap and safe

Buffering anesthetics
- Local anesthetics packaged as acids to prolong shelf life: Lidocaine has pH of 3.5!
- Buffering decreases pain and makes anesthetic more bioavailable
- Recommended dilution 10cc of Lidocaine to 1cc NaHCO3
- Can dilute Bupivacaine 30 to 50cc to 1 cc NaHCO3

Minimizing pain of anesthetic
- Buffer anesthetic
- Use smallest needle practical to infiltrate wound
- Inject through cut margin into subcutaneous tissue; usually don’t need to inject through intact skin; no need to raise a wheal!
Inject very slowly!

**Digital blocks**
- Use half Lidocaine, half bupivacaine
- Goal is to deposit 2-3cc of anesthetic in the region of the neurovascular bundle
- Perform “ring block” to anesthetize dorsal branches of digital nerve
- Mandatory for nail bed injuries; recommended for crush injuries, fractures, extensive lacerations
- Blocks can last as long as 17 hours

**Wound Preparation**
- Shaving hair increase infection rate ten-fold compared with clipping
- Trim hair back 1 to 2mm with iris scissors
- Never shave off eyebrows!
- High pressure irrigation wound irrigation single most effective method for cleaning wound; recommended pressure is 5 to 8 psi
- Use 30-60cc syringe with 19 gauge needle and increase wound bacterial counts

**Tips for effective suturing**
- Grab needle 2/3rds down shaft to avoid twisting or breaking
- When actually pushing the needle through the tissue, hold the needle holder down toward tip; don’t try to suture with your fingers through the rings of the needle holder
- Start at one end of the laceration rather than the “center”; you will have much better control of the skin tension on either side of the wound and will never end up with a dog-ear
- Every tied suture should be exactly perpendicular to the axis of the wound; avoid the “wallet you made a summer camp” look!

**Tissue adhesives**
- Appropriate for use only on low-tension wounds
- Should never be applied inside wound; it induces an intense inflammatory reaction
- If wound edges separated by more than 5 mm, use subcutaneous sutures
- Instructions to patients;
  - Adhesive will slough off in 7-10 days
  - No bandages
  - No ointments of any kind; will loosen adhesive and wound may dehisce
  - After 24 hours, may wash gently with plain water
  - Do not scrub or soak wound; blot dry

**Tetanus prophylaxis**
- For severe or contaminated wounds, TD should be given if more than 5 years since last booster
- For clean and minor wounds, TD should be given only if more than 10 years since last booster
- High-risk wounds:
  - Wounds older than 6 hours
  - Stellate or avulsion wounds
- Wounds over 1 cm deep
- Gunshot wounds
- Crush injuries
- Frostbite, burns
- Visible contamination with dirt or saliva

**Patient education**

- Every laceration leaves a scar! The degree to which it is ultimately visible depends on many factors
- It takes almost a year for a scar to mature; the final appearance will not be known for months
- There may be phase in 1-2 weeks when the healing laceration looks pink and hypertrophied
- Use sunblock (at least 25 to 30 SPF) on the maturing scar to avoid sunburn and hyperpigmentation
- Plastic surgical consultation may be considered at the end of the scar maturation period if necessary
- Timing of suture removal critical to avoid disfiguring “dot-marks” on facial lacerations; be sure to emphasize that patient should return for suture removal not later than 4 to 5 days for facial lacerations
<table>
<thead>
<tr>
<th>Location</th>
<th>Anesthetic</th>
<th>Suture Material</th>
<th>Technique of Closure and Dressing</th>
<th>Suture Removal (d)</th>
<th>Pitfalls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalp</td>
<td>Lidocaine 1% with epinephrine</td>
<td>3-0 or 4-0 Nonabsorbable monofilament</td>
<td>Interrupted in gauze; single tight layer in scalp—horizontal mattress if bleeding not well controlled by simple sutures</td>
<td>7-12</td>
<td>Failure to explore wound for fracture, hemotoma formation secondary to &quot;loose&quot; closure</td>
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<tr>
<td>Face</td>
<td>Lidocaine 1% with epinephrine or use field block</td>
<td>4-0 or 5-0 Synthetic absorbable or 6-0 nonabsorbable monofilament</td>
<td>If full-thickness laceration, layered closure is desirable</td>
<td>3-5</td>
<td>Failure to recognize and examine for damage to underlying structures, i.e., facial nerve, parotid duct</td>
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<tr>
<td>Pinna (ear)</td>
<td>Lidocaine 1% (field block)</td>
<td>5-0 Nonabsorbable monofilament or 6-0 synthetic absorbable</td>
<td>Close perichondrium with 5-0 synthetic absorbable; close skin with nonabsorbable interrupted sutures—silk dressing</td>
<td>4-6</td>
<td>Hemotoma formation secondary to improper or no dressing</td>
</tr>
<tr>
<td>Eyebrow</td>
<td>Lidocaine 1% with epinephrine</td>
<td>4-0 or 5-0 Synthetic absorbable and 6-0 nonabsorbable monofilament</td>
<td>Layered closure</td>
<td>4-5</td>
<td>Perpendicular excision rather than one parallel to direction of hair; shavening of eyebrows</td>
</tr>
<tr>
<td>Eyelid</td>
<td>Lidocaine 1%</td>
<td>6-0 Nonabsorbable monofilament</td>
<td>Single-layer horizontal mattress, interrupted or running</td>
<td>3-5</td>
<td>Failure to examine for globe injury or to appreciate injury to nasal plate</td>
</tr>
<tr>
<td>Lip</td>
<td>Lidocaine 1% with epinephrine or use field block</td>
<td>4-0 or 5-0 Synthetic absorbable in mucosa, muscle, and subcutaneous layer; 6-0 nonabsorbable monofilament</td>
<td>These layers (musculature, muscle, and skin) if through and through; otherwise, two layers</td>
<td>3-5</td>
<td>1 mm or greater malalignment of vermilion border results in cosmetically displeasing result</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>Lidocaine 1% with epinephrine or IV sedation (in children)</td>
<td>4-0 Synthetic absorbable</td>
<td>Simple interrupted or horizontal mattress; layered closure if musculature of tongue involved</td>
<td>7-8 or allow to dissolve</td>
<td>Inadequate suture and exposure particularly in children for necessary procedure</td>
</tr>
<tr>
<td>Neck</td>
<td>Lidocaine 1% with epinephrine</td>
<td>4-0 Synthetic absorbable absorbable intradermal; 5-0 nonabsorbable monofilament</td>
<td>Two-layered closure for best cosmetic results</td>
<td>4-6</td>
<td>Failure to appreciate implication of zone I or zone III injuries; delay in airway management</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Lidocaine 1% with epinephrine</td>
<td>4-0 Synthetic absorbable; 4-0 or 5-0 nonabsorbable monofilament</td>
<td>Single or layered closure</td>
<td>6-12</td>
<td>Failure to use local wound exploration as an initial screen and aggressively follow up with further diagnostic procedures</td>
</tr>
<tr>
<td>Back</td>
<td>Lidocaine 1% with epinephrine</td>
<td>4-0 Synthetic absorbable; 4-0 or 5-0 nonabsorbable monofilament</td>
<td>Single or layered closure</td>
<td>6-12</td>
<td>Failure to appreciate possibility of renal or diaphragmatic injury</td>
</tr>
<tr>
<td>Chest</td>
<td>Lidocaine 1% with epinephrine</td>
<td>4-0 Synthetic absorbable; 4-0 or 5-0 nonabsorbable monofilament</td>
<td>Single or layered closure</td>
<td>6-12</td>
<td>Exploration of wound may cause hemorhage or pneumothorax; failure to consider possibility of diaphragmatic perforation in low chest wounds and pericardial tamponade in wounds near midline</td>
</tr>
<tr>
<td>Extremity</td>
<td>Lidocaine 1% with epinephrine 1%</td>
<td>3-0 or 4-0 Synthetic absorbable (muscle fascia); 4-0 or 5-0 nonabsorbable monofilament</td>
<td>Single-layered closure is adequate, although layered or running SQ closure may give better cosmetic result; apply split if wound is over a joint</td>
<td>6-14</td>
<td>Failure to do sensory examination before anesthesia, failure to explore wound visually after hemostasis; unrecognized foreign body left in wound</td>
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<tr>
<td>Hands and foot</td>
<td>Lidocaine 1% (if field block with 2% lidocaine or 0.25% bupivacaine)</td>
<td>4-0 or 5-0 Nonabsorbable monofilament</td>
<td>Single-layered closure only with simple or horizontal mattress interrupted suture, at least 6 mm from cut wound edges; horizontal mattress sutures should be used if much tension on wound edges; apply split if wound over a joint</td>
<td>7-12</td>
<td>Use of subcuticular sutures; failure to explore wound visually with digit in original position at time of injury</td>
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<tr>
<td>Nailbeds</td>
<td>Lidocaine 2% or bupivacaine 0.25% digital nerve block</td>
<td>5-0 Synthetic absorbable</td>
<td>Graft, meticulous placement to contain even edges; slit dressing with original nail or aluminum foil between cuticle and nail matrix to prevent adhesions</td>
<td>Allow to absorb</td>
<td>Loss of suture by tying too tightly and having it cut through trill nailbed suture; adhesions because of failure to place suture between cuticle and matrix</td>
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</table>