Title: Management of the Traumatic Wound. Not Just ensuring Healing

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I do not have any relevant financial relationship with commercial interest to disclose.
At the end of the presentation, the attendee will be able to:

1. Outline the principles of traumatic wound management, incorporating recent research in wound care

2. Formulate a strategy to apply the updated management of prevention of complications
Pain
1. PAIN. Topical Anesthesia.

- Lidocaine, epinephrine, tetracaine (LET) for an open wound and mixture of local anesthetics (EMLA/ametop) – good in reducing the pain of local injection-non broken skin.
- EMLA cream as pretreatment before infiltrative local anesthesia increases patient satisfaction (adults).
- Cochrane review in 2011 regarding efficacy showed medium to high risk of bias re efficacy. More low risk bias studies needed.
- Trials on lidocaine putty ongoing-do not distort tissue.
1. PAIN. Intradermal Anesthesia

- Lidocaine 1%. Also procaine 1% and bupivacaine 0.25%. Adding epinephrine 1%-clearer field with less blood loss.
- Can be used on the fingers, toes, or nose.

- Allows higher total doses of anesthetic to be used, increasing the maximum dose of lidocaine from 4.5 mg/kg to 7mg/kg.

- **For children** - Inject slowly, warm the medication, use small needles, avoid large injections in one location, and use distracting vibratory stimulation in the area. Can add 1:10 sodium bicarbonate 8.4%, decreases pain but also shortens time to anesthesia onset.
1. PAIN. Nerve Block

- New best practice for performing digital anesthesia.
- Evidence from multiple studies supports use of single palmar injection in the middle of the proximal phalanx over traditional dual dorsal web space injection.
- The pain of injection found to be no different than in the dorsal webbing of the finger and requires only one injection instead of two
1. PAIN. Wound closure.

- Tissue adhesives and adhesive strips have been shown to be non inferior to sutures when used appropriately.

- Well-evaluated over the last 20 years and found to be excellent, less painful or painless alternatives to sutures for the closure of appropriate lacerations.

- Expedite care and improve efficiency in the ED, while improving patient experience.
1. PAIN. Wound Closure

- Suitable lacerations for adhesive:
  - low tension (so as not to risk wound dehiscence), do not require deep-layer sutures, not complicated by hair growth.

- Infection rates and cosmetic comparable with wounds closed with sutures.

- Staples-Quick, cost-effective. One pediatric prospective, randomized trial showed staples resulted in shorter procedures at a lower cost with statistically equal outcomes as sutures. Not to be used when CT or MRI may be needed.
Preventing Infection
2. INFECTION. Irrigation

- Sterile normal saline should be used.
- Antibiotic solution - shown to increase complications compared to soap! - increase in wound healing failures and dehiscence
- Low-pressure irrigation with a slow, gentle wash. Sufficient for cleaning simple, non-bite, uncontaminated wounds in vascular area-scalp or face.
- High-pressure irrigation using a 30 mL or larger syringe with 19-gauge needle - regarded as more effective for removal of debris and reduction in post-repair wound infection.
- Recommendations by wound care experts - 25 to 100 mL of irrigation fluid per cm of laceration.
2. INFECTION. Timing of wound Closure

• Previously more than 6 hours quoted as increased risk of infection. Based on older study from 1995 (Robson et al)

2014 Quinn et al.
• 2,663 patients treated for traumatic lacerations in three U.S. EDs
• **No difference** in the rate of infection for wounds closed before or after 12 hours from injury.
• Important factors impacting on wound infection—Wound more than 5cm, Diabetes, Wound below head and neck, contamination of wound.
2. INFECTION Prophylactic Antibiotics.

- **Prophylactic Antibiotics**
  - No clear evidence in reduction rate of post-repair infections for majority of traumatic wounds repaired in the ED – including hand lacerations.
  - However, for prophylactic coverage of non-bite lacerations - beta lactam.
  - For plantar puncture wounds - theoretical risk for *Pseudomonas* infection, prophylaxis with ciprofloxacin can be considered; however, local antibiotic resistance patterns must be taken into account.
2. INFECTION: Wound Care

- Non-adherent dressings over the wound - moist, clean environment for wound healing to take place.
- Help contain drainage and minimize dried crust formation.
- Not been proven to prevent bacterial contamination,
- Avoid immersing the wound in water until the wound has closed and the sutures are removed but getting wound wet not shown to increase risk of infection
- Tissue adhesives and adhesive strips cannot get wet, or they will lose their strength.
Scarring
3. SCARRING.

Common Question: “Will it scar doctor?”

Correct Answer: “Well yes, it’s a break in the skin but we will be careful to minimize it”

- Hypertrophic scars - hard, red or pink, raised scars, elevated but remaining within the limits of the original wound. May regress over time.
- Keloids raised, reddish-purple, nodular scars, harder than hypertrophic scars, invading adjacent tissue extending beyond the margins of the original wound, and rarely regressing over time. Common in darker skinned people.
- Can prevent hypertrophy with good wound closure, no evidence that keloid formation can be prevented.
SCARRING. Absorbable or non absorbable?

Suture Choice

- Absorbable sutures - convenient – do not require follow up for removal.
- Previous belief that enzymatic process responsible for suture dissolution will leave a visible mark.
- Newer research shows no increase in adverse appearance when used properly.
- Cosmetic outcomes for absorbable and non absorbable options generally are equivalent.
3. SCARRING. Sub speciality follow up?

- Specialty consultation is not always available eg in a remote environment or late at night.
- Complex facial lacerations warrant referral or consult.
- Study of facial laceration repair - satisfaction scores were similar between wounds repaired by plastic surgeons and those repaired by ED physicians.
- A subset of females and parents of small children preferred plastic surgeon repair-bias because of patient awareness of provider specialty.
- Dermatology referral - scar management, laser surgery and pharmacologic management once the wound has healed.
<table>
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<tr>
<th>Take home messages</th>
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<tr>
<td>No “Golden Hour” of wound repair- especially of head and face. Up to 19 hours is no greater risk of infection than before if no clinical evidence of infection.</td>
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<td>Topical anesthetics reduce pain of local infiltration-important in children, but increase ED stay.</td>
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<td>Effective irrigation if contaminated wound to help prevent infection.</td>
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<td>Prophylactic antibiotics in high risk contaminated wounds only</td>
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<td>Scarring can be minimized but may still be present</td>
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References


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THANK YOU