

# 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

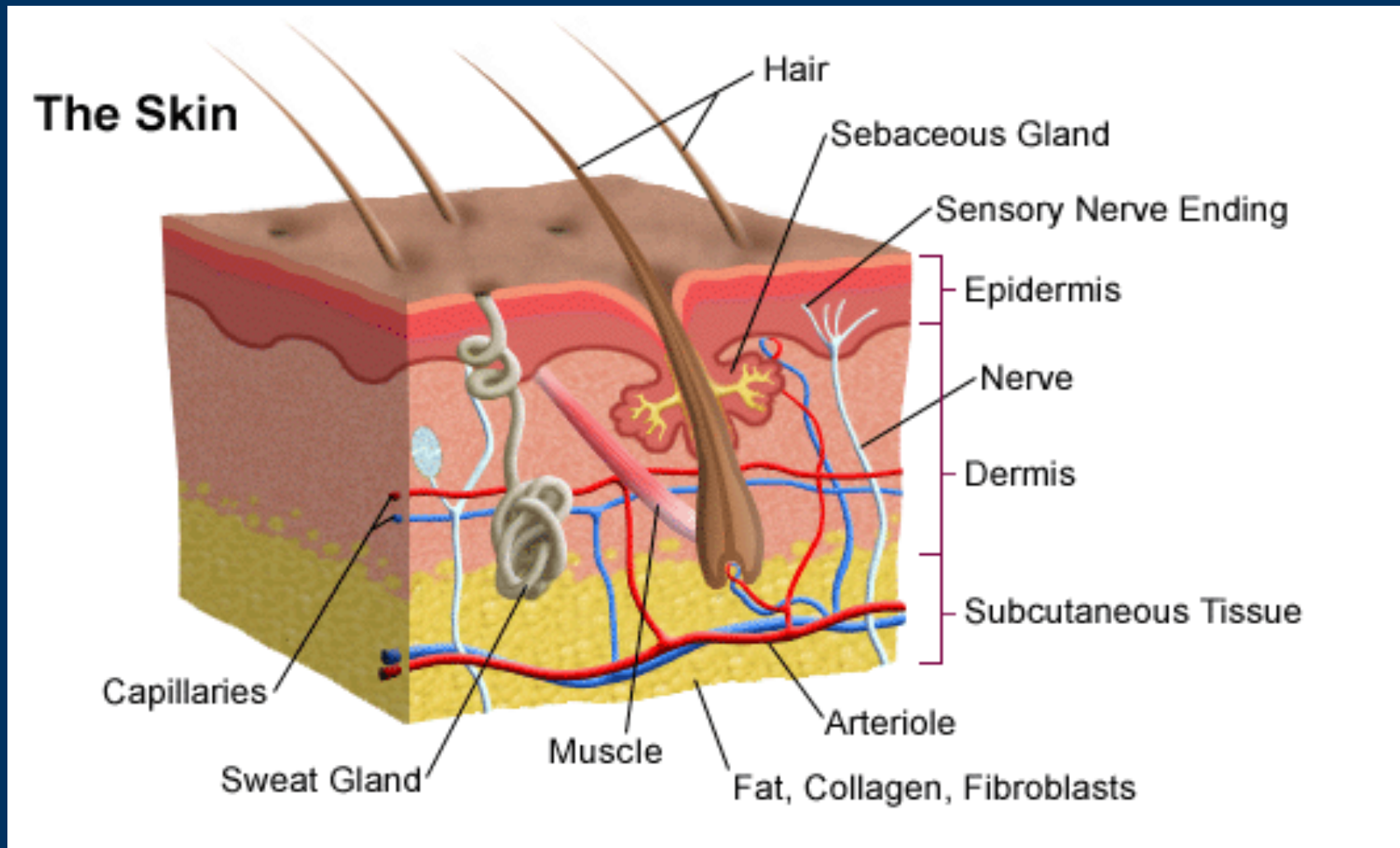
Knot Tying

Suturing Technique

# Before Procedure:

- Sterile technique
- Know your anatomy
- Be prepared!

# Skin Layers



# Instruments

Needle Holder



# Forceps



Adson

Adson with teeth



Bishop

Adson-Brown



# Suture Scissors



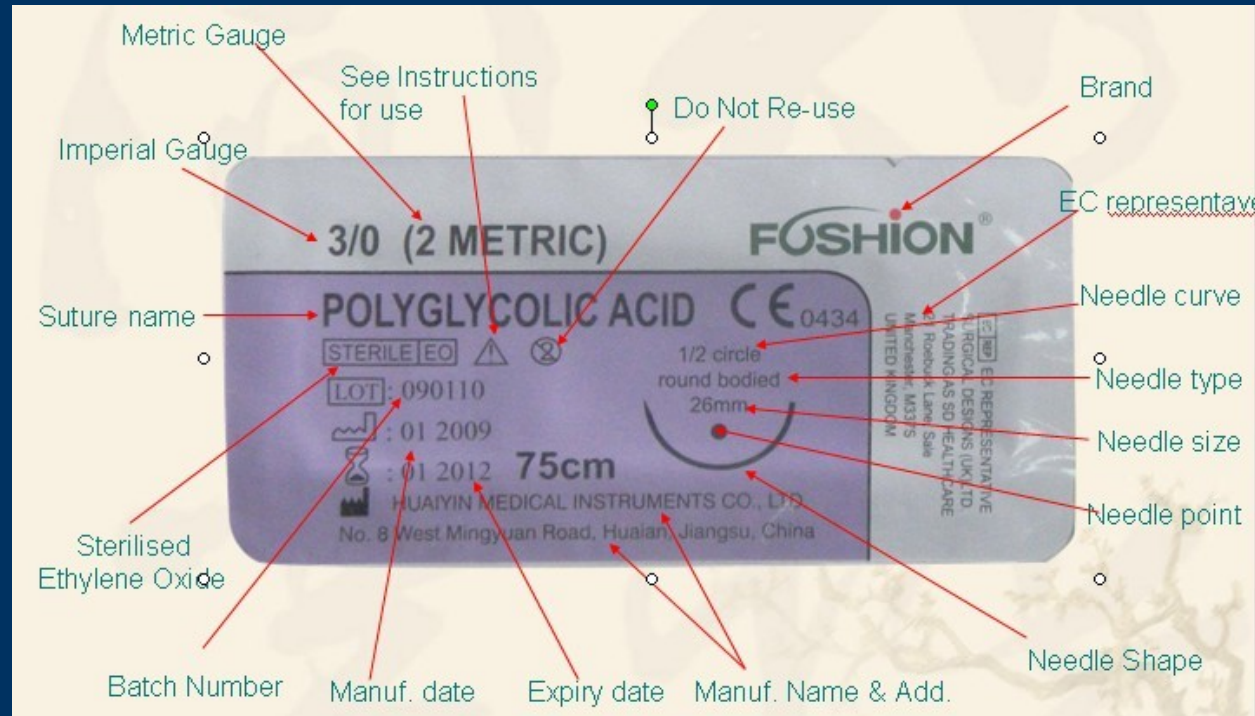


# Good Lighting!!



# 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 (bupivacaine): 0.25%, 0.5%
    - Slower onset, but lasts longer

# Cleansing Products

- Betadine
  - Chlorhexidine
- 
- Dilute if using in wound
  - Betadine ophthalmic if near eyes
- 
- \*Copious Irrigation\*



# 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  $\frac{1}{2}$  to  $\frac{3}{4}$  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<sup>th</sup> 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

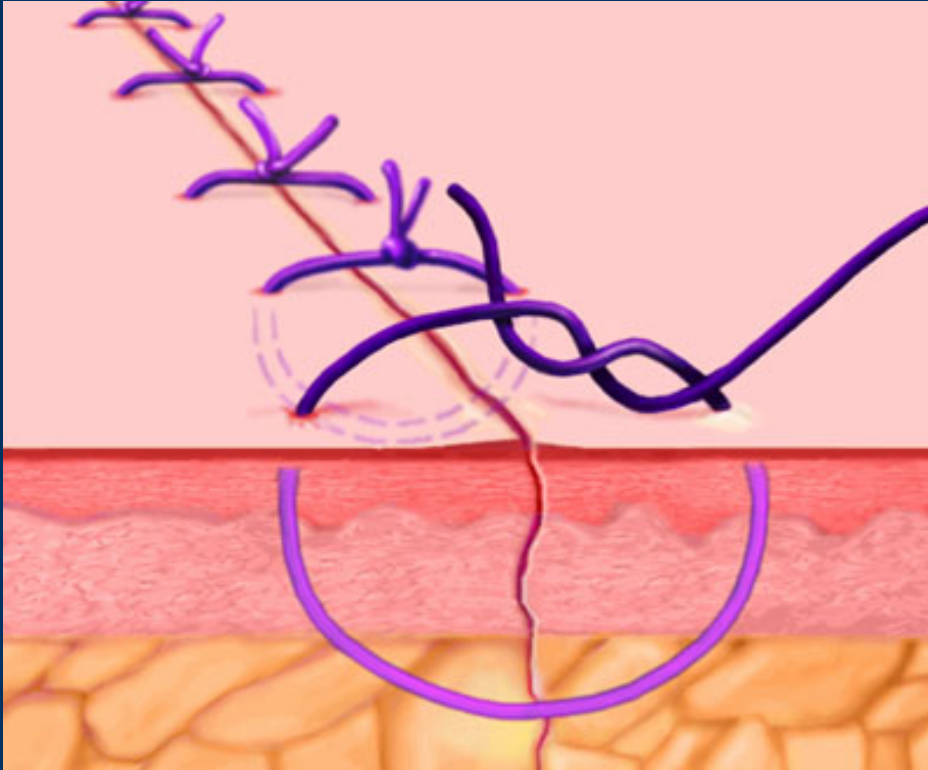
- Dependent upon
  - Location of wound
  - Tension
  - Thickness of wound
  - Cosmetic result
- Look before you leap



# Suturing Types

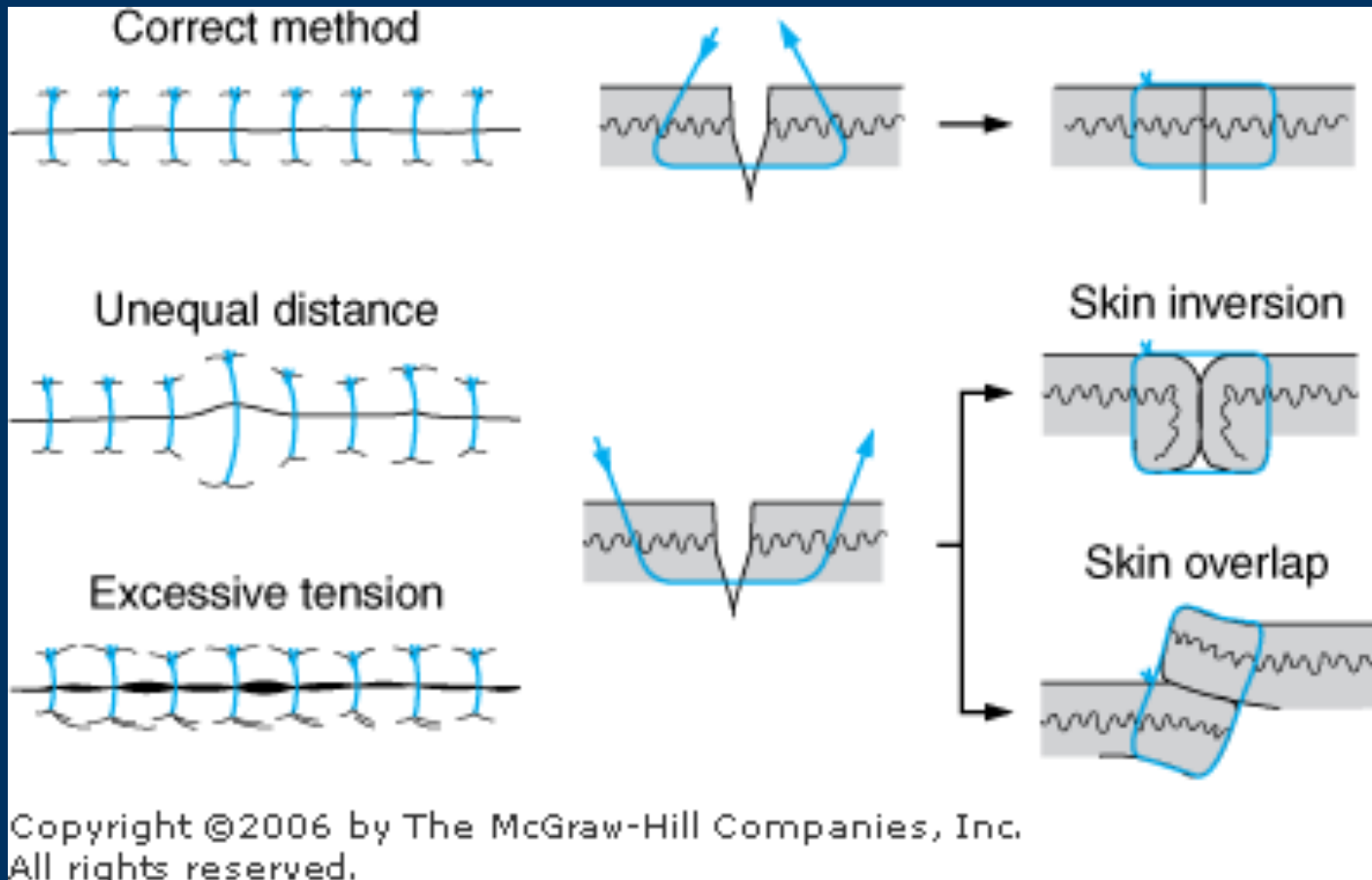
- Simple interrupted
- Subcutaneous (Buried)
- Vertical mattress
- Horizontal mattress
  - Parallel lacerations
- Running
- Running locked
- Subcuticular
- Half-buried mattress/3-point

# Simple Interrupted



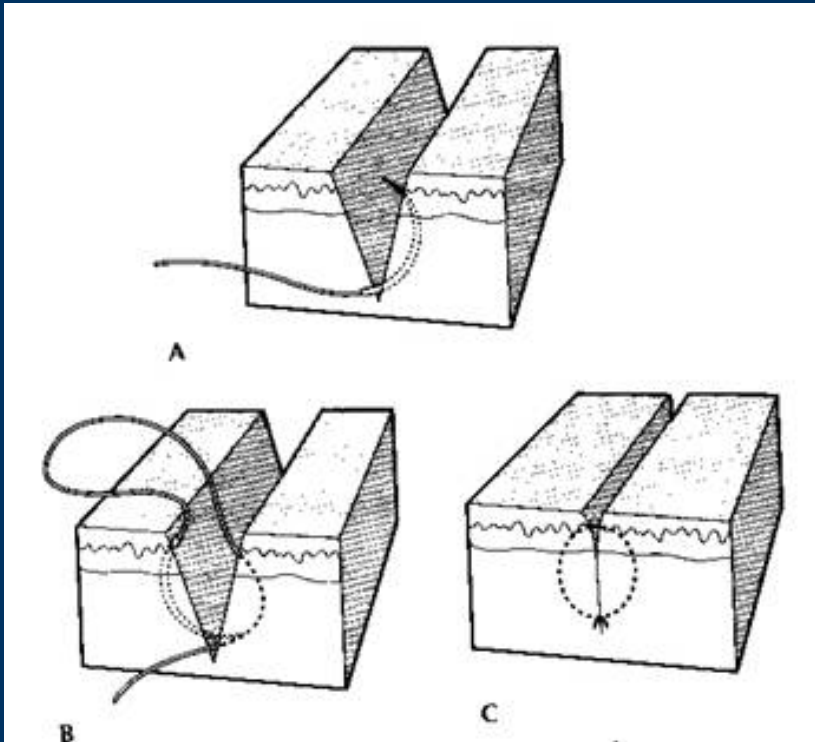
- For surface closure
- Everts wound edges
- Spacing depends on location and type of laceration
- Better eversion if needle inserted at 90 degrees

# Technique

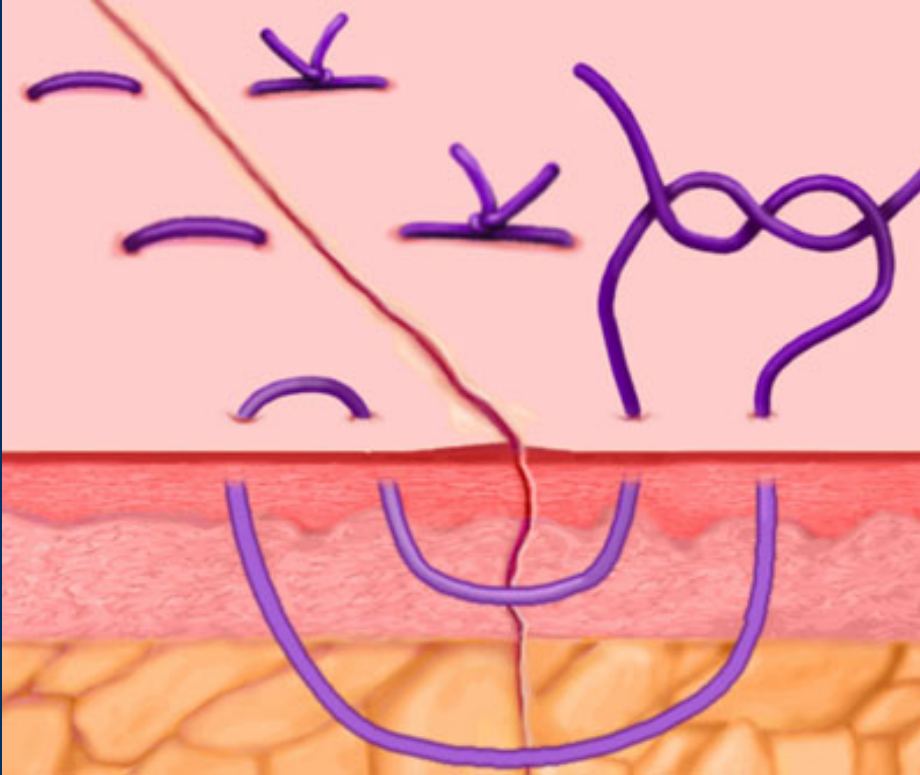


# Deep Dermal/Buried

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

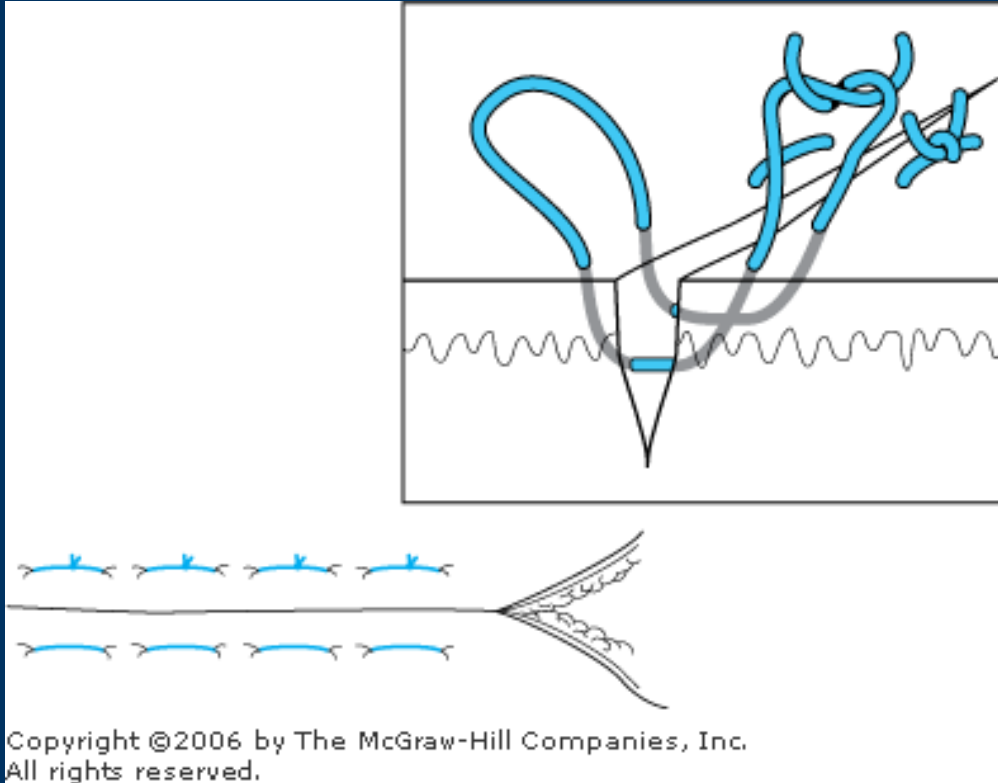


# Vertical Mattress



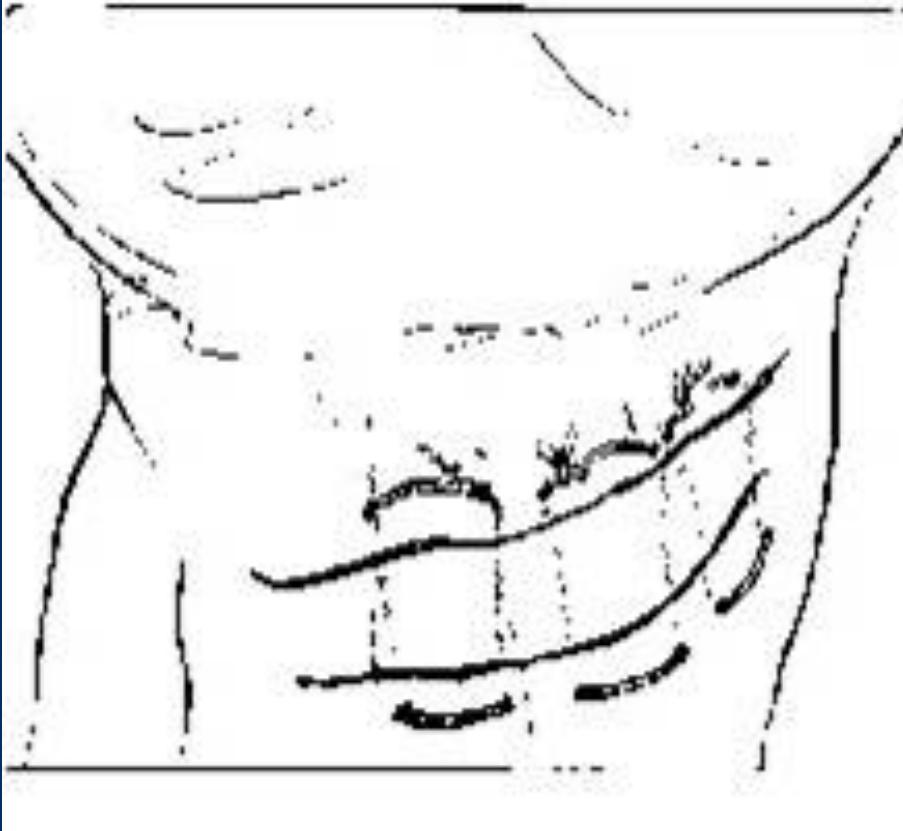
- May be used in place of layered closure in some circumstances
- Better eversion of wound edges

# Horizontal Mattress



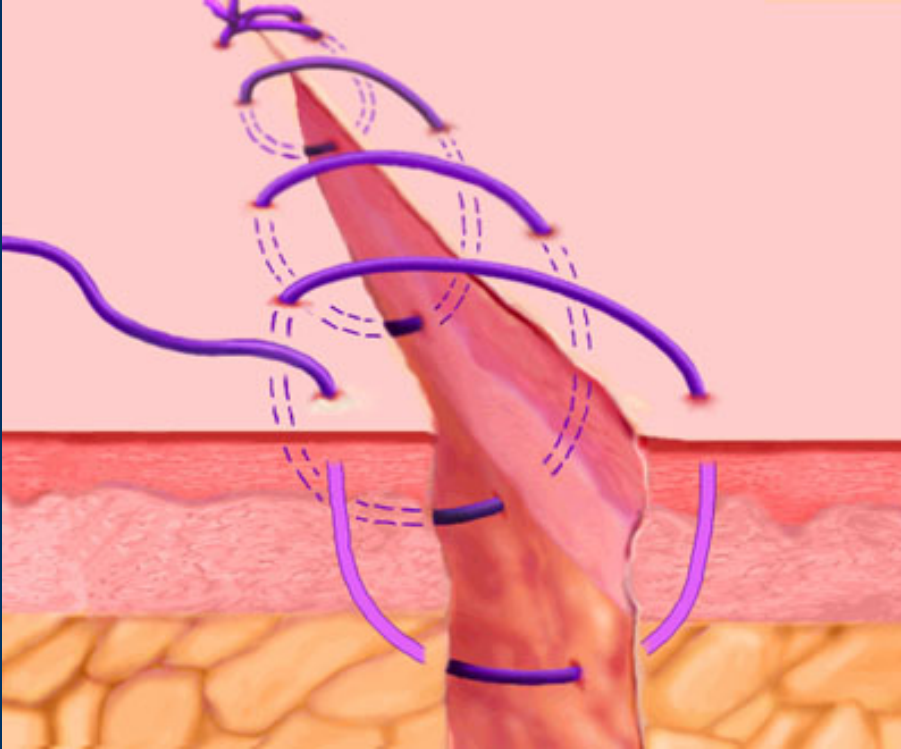
- Used to evert wound edges
- Helpful in calloused areas (palms, soles) and skin creases

# Horizontal Mattress



- May also be used with parallel lacerations

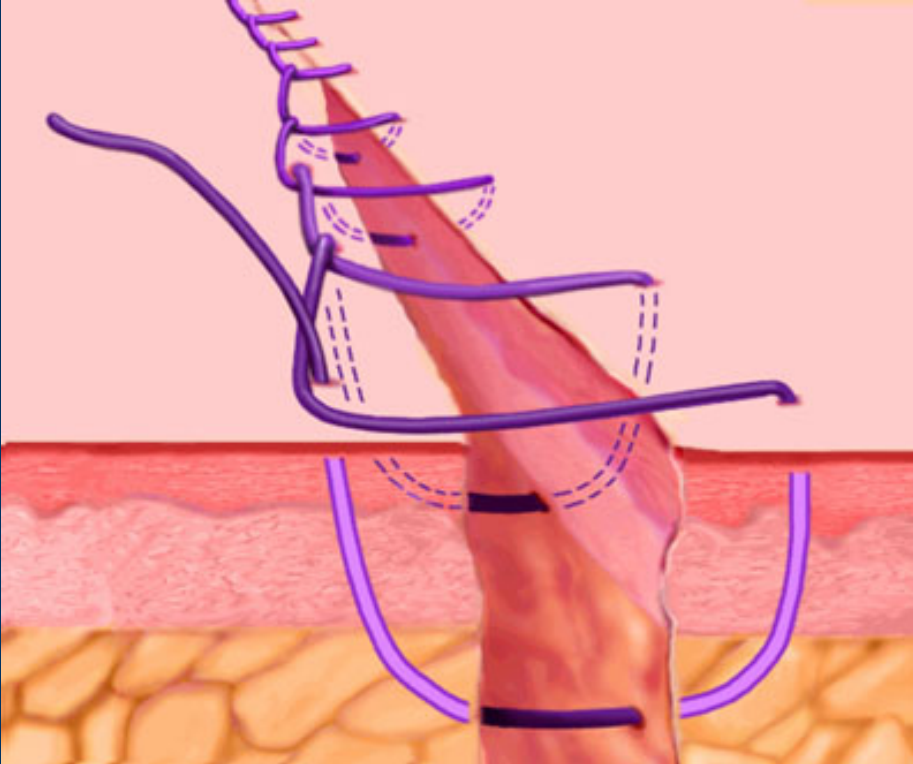
# Running



- Rapid closure
- Hemostasis
- Not for wounds at high risk for infection



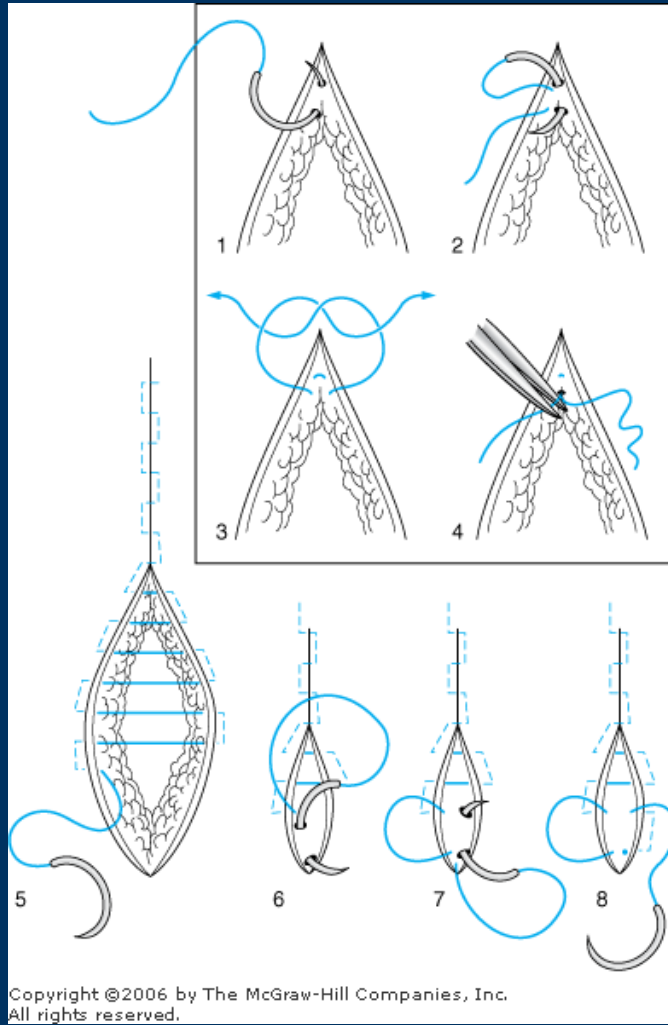
# Running – Locked



- 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

R=197  
G=11  
B=36

R=241  
G=90  
B=41

R=241  
G=181  
B=0

R=63  
G=128  
B=205

R=0  
G=37  
B=78

### Alternate slide template

This is a good background to use when the slide has pictures with white borders.

Red to match  
for print  
R=229  
G=27  
B=39

# 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

R=197  
G=11  
B=36

R=241  
G=90  
B=41

R=63  
G=128  
B=205

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

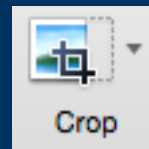
R=241  
G=90  
B=41

R=241  
G=181  
B=0

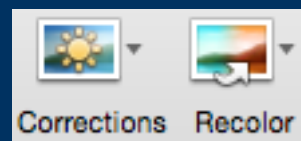
# Useful Tools in the “Format Picture” Menu

Access this menu by  
selecting a picture

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

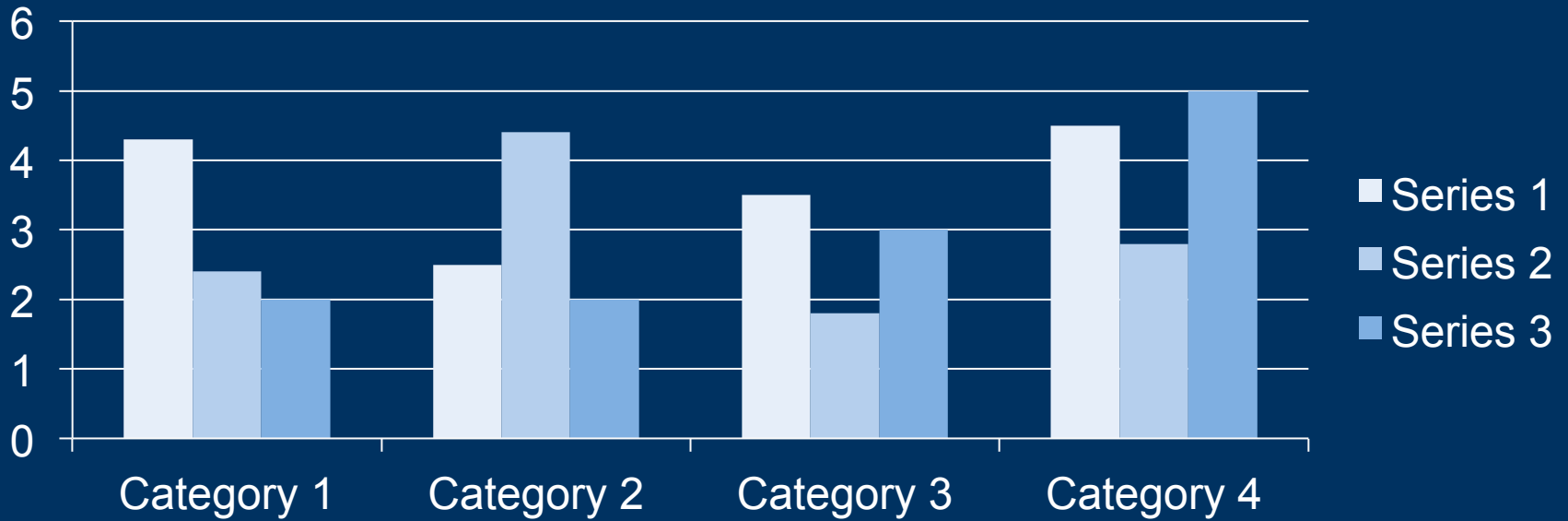


- You can change a picture's appearance with the **Corrections** and **Recolor** tools



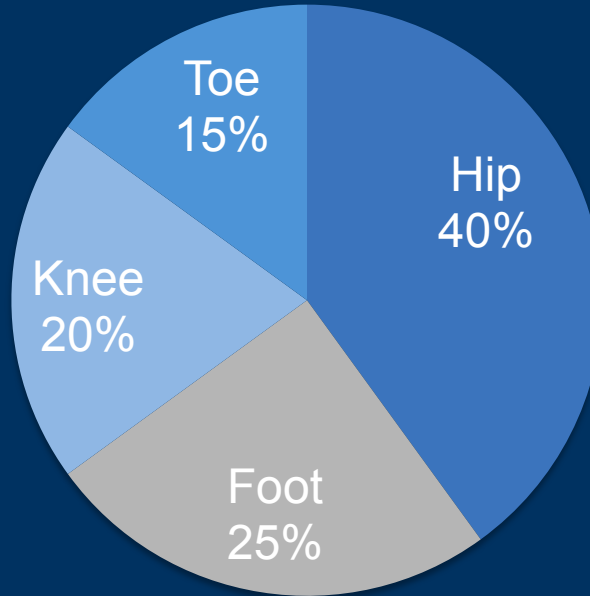
- To make the file size smaller use the **Compress** feature
  - This tool converts pictures from high to low resolution. It can not put resolution back, so if you want to email a file, keep a separate larger file





Here's a sample bar graph.  
Right click on the bar graph  
to edit the data in Excel.

## Surgeries



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**



Texas Children's  
Hospital®