Welcome!

How (and why) to Master Lacerations as an EM Resident

Speaker: Patrick O'Malley, MD, Course Director and Founder of *The Laceration Course*
Moderator: Valerie Youhouse

August 8, 2023

Brought to you by:

Presenter

- Patrick O’Malley, MD
- East Carolina University, Brody School of Medicine
- Carolinas Medical Center, Emergency Medicine Residency
- 16 years community emergency medicine and urgent care experience
- Urgent Care Association National Conference Presenter
- Board of Directors, College of Urgent Care Medicine
- Creator of The Laceration Course in partnership with EB Medicine

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Where this all began....

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Why this matters

- During residency, you are expected to learn it all, this is your chance
- You have the time and oversight – take advantage of it
- Don't over-consult – manage these yourself
- In "the real world" you may or may not have APP back-up to help
- Some ED's have fast-track settings where APPs handle most of the lacerations, you may or may not see these frequently
- Single coverage
- Plastic surgery – does it exist?
- Reimbursement is related to documentation

During residency

- Didactics
- Workshops
- Trauma, general surgery, orthopedics, plastics rotations
- ED shifts, bedside teaching
- Do you have the skill set to practice independently and manage any laceration that comes in?

Survey data from EB Medicine

- Survey Monkey survey sent to EB Medicine subscribers
- Small sample size
- Future study?

Resident survey

- 45% of resident programs of those surveyed don’t provide didactic training on laceration management
- Almost 70% of resident programs of those surveyed don’t offer a plastic surgery rotation
- 60% of those surveyed are responsible for managing all types of lacerations
- Most of those surveyed perform 6-10 laceration repairs per month

Resident survey

- **<u>72% of those surveyed are only somewhat prepared to manage lacerations post-residency and almost 10% feel they are not prepared at all.</u>**
- 91% of those surveyed feel like they would benefit from videos/step-by-step access
- Only 3% said they don’t need additional education on this
- …..knowledge/skill gap

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Attending survey

- Most responses were from first-year attending
- Around 60% perform laceration repair weekly
- **75% feel they were only somewhat prepared to manage lacerations after residency**
- 28% felt their residency program didn't adequately prepare them for laceration management
- Access to videos and better oversight were two points they felt could better prepare them for laceration management
- 50% stated that most lacerations were managed by APPs
- **100% of those surveyed feel like they would benefit from videos/step-by-step access**

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Case 2 - Presentation

- Elderly woman who fell, striking head against fence post
- Large stellate, flap laceration to forehead

Case 3 - Presentation

Case 7 - Presentation

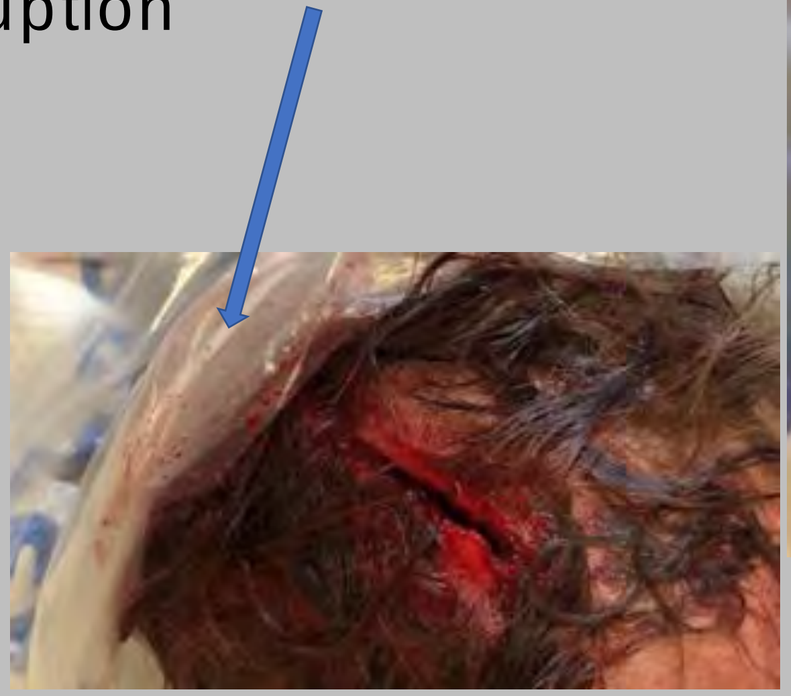
- Side-grinder to dorsal aspect of the hand
- Irregular edges, avulsed tissue

Case 8 - Presentation

- Tractor to foot

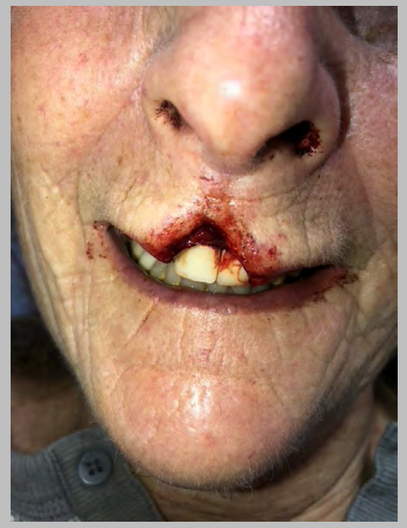
Case 10 - Presentation

- Tractor vs head
- Large scalp laceration
- Galea disruption



Case 12 - Presentation

- 14 year old boy, bike accident, scrotal lacerations



Poll – Would you feel comfortable managing all of these yourself?

Topics and Objectives

- Goal-come away with 5 tips, regardless of experience level, that will change how you approach lacerations
- Intentionality-efficiency-medical decision making through case presentation
- Understand suture materials
- Instrument handling and knots
- A better digital block
- Bust a few myths
- Discuss must-have products
- Advanced techniques

Webinar interaction

- 45-minute discussion
- Educational product overview/demo
- Q/A
- Poll questions
- Chat

Case 1 - Presentation

Elderly patient with large pretibial laceration from car door

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Basics

- Approach
- Sutures and instruments
- Digital block

Approach to Lacerations – Be Intentional!

- Patient in waiting room with a lac. Already start thinking about what I'm going to need and do
- Get in the room - ABCs, routine history taking. What happened? Tetanus status
- Look-superficial observation will tell me 95% of what I am going to need. Order X-rays. Gather supplies, set things up, draw up anesthetic
- Anesthetize. Go chart, see another patient. Come back-irrigate, sink vs stretcher. Repair. Talk about discharge instructions while repairing
- Wipe wound clean. Antibiotic ointment, bandage. Dispose of materials. Chart
- If busy, large complex laceration, may have to stop and go check on department
- Avoid unnecessary trips in and out of the room

Always think ahead and be mindful of your surroundings!!

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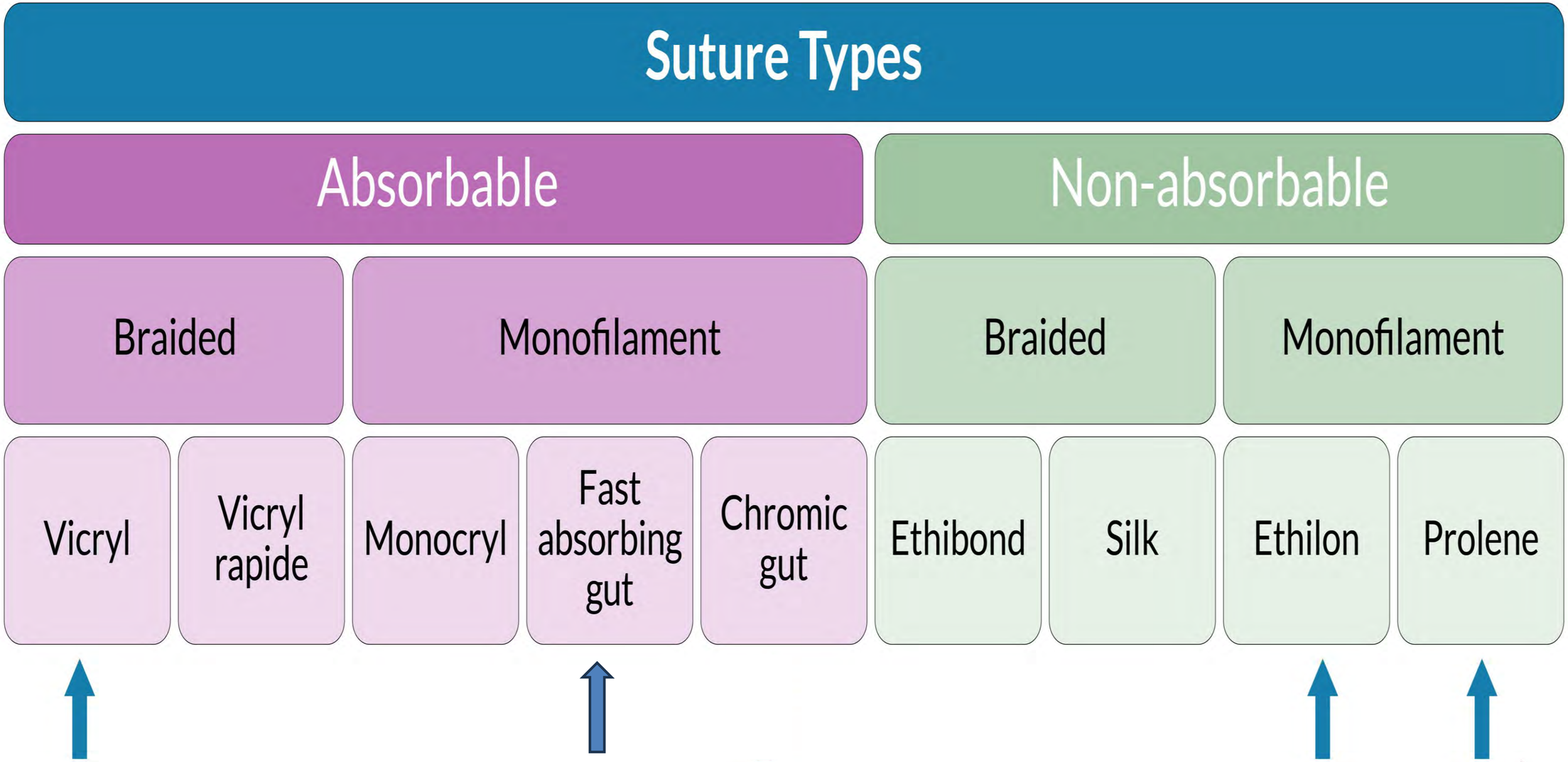
Suture Types
Absorbable
Non-absorbable
Braided
Monofilament
Braided
Monofilament
Vicryl
Vicryl rapide
Monocryl
Fast absorbing gut
Chromic gut
Ethibond
Silk
Ethilon
Prolene
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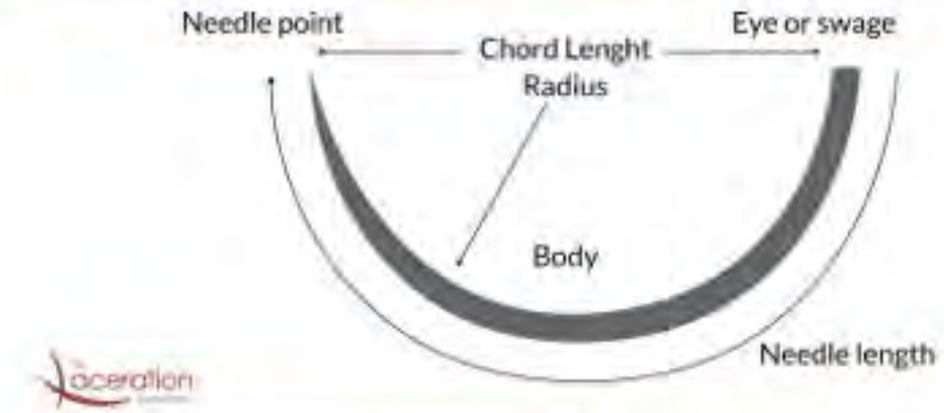
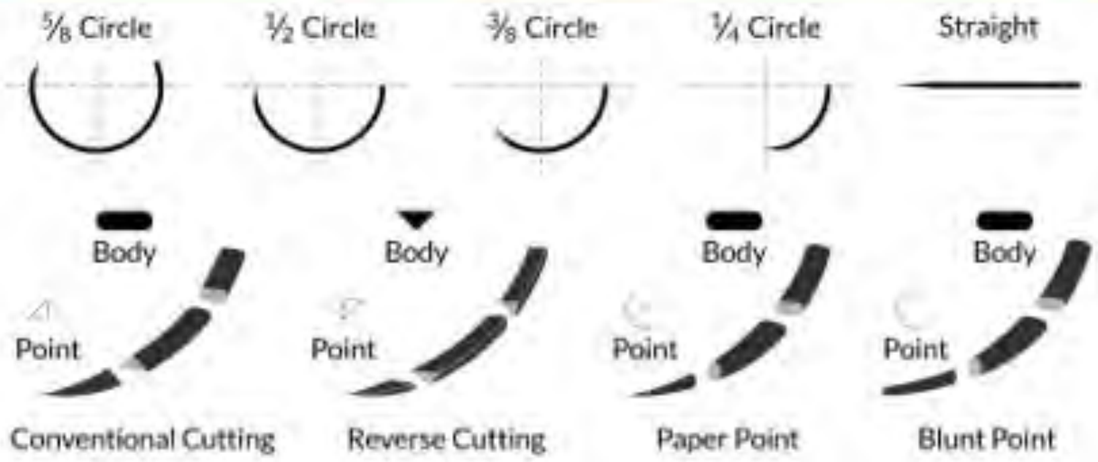
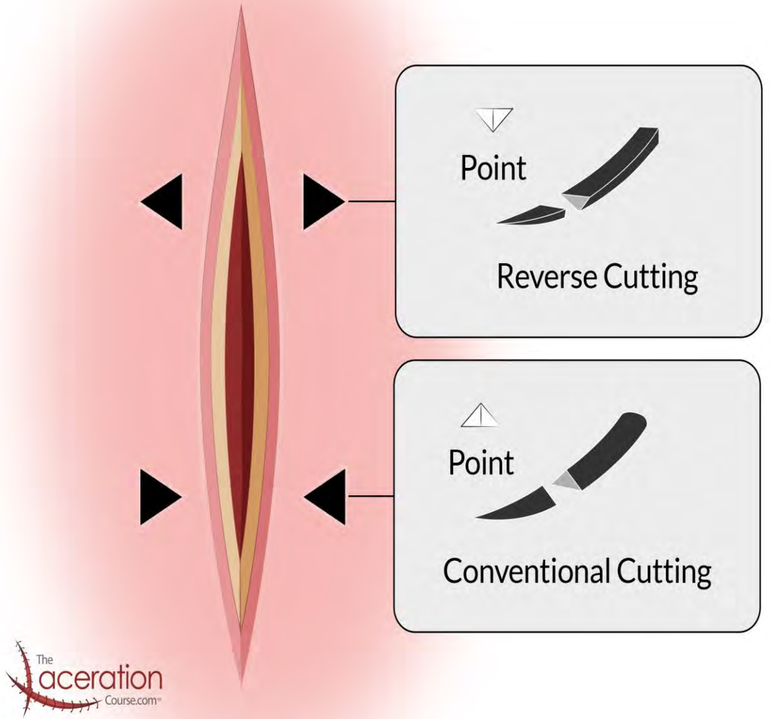
Needle Anatomy



Common Types of Needles



Cutting Needle Tissue Defects



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Important Definitions When Describing Sutures

Knot strength	Amount of force needed for knot to slip, related to the friction and ability to strech
Elasticity	The ability of the suture to stretch and recoil
Plasticity	When the suture stretches but does not recoil
Memory	Ability to return to its shape after it is manipulated, less pliable
Coefficient of friction	Suture's relative resistance to being passed through a tissue, higher means more local tissue damage
Tensile strength	Suture's ability to resist breakage

Tip - straighten thread – cut short

Case 1 - Preparation

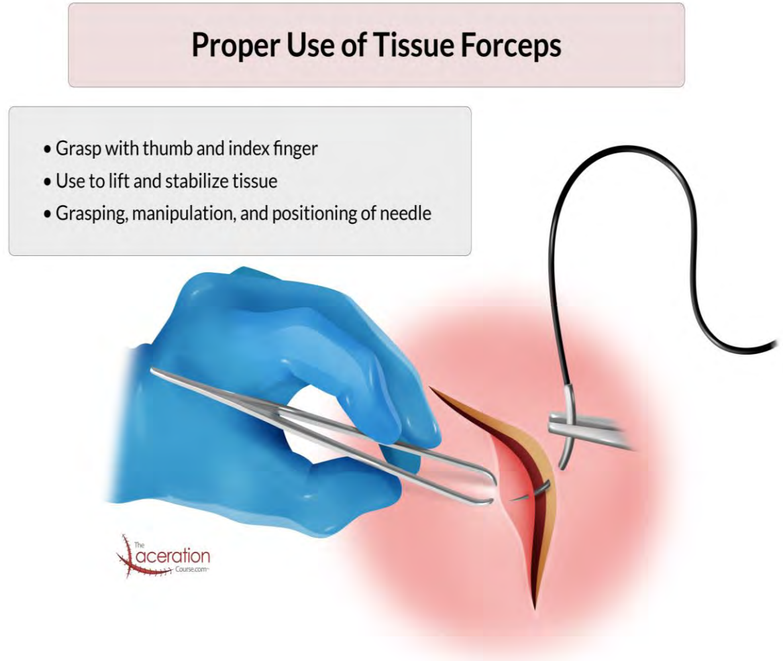
- How do you approach this?
- Associated injuries?
- Imaging?
- Anesthesia
- Irrigation
- Supplies

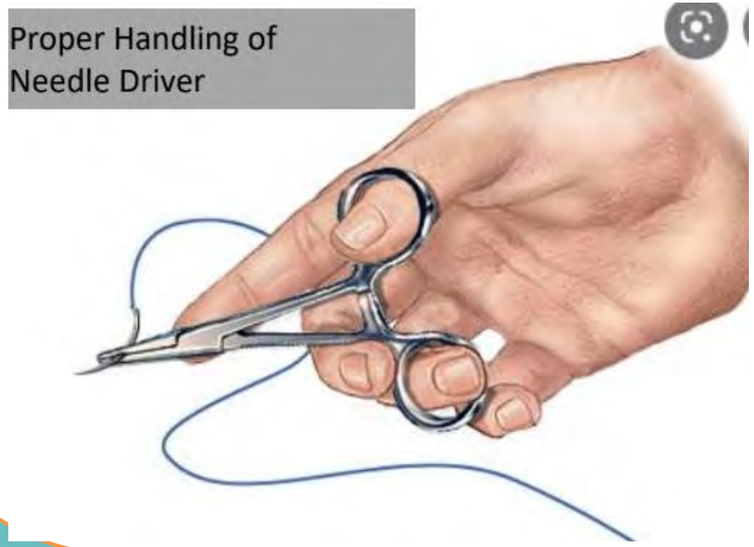
Instrument handling

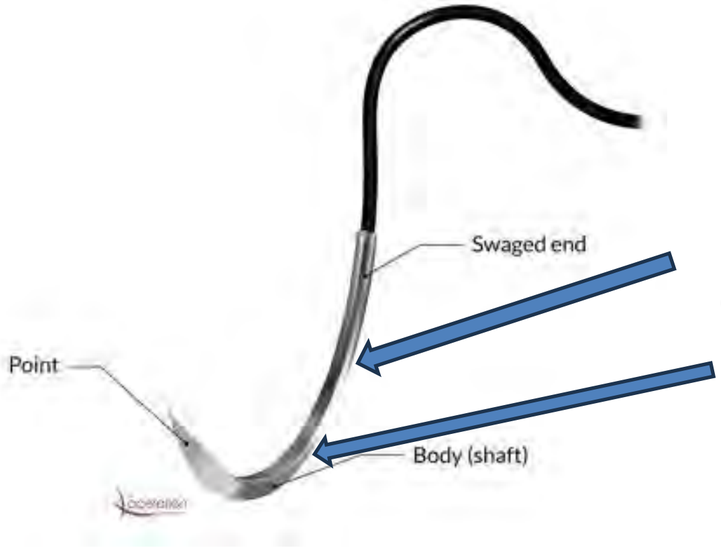
- Instrument handling and instrument tie
- Proper techniques
- Not touching needle with fingers

Instrument handling

- Instruments are an extension of your hand
- “Turning the doorknob”
- Forceps to present tissue to the needle and facilitate proper needle placement in the tissue
- Body mechanics – make the instruments for <u>FOR</u> you







Hold needle between arrows with needle driver

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Knots

- **<u>Instrument tie</u>**
- Basic skill, you must master it
- **<u>Back and forth in opposite directions</u>** so the knots lay down nicely
- 2 throws followed by single throw, repeat... (surgeon's knot)
- Number of throws depends on suture material
- Thread "memory"

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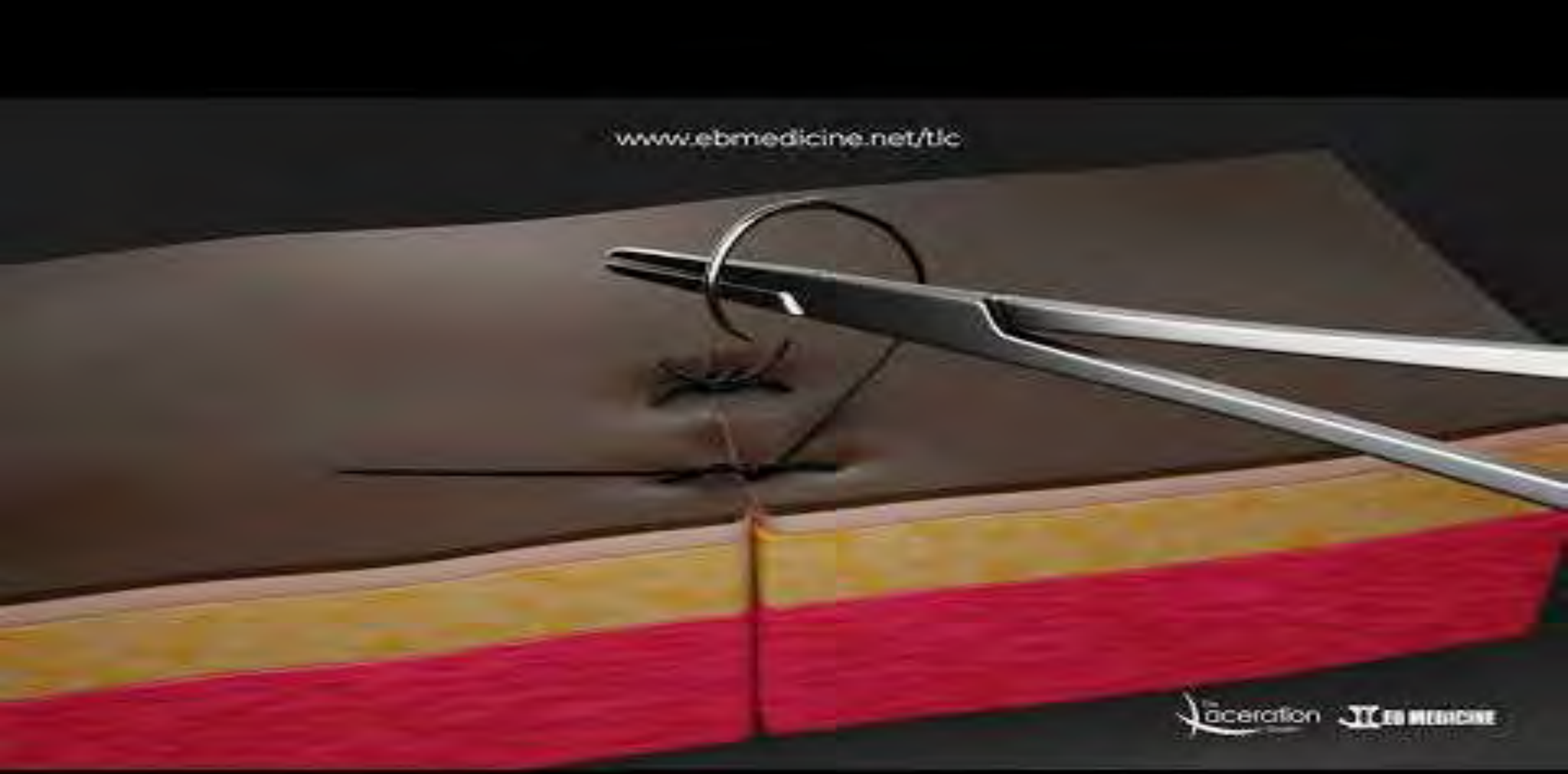
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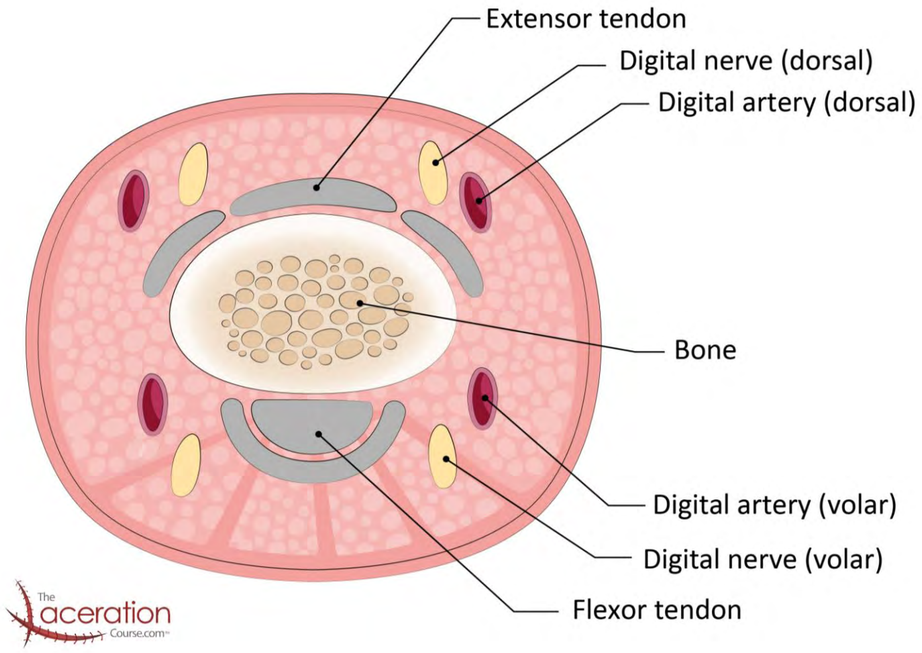
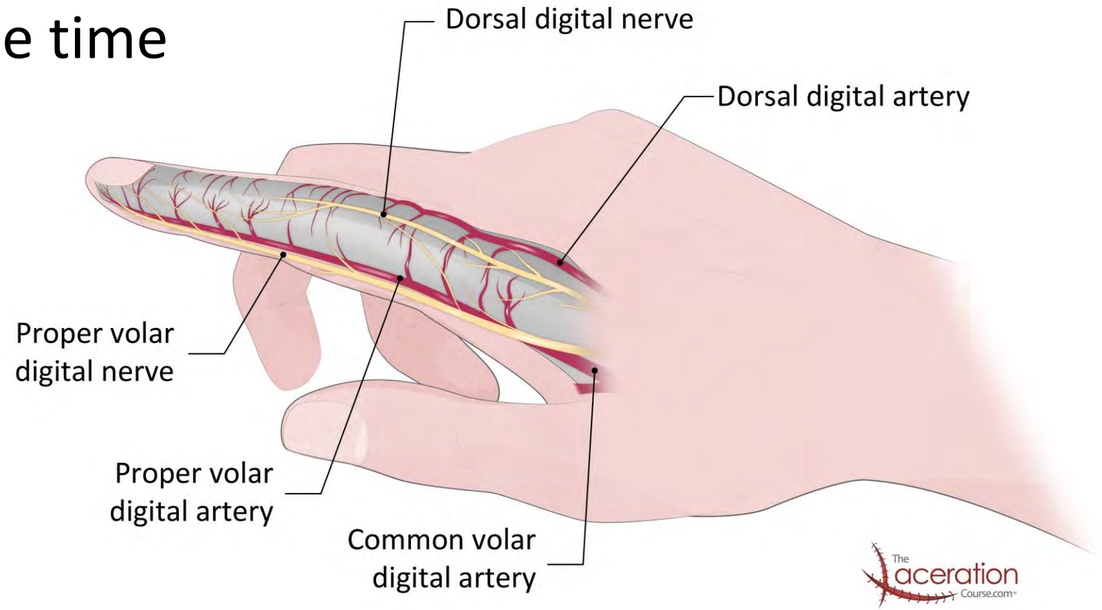
Knot tying

- Prone to unraveling

Digital Block

- Inject slowly
- Let sit for 5 minutes, inject more if needed
- If two adjacent fingers or toes injured, can inject in shared web-space to get two surfaces at one time





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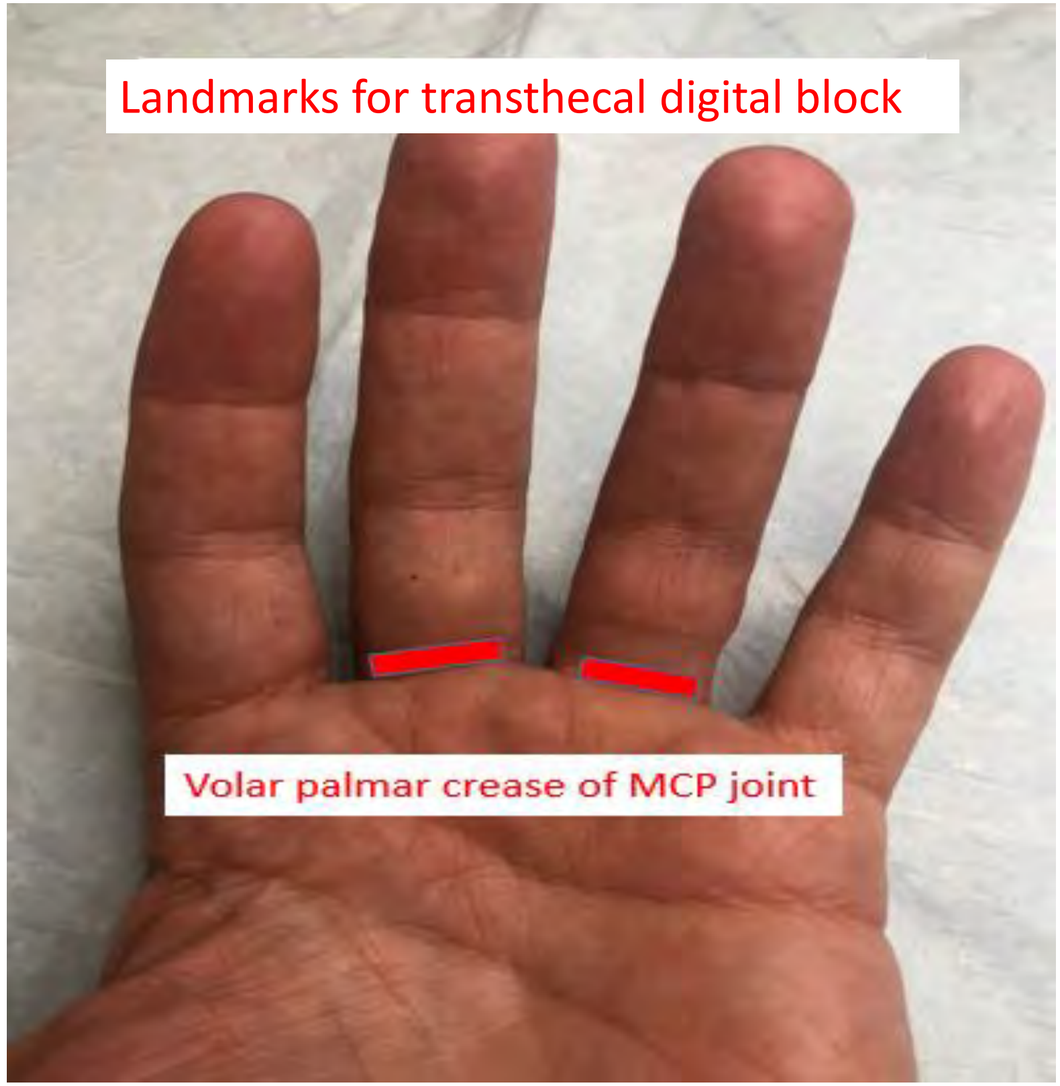
Transthecal nerve block

- Single injection
- Midline palmar/MCP crease
- Aim distal, go to bone, aspirate, withdraw and inject
- Great for multiple adjacent fingers

- YouTube video



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Closure

Myths and Bad Practice Habits

- Sterile water
- Sterile gloves
- Epinephrine in digits
- Betadine, chlorhexidine
- Irrigation

Sterile field

- It’s a dirty wound to start with
- Clean around the wound, use the sterile drapes for instruments and keep patient’s hands, clothing, hair away from your work

Sterile water

- Tap water is completely safe
- Cheaper - $1.50 for bottle of saline
- After anesthetized, consider having patient stand at sink to irrigate for a few minutes
- Can give them gauze and let them clean off dried blood
- Tap water in instrument basin for irrigation

Sterile gloves

- Not needed – it is NOT a sterile procedure
- Sterile gloves are more expensive - $2.30 vs $0.07
- Can SAFELY use the boxed gloves
- Some like the fit better…

Epinephrine in fingers – poll question

- Fingers, nose, penis, toes…
- WRONG!
- Orthopedists and plastics routinely use
- Longer action of anesthetic
- Helps control bleeding
- Consider avoiding in those with Reynaud's, PAD

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Povidone-Iodine, chlorhexidine, and hydrogen peroxide

- Controversial
- Lots of bad practices
- Betadine-10% povidone iodine. Iodine and a synthetic polymer
- No benefit in preventing infection

- https://pubmed.ncbi.nlm.nih.gov/27269416/

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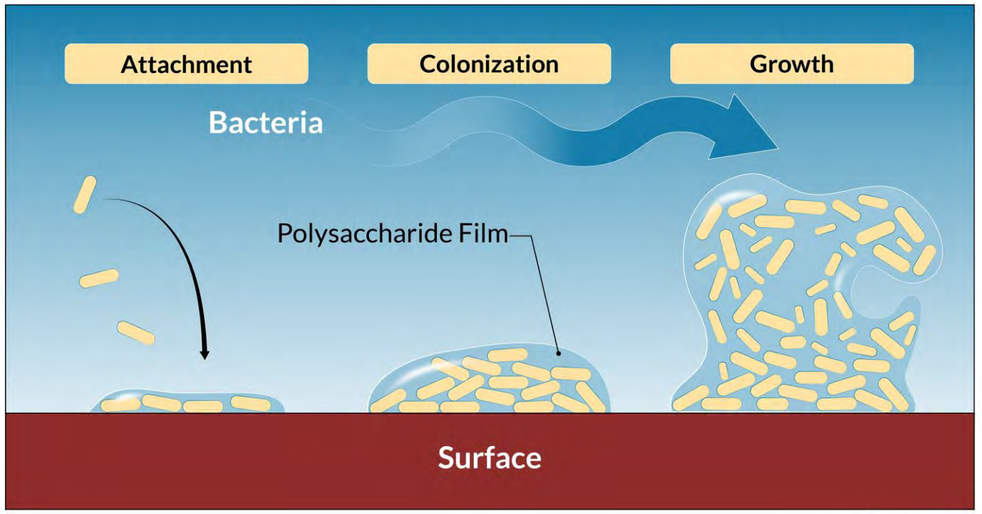
Povidone-Iodine, chlorhexidine, and hydrogen peroxide

- Chlorhexidine?
- Felt to be safe but no strong recommendations that it is better than water
- Water to loosen dried blood
- Hydrogen peroxide-NEVER

Irrigation

- You can’t punch holes in a bottle and squeeze or use bulb syringe
- 50-100cc per cm of laceration
- Must generate 12-15 psi**
- Syringe and splash guard is the way to go, or tap water at sink if appropriate
- Use a 60cc syringe (more efficient)

Biofilm Formation



Case 1 - Documentation

This 10cm gaping laceration to the anterior aspect of the left tibia was anesthetized with 1% lidocaine and epinephrine. Then irrigated with 1L of saline. Benzoin was applied to the wound edges and steri-strips were adhered to the skin. 3.0 Prolene was used to place 7 horizontal mattress sutures and a single interrupted suture. The wound edges were closely reapproximated and the area was bandaged. She was given a long leg splint, crutches and close orthopedic follow-up was arranged.

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Must-have products

- Trauma shears
- Lighting
- Ruler
- Cyanoacrylate
- Stapler
- Steri-strips, benzoin
- Finger tourniquet

Finger tourniquet

- Life saver
- Must have bloodless field when repairing finger lacs
- Elastic band from glove, gauze and hemostat, Penrose drain
- Glove technique
- Several commercial options
- Don’t forget to remove!!

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Case 1 - Follow-up

2 weeks

4 weeks

6 months

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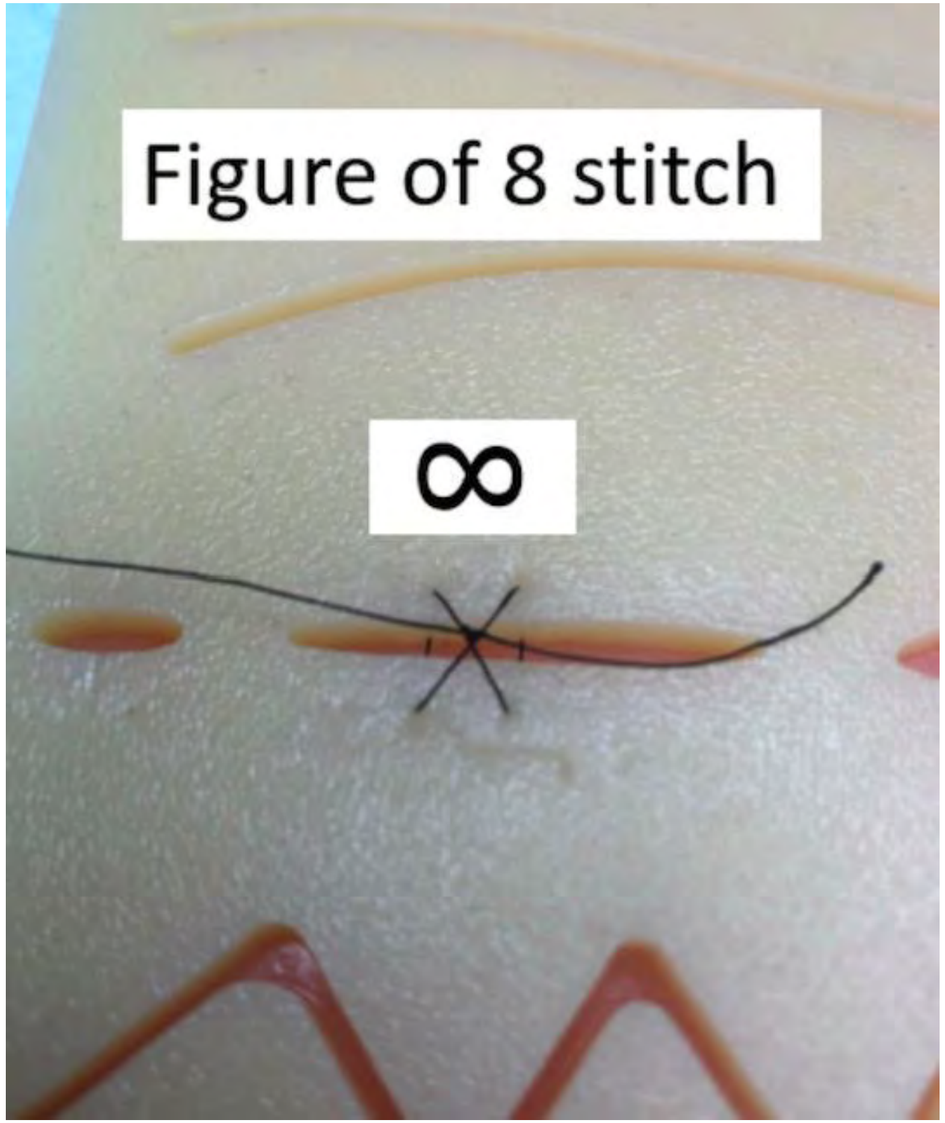
Advanced techniques

- Figure of 8
- Steri-strips
- Flaps, parallel
- Corner

Bleeding varicose vein

- TXA or lido/epi on a gauze-secure with bottle cap and Coban-pressure
- Figure of 8 suture
- Can be done with suture removal kit and suture
- Absorbable suture an option

- Also for post arterial catheter, dialysis puncture site bleeding, paracentesis leakage



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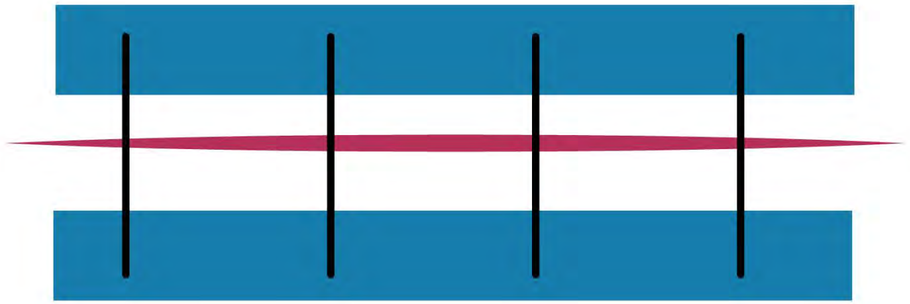
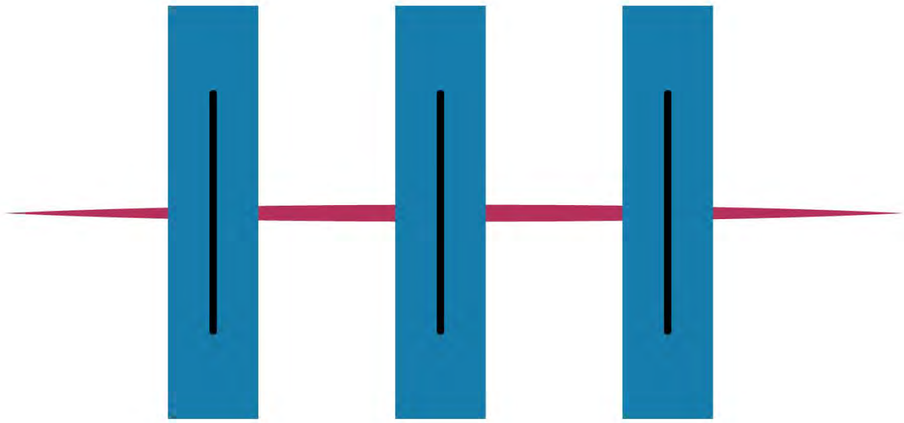
Closure Techniques – Steri-strips

- Skin tears
- Wounds under low tension
- Can combine with glue, sutures





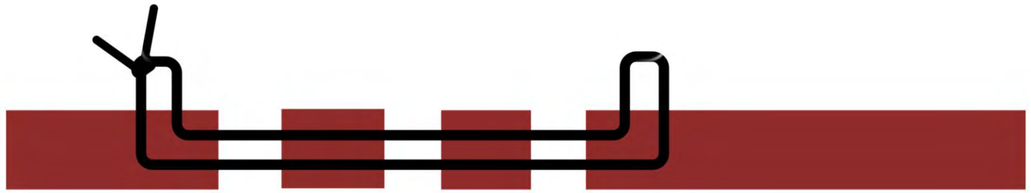
Large skin tear/laceration

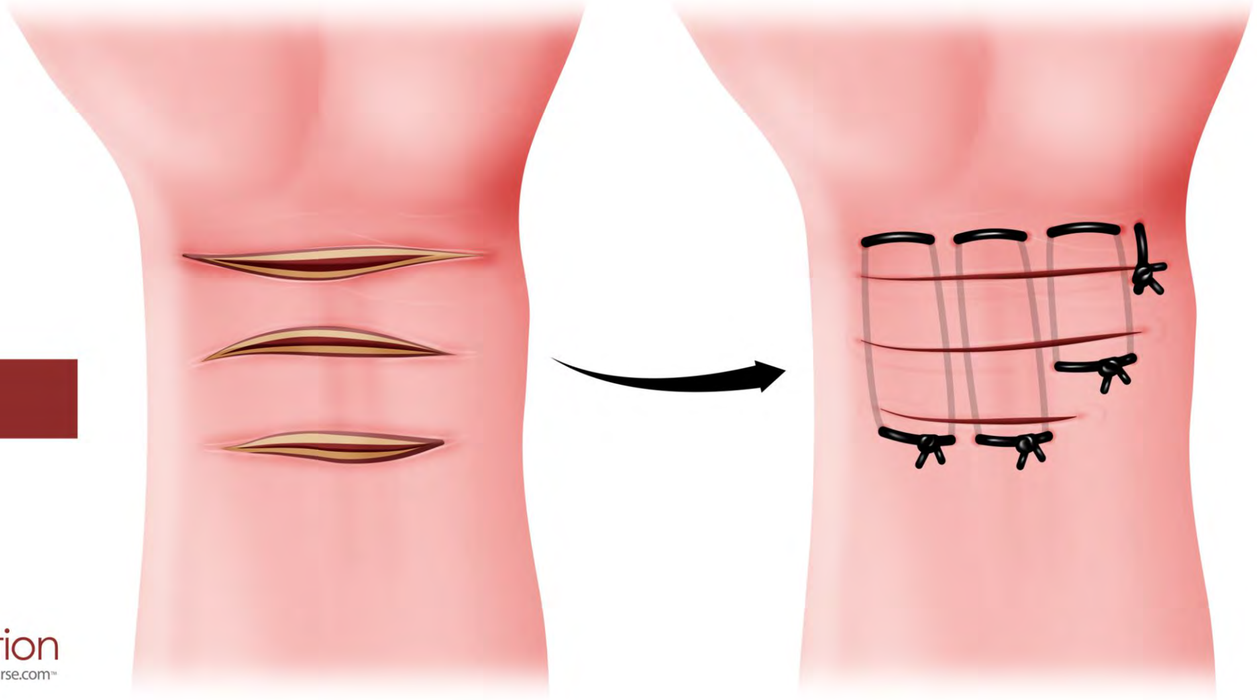
- Steri-strips, benzoin, horizontal mattress sutures

Tissue Bridges/Flaps, Parallel Lacerations

- Envision how the wound should come together
- Develop a plan or strategy before starting-may have to adapt as the wound comes together
- Draw it out!
- May require undermining or debridement
- Combination of interrupted, subcuticular, mattress techniques
- The more tricks you have, the more you can do...

Parallel Lacerations





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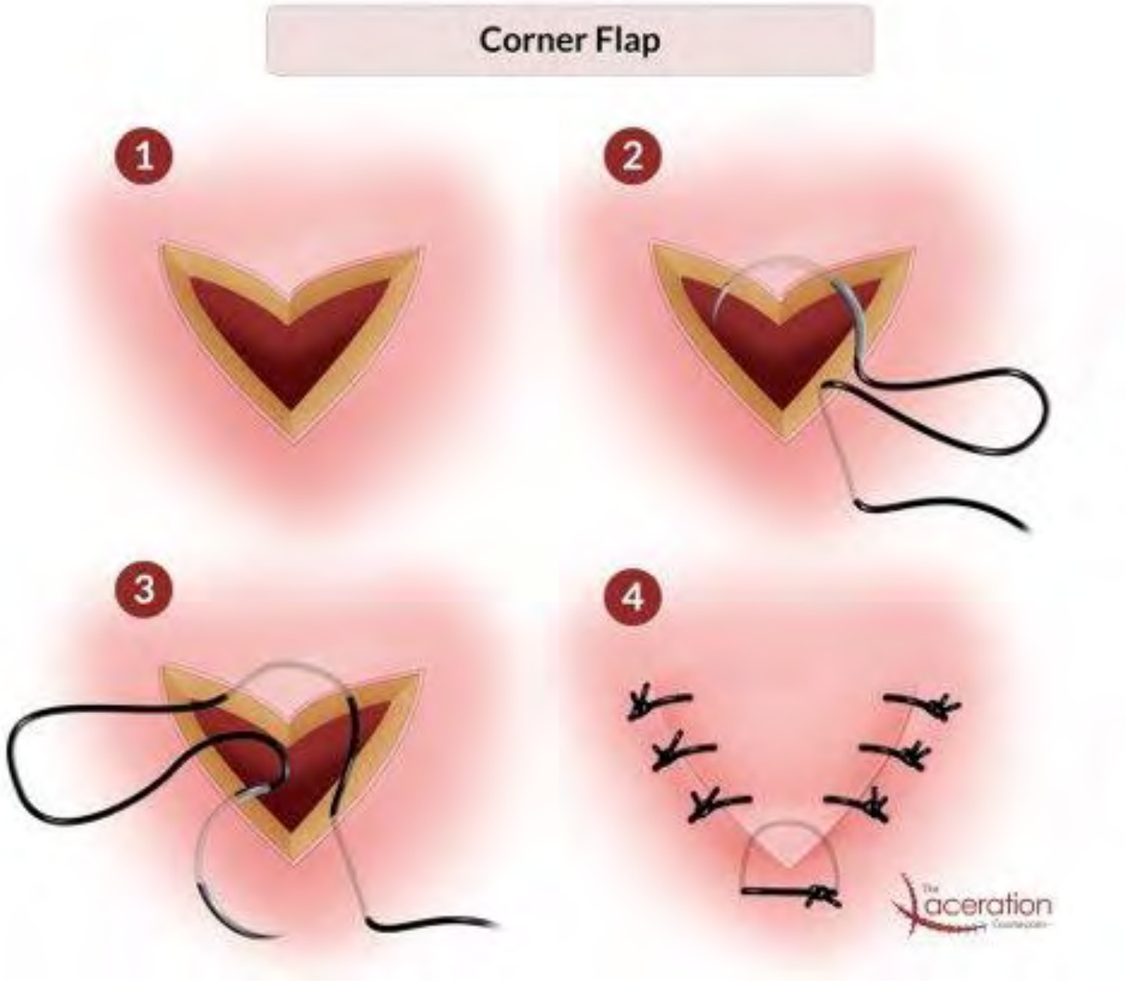
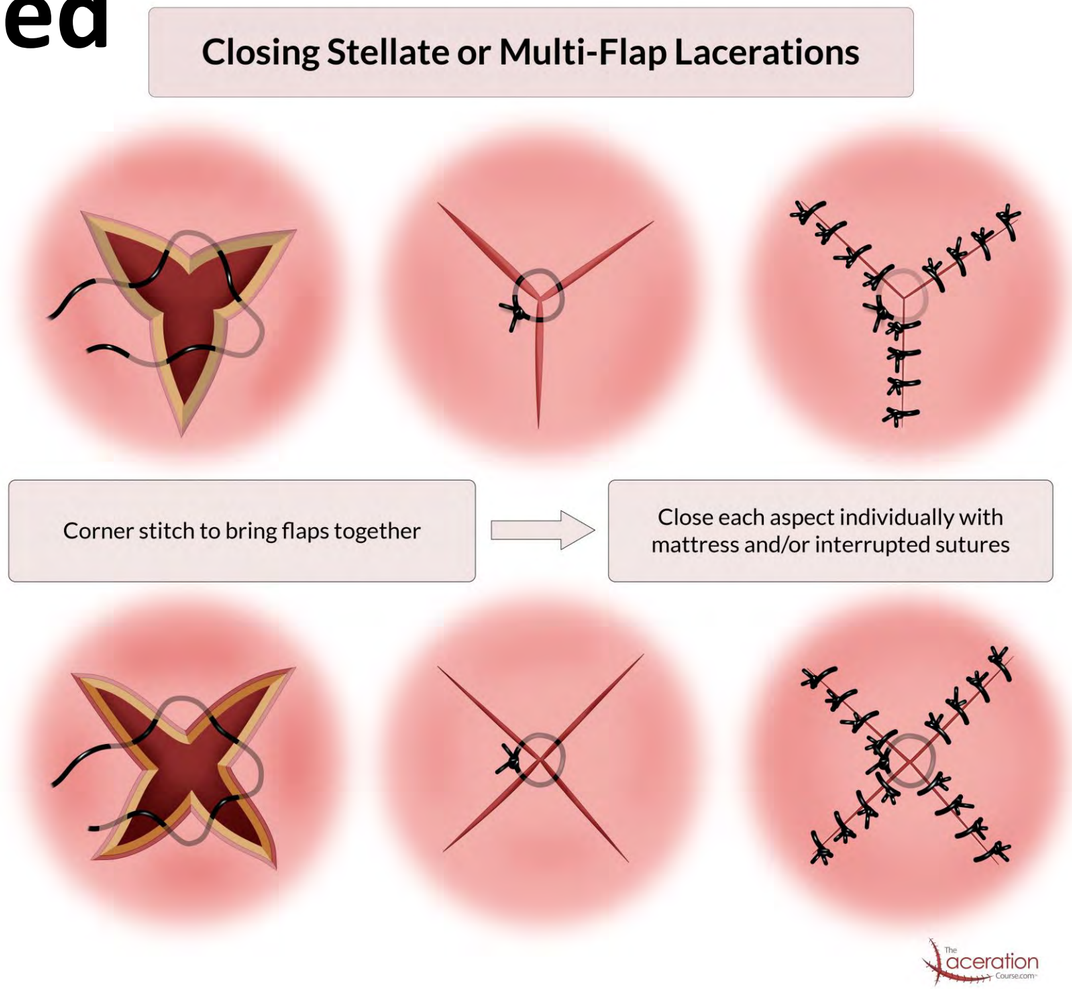
Corner flap – V and Y shaped





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Case 1 - Discussion

- Need for imaging?
- What type of suture?
- Biggest concerns?
- Concern for infection - antibiotics?
- Close follow-up with orthopedics
- What could I have done differently, where could this have gone wrong?

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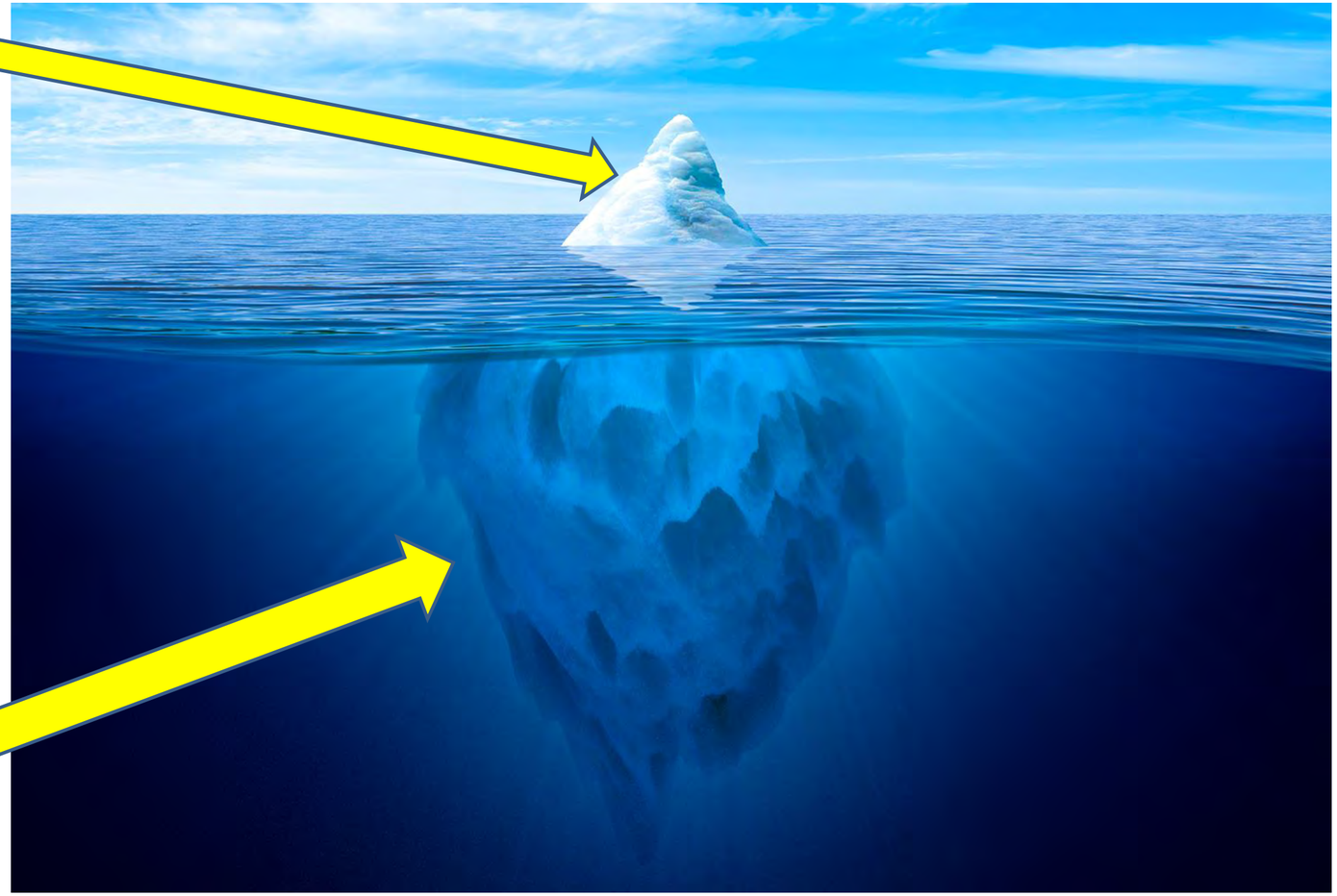
This webinar



Everything about lacerations

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Poll – Would this content be helpful to you as a resident?

Question and Answer, Comments...

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THE LACERATION COURSE MODULES

- **Module 1:** Physical exam, mechanism of injury
- **Module 2:** Children, Prep, Anesthesia, Foreign Bodies
- **Module 3:** Irrigation, Closure, Concepts, Aftercare
- **Module 4:** Suturing Basics
- **Module 5:** Suture Techniques
- **Module 6:** Bites and other soft-tissue injuries
- **Module 7:** Face, Complex Wounds and Injuries, Fingers
- **Module 8:** Disposition, Transfers, Notes
- **Module 9:** Billing and Coding
- **Module 10:** Medicolegal
- **Module 11:** Case Presentations
- **Module 12:** Laceration Repair Videos
- **Module 13:** Suture Technique Videos
- **BONUS:** Practice Suture Kit

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Practice Suture Pad

- Pad
- Instruments
- Suture material
- Stapler
- QR Code menu
- Comes with course purchase-available for groups also

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Cheat sheet comes with course purchase

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THE LACERATION COURSE: HIGH-YIELD INFORMATION

Wound Irrigation

- "The Solution to Pollution is Dilution"
- Wound irrigation is felt to be most important step to reduce infection
- Irrigate wounds well
- 50-100ml of water per centimeter of laceration length
- Tap water is safe and effective as saline, no difference in infection rates
- Goal is to generate 10-15 psi to overcome biofilm, remove contamination
- Larger syringe (50-60cc) allows for more efficient irrigation
- Betadine and chlorhexidine do not show benefit in reducing infection compared to water alone

Time Frame for Staple and Suture Removal

Face: 3-5 days
Scalp: 5-7 days
Low-tension extremity: 6-10 days
High-tension extremity: 10-14 days
Abdomen: 6-12 days
Chest and back: 6-12 days

Sample Procedure Note

Laceration repair. Performed by me. Verbal consent obtained. This is a 3cm laceration to the volar aspect of the right forearm. After wiping the wound clean of dried blood, 5ml of lidocaine and epinephrine was used for anesthesia, injected into the wound margins. The wound was irrigated with 300cc of saline with syringe and splashguard. No neurovascular involvement. Several small foreign bodies were removed. Closure with 5 interrupted 3.0 Prolene sutures. There was good wound re-approximation. Topical antibiotic was applied and the wound was bandaged. Patient tolerated the procedure well. No complications. Follow-up or return in 10 days for suture removal.

Sample Discharge Instructions

Keep a close eye on the wound; come back if you have any fever, redness, pus, or streaks coming from the wound. You may wash the wound with soap and warm water, but do not submerge or soak in water; no swimming. You may apply a loose bandage with topical antibiotic ointment until the sutures are removed. Come back in 10 days for suture or staple removal. If indicated, you will be given a prescription for antibiotics. Not all lacerations require antibiotics. Ibuprofen or Tylenol for pain; other pain medications as prescribed.

Suture Types (And When to Use)

- Prolene or Ethilon: everywhere except inside the mouth
- Vicryl-absorbable: under the skin-layered closure; some advocate for children, face, if unreliable for returning for removal
- Chromic gut: inside the mouth, wet mucosa of the lip

Needle Types (And When to Use)

- Small needle (13mm): facial, fingers, small lacerations, finer work
- Large needle (24mm): extremities, trunk, larger lacerations, more "bite"
- Reverse cutting (cutting edge on outside; convex surface): tougher tissues, less risk of cutting through tissue
- Regular cutting (cutting edge on all three sides): most commonly used in acute setting, skin

Busting Common Myths

- Epinephrine is safe to use for digital blocks
- Sterile gloves are NOT needed
- Sterile field is not required
- Tap water is completely safe to use for irrigation
- Squeezing a saline bottle does not generate enough pressure to irrigate a wound

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THE LACERATION COURSE: HIGH-YIELD INFORMATION

Billing and Coding Basics

- Provide as much detail as you can about the wound and the repair
- Location: be specific (left/right, fingers, crossing joints, etc.)
- Length in centimeters
- Complexity: accounts for layered closure, contamination, debridement

When Transfering

- YOU call and speak to the attending physician; do not have a nurse or medical assistant do this
- Make sure they have the proper service you are advising for the patient
- Provide a copy of any imaging and the urgent care notes
- If there will be a delay, consider irrigating the wound and bandaging, parenteral antibiotics if indicated/available
- Don't promise the patient as to what will or will not be done

When to Use What

Sutures

- More precise, better tissue control
- Time-consuming
- Suture costs less than a reliable stapler

Staples

- Fast, excellent hold
- Similar scarring to sutures
- SCALP! (Large trunk and extremity wounds where cosmetic outcome is less concerning; discuss with patient for shared decision-making.)
- Must have high-quality stapler!

Dermabond

- Can be used more than we think
- Wound must be dry, not oozing
- Careful around eyes; use erythromycin ointment to remove if gets in eyes

Steri-strips

- Must have benzoin!
- Low-tension wounds
- Good for skin tears
- Can combine with Dermabond or sutures for extra strength

Medicolegal Aspects

- Exclude foreign bodies: Look, feel, imaging; remove or refer appropriately
- Provide good discharge instructions, reasons for returning, going to ED
- Diagnosing tendon injuries
- Document neurovascular and tendon exam before and after
- Identify open fractures and treat/refer appropriately
- Document; if not charted, it didn't happen
- Antibiotics for dog bites if repaired
- Remove rings from fingers for any arm, hand, finger injuries

ABOUT THE LACERATION COURSE

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The Information You Need to Confidently Manage Lacerations.

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Residency programs

- Discounted rate
- Everyone gets access
- Suture kits
- Integrate into curriculum
- Mandatory for incoming interns before starting
- Integrate with in-person suturing workshop
- Available for rotating students also
- Progress reports
- Discounted faculty rate

West J Emerg Med. 2015 Nov; 16(6): 856–858.
Published online 2015 Oct 22. doi: 10.5811/westjem.2015.9.27369
PMCID: PMC4651582
PMID: 26594278

Assessing the Impact of Video-based Training on Laceration Repair: A Comparison to the Traditional Workshop Method

Nicholas Chien, BS, Terren Trott, MD, Christopher Doty, MD, and Brian Adkins, MD

- In our study, students who participated in VBL had no significant difference in suturing scores at one and three months compared to LWL. These results suggest that VBL may be as effective as live workshop training. The implementation of accessible VBL into medical students' pre-clinical education may be an effective way to teach students procedural skills while saving time, space, and resources used for scheduled instruction in an environment of ever-increasing educational demands.

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I can assure you...

- Deeper knowledge base
- Technical skill
- Increase confidence

- You will be better prepared for the "Real World"!

Website demo

EB Medicine www.ebmedicine.net

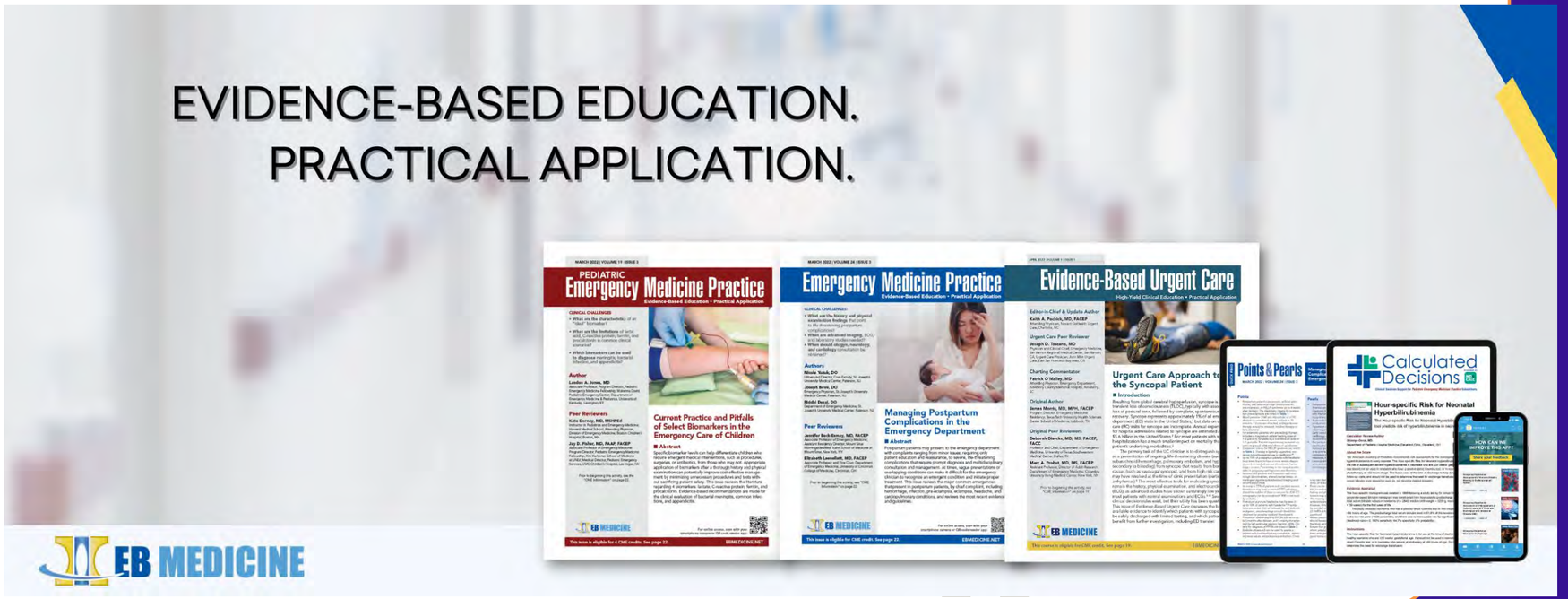
Ongoing Education:

- *Emergency Medicine Practice*
- *Pediatric Emergency Medicine Practice*
- *Evidence-Based Urgent Care*

Onboarding Education:

- The Urgent Care EKG Course
- The Laceration Course

Contact us to learn more about group pricing!



Free resources for students/residents

- EB Medicine is offering FREE and instant access to hundreds of research reviews published in *Emergency Medicine Practice* and *Pediatric Emergency Medicine Practice* for Residents & Students! Act now to claim your free emergency medicine educational resources!
- Register here: https://www.ebmedicine.net/residents
- EMplify podcast – accompanies each EMP issue

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Residents/students-use promo code: **AAEMRSA**
for 10% off The Laceration Course
Students/residents - retail $99 ($89.10)

Attendings-use code **AAEMRSA-TLC** for 10% off
Practicing clinicians/faculty - retail $299 ($269.10)

The laceration Course™

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Facebook Group – EBM Urgent Care Clinicians

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Follow-up

- Watch for an email from EB Medicine
- Replay link
- Discount code
- Contact information

Thank you!

- Interested in laceration specific research??? Contact me!
  - Wound irrigation, topical antibiotic, infection rates, cosmetic outcomes, resident/student education/simulation
- Contact information

  Email: OMALLEYMD@EBMEDICINE.NET
- Find me on LinkedIn
- Follow *The Laceration Course* on Facebook, Instagram, and YouTube
- www.ebmedicine.net/TLC

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Topical antibiotics and lacerations

- There are a lot of conflicting recommendations, which make this complicated
- Triple antibiotic ointment
- Double antibiotic ointment
- Bacitracin alone
- Sensitivity vs allergy
- Post surgery vs traumatic
- Dermabond, staples, steri-strips, new closure devices
- Is antibiotic ointment mandatory
- How do wounds heal without it
- Arguments for and against
- https://en.wikipedia.org/wiki/Neomycin/polymyxin_B/bacitracin
- https://www.drugs.com/drug-class/topical-antibiotics.html

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Up to date

- https://www.uptodate.com/contents/skin-laceration-repair-with-sutures?topicRef=15912&source=see_link#H37

- **Topical antibiotics and wound dressing** — For traumatic lacerations in patients without sensitivity to neomycin or other components, we recommend application of a topical antibiotic ointment such as topical bacitracin zinc or combination ointment containing neomycin sulfate, bacitracin zinc, and polymyxin B sulfate [21,22]. For patients with sensitivity to neomycin, we suggest dressing the wound without topical antibiotics. To enhance healing, we also suggest that lacerations repaired with sutures be initially covered with an open or semiocclusive dressing, as determined by the amount of anticipated drainage:
- ●**Wounds with potential drainage or closed with nonabsorbable sutures** – Sterile gauze dressing or adhesive bandage (open dressing).
- ●**Wounds without drainage or closed with absorbable sutures (fast-absorbing gut or Vicryl Rapide)** – Either an open or semiocclusive dressing such as a polymer film (eg, Tegaderm, Cutifilm, Blisterfilm, or Bioculsive) can keep the sutures dry. Polymer films may permit the patient to shower more easily without getting the wound wet and permit examination of the wound for signs of infection without removing the dressing.
- The dressing should be left in place for at least 24 hours, after which time, wounds can be left open to air. An antibiotic ointment can be applied to the wound as well, with instructions to apply the ointment two times per day at home until suture removal.
- The use of a topical antibiotic ointment is supported by a randomized blinded trial of 426 adults undergoing traumatic laceration repair with sutures in which topical ointment containing neomycin sulfate bacitracin zinc and polymyxin B sulfate significantly reduced the rates of wound infection when compared with a petroleum ointment control (5 to 6 versus 18 percent, respectively) [21]. In another randomized and blinded study of 177 children with minor wounds, most of which were grazes, abrasions, and cuts, individuals who treated the wound with topical antibiotics also had significantly lower rates of infection (1.6 percent) compared with placebo (12.5