Objectives

• Understand and demonstrate proper suturing techniques
• Learn how to properly handle instruments
• Know types of suture and appropriate use
• Hand-tying
• Learn how to trouble-shoot complications after suturing
Goals of Suturing

• Provide hemostasis
• Close dead space
• Decrease risk of infection
• Approximate wound until tensile strength adequate
• Good cosmetic result
Surgical Principles

Knot Tying

Suturing Technique
Before Procedure:

• Sterile technique

• Know your anatomy

• Be prepared!
Skin Layers

The Skin

- Hair
- Sebaceous Gland
- Sensory Nerve Ending
- Epidermis
- Nerve
- Dermis
- Subcutaneous Tissue
- Capillaries
- Sweat Gland
- Muscle
- Arteriole
- Fat, Collagen, Fibroblasts

Texas Children’s Hospital®
Instruments

Needle Holder
Forceps

Adson

Adson with teeth

Bishop

Adson-Brown
Suture Scissors
Good Lighting!!
Suture Material

• Dependent upon
  – Age of patient
  – Tension
  – Location
  – Depth
  – Surgeon preference!
Suture Sizing

- Sizing refers to diameter of the suture and is denoted as zeros.
- The more zeros, the smaller the diameter.
  - For example, 4-0 has a larger diameter than 5-0 suture.
Suture Material

• Absorbable
  – More inflammation/scarring
  – Avoids removal for pediatric patients

• Examples:
  – Vicryl
  – Monocryl
  – PDS
  – Plain gut
  – Chromic gut
  – Fast-absorbing gut

• Non-absorbable
  – Less inflammation/scarring
  – Needs to be removed

• Examples:
  – Nylon/Ethilon
  – Prolene
  – Ethibond
  – Silk
  – Steel
Suture Material

• Braided
  – Increased strength
  – Flexible
  – Increased risk of infection

• Examples:
  – Vicryl
  – Silk
  – Dexon

• Monofilament
  – Less strength
  – Smooth/glides easier
  – Less risk of infection

• Examples:
  – Nylon
  – Prolene
  – PDS
  – Monocryl
Anesthesia

• Topical if indicated (Emla, LET)
• Sedation if needed, especially for children
• Local anesthesia (With or without epinephrine)
  – Xylocaine (lidocaine): 0.5%, 1%, 2%
    • Most commonly used
    • Max: 4.5mg/kg/dose
  – Marcaine (bupivicaine): 0.25%, 0.5%
    • Slower onset, but lasts longer
Cleansing Products

- Betadine
- Chlorhexidine

*Copious Irrigation*

- Dilute if using in wound
- Betadine ophthalmic if near eyes
Sterile Technique
During Procedure:

- Keep surgical site clean
  - Suction any drainage
  - Irrigate before closure
- Inspect for foreign bodies and damage to structures
- Practice safe dissection & inspection
  - Tendons, nerves, blood vessels
- Handle tissue gently
- Keep excision and repair as small as possible
- Minimize scar length and visibility
Suture Placement:

• Grasp needle at the distal portion ½ to ¾ distance from the tip. Vertically and longitudinally perpendicular to the driver.

• Lock the hemostat by tightening until the ratchet catches. Do not tighten excessively.

• Hold the driver with your thumb and 4\textsuperscript{th} finger in the loops and index finger on the fulcrum.
Suture Placement:

• Stabilize the tissue using forceps and use them to grasp the needle after it passes through the skin.

• The needle should penetrate at 90° angle to minimize the entry wound and evert the edges.

• Insert 1-3mm from the wound edge and exit the same distance on the other side, at a 90° angle if possible.
Surgical Principles

Knot Tying

Suturing Technique
Basic Knot Tying

• Instrument Tie
• 2-Hand Tie
• 1-Hand Tie
• Square Knot
Knot Tying:

• Square knot (avoid the granny knot!) using the driver
  – Wrap string clockwise 2 times around the driver then grab the short end and pull, crossing the hands
  – Wrap string counterclockwise 1 time and grab the string pulling with straight hands
  – *hint: make sure the knot lies flat as if you were tying your shoe, if it is not flat, rotate your hands so it does lie flat. Same goes for the second tie
Surgical Principles

Knot Tying

Suturing Technique
Suturing Technique

• Dependent upon
  – Location of wound
  – Tension
  – Thickness of wound
  – Cosmetic result

• Look before you leap
Suturing Types

• Simple interrupted
• Subcutaneous (Buried)
• Vertical mattress
• Horizontal mattress
  – Parallel lacerations
• Running
• Running locked
• Subcuticular
• Half-buried mattress/3-point
Simple Interrupted

- For surface closure
- Everts wound edges
- Spacing depends on location and type of laceration
- Better eversion if needle inserted at 90 degrees
Technique

Correct method

Unequal distance

Excessive tension

Skin inversion

Skin overlap

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Deep Dermal/Buried

- For gaping or deep wounds
- >5-10mm on face
- Absorbable suture
Vertical Mattress

- May be used in place of layered closure in some circumstances
- Better eversion of wound edges
Horizontal Mattress

- Used to evert wound edges
- Helpful in calloused areas (palms, soles) and skin creases
Horizontal Mattress

• May also be used with parallel lacerations
Running

• Rapid closure
• Hemostasis
• Not for wounds at high risk for infection
Running – Locked

- High tension areas when quick hemostasis is needed
Running Subcuticular

- Horizontal running suture through papillary dermis
- Better cosmetic result
- No crosshatching
- Use absorbable suture
- Used under minimal tension and dead space has been eliminated
- Does not provide wound strength but does provide good approximation
Alternative Closure

• Dermabond
  *hint: sticks to gloves and when you pull it off, it opens the wound!

• Staples – scalp wounds, laparotomy

• Steri-strips – can combine with other methods
After Procedure

• Age-appropriate dressing for wound
• Communicate wound care instructions with patient & family
  – Daily cleaning regimen
  – Antibiotic ointment
  – Bandaging
  – Bathing
• Make sure patient understands what to watch out for and how to reach you with problems early – before they become big problems
END OF BASIC LECTURE
References

• McGraw Hill
• Netter’s Anatomy, John Henson, PhD
Alternate slide template
This is a good background to use when the slide has pictures with white borders.
A Few Items

• Keep titles white and title cased
• Keep the TCH logo in the lower right
• For body text, try to keep the size between 16 and 28
• Only use white dots or dashes for bullets
• Keep animation to a minimum and only use if it enhances the message of the presentation
Colors That Project Reliably

Red doesn’t project well as text. Use white type over a red box.

Red doesn’t project well as text because it has less contrast against the background than white.

Use white type over a red box.

To call out something in plain type, use orange or marigold.
Useful Tools in the “Format Picture” Menu

Access this menu by selecting a picture

• Use the **Crop** tool to cut out parts of the image you do not want

• You can change a picture’s appearance with the **Corrections and Recolor** tools

• To make the file size smaller use the **Compress** feature
  – This tool converts pictures from high to low resolution. It cannot put resolution back, so if you want to email a file, keep a separate larger file
Here’s a sample bar graph. Right click on the bar graph to edit the data in Excel.
Here’s a sample pie graph. Right click on the graph to edit the data. Data shown in a pie graph can often be read faster when presented in a table.
Use this slide master for figures or large visuals. If you have an image/graph that overlaps the logo, you can hide it. Under the Format drop down menu, select background settings and check the box that says **Hide Background Objects**.