ADVANCED SUTURING WORKSHOP

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The technique of suturing, as a method for closing cutaneous wounds has been a part of medicine for hundreds of years. Over the centuries, although suture materials and aspects of the technique have evolved, the goals remain the same: closing dead space, supporting and strengthening wounds until healing, approximating skin edges for an aesthetically acceptable and functional result, and minimizing the risks of bleeding and infection.
OBJECTIVES

- Attendees will be able to assess wounds and incorporate appropriate wound management in the clinical setting.
- Attendees will be able to utilize appropriate anesthesia in preparing wounds for suturing.
- Attendees will be able to incorporate basic suturing techniques in the clinical setting.
<table>
<thead>
<tr>
<th>Local Anesthetic</th>
<th>Onset (Min)</th>
<th>Duration (Hour)</th>
<th>Max Adult Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine 1% OR 2% (xylocaine)</td>
<td>1</td>
<td>0.5-1</td>
<td>4mg/kg up to 300mg (30 ml)</td>
</tr>
<tr>
<td>Lidocaine w/epinephrine</td>
<td>1</td>
<td>2-6</td>
<td>7mg/kg up to 500mg (50 ml)</td>
</tr>
<tr>
<td>Bupivacaine 0.25% (Marcaine)</td>
<td>5</td>
<td>2-4</td>
<td>3mg/kg up to 225mg (64ml)</td>
</tr>
<tr>
<td>Bupivacaine w/epi</td>
<td>5</td>
<td>3-7</td>
<td>3mg/kg up to 175mg (50 ml)</td>
</tr>
<tr>
<td>Etidocaine (Duranest)</td>
<td>3-5</td>
<td>3-7</td>
<td>3mg/kg up to 225mg</td>
</tr>
</tbody>
</table>
Lidocaine (Xylocaine) without epinephrine (1% or 2%)
- Can cause vasodilation
- Use in contaminated areas
- If vascular disease, if patient is immunocompromised, or if there are cerebrovascular or cardiovascular risks
- Use for nerve block

Lidocaine (Xylocaine) with epinephrine (1% or 2%)
- Causes vasoconstriction
- Has longer duration
- Use in highly vascular areas to improve visualization and decrease bleeding
- Use in clean wounds
- Do not use on fingers, nose, penis, toes and ears.

Bupivacaine (Marcaine)
- For longer duration
- For nerve blocks
TIPS TO REDUCE PAIN WITH INJECTIONS

- Sodium Bicarbonate 8.4%
  - Can use with lidocaine with or without epinephrine to reduce the pain or stinging sensation of the medication.
  - Approximate ratio is 10:1

- Use warm (room temperature) solutions
- Use as small of needle as possible (30g if possible)
- Inject slowly
- Pinch up and “shake” the skin while the injection is being given
- Use a topical anesthetic before injection
- Use a topical refrigerant to cool the area before injection (e.g. ethyl chloride, fluori-methane, medifrig)
## Topical Anesthetic Agents

<table>
<thead>
<tr>
<th>Agents</th>
<th>Onset of Action</th>
<th>Duration</th>
<th>Maximum Dose or Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMLA Cream</td>
<td>60-120 min</td>
<td>180 min</td>
<td>20g/200cm²</td>
</tr>
<tr>
<td>Lidocaine Acid Mantle</td>
<td>20 min</td>
<td>30-60 min</td>
<td>None given</td>
</tr>
<tr>
<td>TAC (0.5% tetracaine; 1:1000 epinephrine; 11.8% cocaine)</td>
<td>10-20 min</td>
<td>30-60 min</td>
<td></td>
</tr>
<tr>
<td>LAT (4% lidocaine; 1:2000 epinephrine; 1% tetracaine)</td>
<td>10-20 min</td>
<td>30-60 min</td>
<td></td>
</tr>
<tr>
<td>Benzocaine (cetacaine) spray</td>
<td>&lt; 5 min</td>
<td>15-45 min</td>
<td></td>
</tr>
<tr>
<td>Viscous lidocaine (2%)</td>
<td>1-2 min</td>
<td>15-20 min</td>
<td>100mg</td>
</tr>
<tr>
<td>Cocaine solution (4%; 10%)</td>
<td>1-5 min</td>
<td>30-60 min</td>
<td>200mg</td>
</tr>
</tbody>
</table>
In conventional cutting needles, the pressure is concentrated on the apex of the triangle and thereby has a tendency to tear through tissue. In reverse cutting, the advantage of piercing through tissue still exists, but the pressure from the suture is distributed over the whole base so unwanted tearing is reduced.
NEEDLE SIZES

Smaller needles are used for fine or small wounds, while larger needles are used for deep wounds. For instance, facial closures are often done with a P-3 needle, while other areas with thick skin require an FS-2 or FS-3.
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>TYPE</th>
<th>TENSILE STRENGTH/ABSORPTION</th>
<th>TISSUE REACTION</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILK</td>
<td>BRAIDED, NON-ABSORBABLE</td>
<td>POOR</td>
<td>HIGH</td>
<td>LOW</td>
</tr>
<tr>
<td>NYLON (ETHILON;DERMALON)</td>
<td>MONO, NON-ABSORBABLE</td>
<td>GOOD</td>
<td>MINIMAL</td>
<td>LOW</td>
</tr>
<tr>
<td>POLYPROPYLENE (PROLENE, SURGILENE)</td>
<td>MONO, NON-ABSORBABLE</td>
<td>EXCELLENT</td>
<td>MINIMAL</td>
<td>HIGH</td>
</tr>
<tr>
<td>POLYLACTIC ACID (VICRYL)</td>
<td>BRAIDED, ABSORBABLE</td>
<td>60% IN 14 DAYS</td>
<td>MILD</td>
<td></td>
</tr>
<tr>
<td>CHROMIC GUT</td>
<td>ABSORBABLE</td>
<td>7-10 DAYS</td>
<td>MODERATE</td>
<td></td>
</tr>
<tr>
<td>POLYLACTIC ACID (Dexon)</td>
<td>MONO, ABSORBABLE</td>
<td>40% IN 7 DAYS</td>
<td>MILD</td>
<td></td>
</tr>
</tbody>
</table>
A. Four digital nerves of the digit. B. Digital nerve block of the finger. The sites of the nerves are injected bilaterally. Insert the needle after touching bone, withdraw slightly and inject 0.5ml of anesthetic. Direct the needle superiorly to the midline, and inject 0.5-1ml from the midline down. Do the same inferiorly. Repeat the technique on the contralateral side. Also called a “ring block” and effectively anesthetizes the entire digit.
BLOCKS, cont.

C. Alternative method of injection from the dorsal aspect. This is followed by a ventral injection in the same manner.

D. Web space injection using same technique as above.
Area of the mucobuccal fold at or anterior to the mental foramen. Lies between the mandibular pre-molars. Depth of injection: 5-6mm
Inject 0.5-1ml of local anesthetic, preferable bupivacaine for longer pain relief
Massage local into tissue.
Infraorbital Block:

- Identify the infraorbital foramen extra-orally and place thumb or index finger on region.
- Retract the upper lip and buccal mucosa to expose the region of insertion, which is the mucobuccal fold of the 1st premolar/canine area.
- Contact bone in infraorbital region.
- Inject 0.9-1.2cc of local anesthetic.
A. Dots show the area of insertion.
B. Arrows show the direction of needle injection anesthetic.
SUTURE TECHNIQUE

Keep sutures even in both width and length.

A. “make hills not valley’s”. B. acceptable, but not optimal C. Improper since healing will lead to further contraction and scar depression.
SIMPLE RUNNING STITCH
MATTRESS SUTURES

**Vertical Mattress:** Promotes eversion of skin. Good for loose, flabby skin or for very thin skin where interrupted sutures have a tendency to pull through.

**Horizontal mattress:** Used for wounds under a moderate amount of tension; promotes wound edge eversion. Useful for palms, soles, and in deep wounds in patients who are susceptible to infections.

**Mattress:** Promotes eversion of skin. Good for flabby skin or for very thin skin where interrupted sutures have a tendency to pull through.
MULTIPLE LAYER CLOSURE

A. Simple interrupted with absorbable suture with high strength.

B. Running inner layer suture with absorbable suture with high strength.

Cannot leave open or “dead space” in a wound. Can close large, deep layer closure, mattress stitch, or by putting an inner layer of sutures in the wound.

Diagram to the near right: Using buried deep stitch with absorbable suture.

A. Simple interrupted with absorbable suture with high strength.
B. Running inner layer suture with absorbable suture with high strength.
THREE POINT MATTRESS

This closure works well for large, flap type wounds that require a lot of strength to hold closed.
LIP LACERATIONS

Lip lacerations that cross the vermillion border require precise closure. The first suture MUST precisely line up the border.

Use oral blocks for anesthesia to prevent abnormal raising of the wound before closure.
Initial knot always at least double wrapped before pulling through.

Start with double (at least) initial knot, followed by square knots.

To perform square knot, simply reverse direction with each throw.

How many throws you choose depends on wound. If using fine, mono suture then 3 usually more than adequate. If thicker suture, may require more throws to adequately hold.
SOURCES

- Lacerationrepair.com
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- Medscape.com
- Pfenniger and Fowler, Procedures for Primary Care Physicians, 3rd edition. Mosby, Inc. 2011