Suturing & More!  
(A quick review and practice time!)

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Objectives
At the conclusion of this workshop, the participant will be able to:

1) Assess wounds and incorporate appropriate wound management in the clinical setting.
2) Utilize appropriate anesthesia in preparing wounds for suturing.
3) Incorporate basic suturing techniques in the clinical setting.

Agenda

- Discuss wound assessment
- Discuss basic suturing knots
- Practice after break!

Assessment of Injury

- Initial hemostasis
  - Direct pressure (no FB)
  - "eye" cautery
  - Suture ligature
Mechanism of Injury

- Sharp vs. Blunt
- Sharp – easiest to repair (knife wound)
- Blunt – laceration caused by trauma (baseball bat)

Age of Wound

- “Golden period” =<12 hours for most wounds
- Facial wounds (12-16)

Extent of Injury (know your A & P!!!)

- Tendon injury
- Nerve testing/injury
- Blood supply assessment
- Bone assessment

Condition of Wound

- Tidy – no devitalized tissue, clean of debris
- Untidy – may have dead tissue or debris in the wound, (Irrigate!)
- Clean – Little bacterial contamination
- Contaminated – Bacteria in wound

Condition of Wound

- Non-Complex – flat surface, perpendicular to skin, linear, distant from vital, necessary hand, facial or limb critical areas
- Complex – wound in convex, concave, flexion crease or angle to normal crease. Non-linear, skin flap, irregular edge, oblique to skin surface (should/needs to be converted to non-complex)
Condition of Wound
- Simple – dermis and fat only
- Compound – involves nerves, ducts, tendons, major blood vessels, glands, fascia, muscle

Classification of Wound
- Laceration
- Penetration
- Amputation
- Avulsions

Factors Affecting Wound Healing
- Age
- Race
- Anatomic Location
- Technical
- Comorbidities
- Drugs

Phases of Wound Healing
- Hemostasis
- Inflammatory Response
- Collagen Formation
- Wound Contracture
- Re-epithelialization
General Guidelines for Antibiotics

- Consult EBP guidelines/PDAs
- Heavily contaminated, traumatic injuries
- Wounds invading the joints
- May/not wounds > 6 hours
- Animal or Human Bites
- Compromised Host

Local Anesthesia – Sensory Modalities

- 2 point discrimination
- Pain
- Light touch
- Paresthesia
- Pressure
- Proprioception

Local Anesthesia – Types

- Esters – Procaine (Novocaine), tetracaine, cocaine > OLDER and not used in PHC setting and have more reactions
- Amides – Lidocaine (Xylocaine), Bupivacaine (Marcaine) – CHECK for ALLERGIES
- Addition of Epinephrine
  - Advantages (decreases bleeding, prolongs, less systemic)
  - Disadvantages (vasoconstriction!!)

Common Injectable in Office

<table>
<thead>
<tr>
<th>Type</th>
<th>Onset (min)</th>
<th>Duration (hour)</th>
</tr>
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<tbody>
<tr>
<td>Lidocaine (Xylocaine)</td>
<td>1</td>
<td>0.5-1</td>
</tr>
<tr>
<td>Lidocaine with epinephrine</td>
<td>1</td>
<td>2-6</td>
</tr>
<tr>
<td>Mepivacaine (Carbocaine)</td>
<td>3-5</td>
<td>0.5-1.5</td>
</tr>
<tr>
<td>Bupivacaine (Marcaine)</td>
<td>5</td>
<td>2-4</td>
</tr>
<tr>
<td>Bupivacaine with epinephrine</td>
<td>5</td>
<td>3-7</td>
</tr>
</tbody>
</table>
Where and When NOT to inject Vasocostricators:
- Nose
- Ears
- Penis
- Fingers
- Toes
- Known PVD (DM, HTN, etc - - )
- Flap with ? Viability
- Risk for infection

Reducing Pain with Injections:
- Warm solution
- Small needle (30g)
- Inject slowly
- Inject subcutaneously (vs intradermal)
- Prepare patient for discomfort
- Pinch and shake skin while injecting
- Use topical anesthetic or refrigerant

Procedure:
- Select appropriate syringe – 5cc
- Draw up, change needles, use 27-30 gauge for injecting patient
- Stick, aspirate and if blood, reposition the needle outward
- Never inject if blood return > systemic
- Administer pulling back not going forward to avoid systemic infiltration
- Inject directly into wound

Local Anesthesia
Before you INJECT,
You must DOCUMENT!

So DOCUMENT ALL ASPECTS OF YOUR INJURY!
In Preparation for suturing

- Know skin tension lines
- Determine if laceration needs to be "redesigned"
- Determine if you need to refer!
- Sterile field
- Debridement or not
- Tension? Undermine or not

Eliminate Dead Space

- Use of embedded absorbable suture

Accurately Approximate Tissue Layers

- Skin tension lines
- Debridement
- Anatomical Areas Match (e.g. vermilion border of lip)

Approximate Wound with minimal tension

- Undermining
- Tenting
- Even pressure
- Symmetrical
Suture

- Sizes
  - The more “O” the smaller (4-0 < 3-0)
  - Width and tensile strength
- Choice of Absorbable or Non-absorbable
- Needle choice
  - Size
  - Tip shape
  - Contour

Needle Choices

Wound Closure instruments

- Needle holder
- Forceps
- Suture scissors
- Curved hemostats

Antiseptics

- Halogens – iodine, iodoform
- Alcohol
- Biguanides – chlorhexidine (hibiclens)
- Oxidizing agents (H202)
- Surfactants – Sur-Clens, liquid detergents
Wound Field Preparation

- Hair Trimming?
- Packing wound
- Prep skin

Wound Irrigation

“The SOLUTION to POLLUTION is DILUTION!!”

Simple, Interrupted

Vertical Mattress

- Wound edge eversion
- Retention stitch
  - over high tension areas
  - Great stitch to approx. wound edges
- Disadvantage:
  - 2nd stitch can tear
  - May over-evert edge
**Horizontal Mattress**
- Wound edge eversion
- Retention stitch
  - over high tension areas
  - Temporary Stitch to approx wound edges
  - can remain in a few days longer
- On palms and soles of feet

**Horizontal Mattress**
- Wound edge eversion
- Retention stitch
  - over high tension areas
  - Temporary Stitch to approx wound edges
  - can remain in a few days longer
- “Suicide Stitch”
- Disadvantages
  - suture marks > 7 days
  - risk of tissue strangulation

**Buried (Deep) Stitch**
- Reduce tension on surface
- Eliminates “Dead space”
- Close subcutaneous layers
- Use absorbable material
- Avoid numerous sutures
- Areas to consider

**Corner Stitch**
- for simple corner/flap injuries.
- Blunt type/stellate multi-flap injury
- Secures Corners
- Keeps blood flow intact to small area
**Corner Stitch**
- Utilizes half-buried horizontal mattress suture.
- Tie away from corner
- Drawbacks
  - Edge approximation can be difficult
  - Small risk of trauma to corner
  - Risk of “dead space”

**Stellate injuries**
- Utilize Corner stitch
- One corner stitch can encompass several corners

**Suture Patterns**
- Simple interrupted
- Vertical Mattress
- Horizontal Mattress
- Subcutaneous (Buried)
  - Depth – Varies with stitch – No deeper than laceration
  - Width – From lac. Edge (about same distance as cut in skin)

**After-Care**
- Dressings
- Topical agents
- Wound check
- Suture removal – How and when
  - Face: 3-4 days
  - Scalp: 5 days
  - Trunk: 7 days
  - Arm or leg: 7-10 days
  - Foot: 10-14 days
**General tips**

- Handle tissue gently vs. Roughly
- Meticulous hemostasis.
- Enter needle and exit at right angles.
- Evert skin edge vs. Invert.

**Bibliography**


Break!!!

- Practice time
- Please put all materials under your chair, table