BACK TO BASICS: SUTURES & NEEDLES

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OBJECTIVES

At the end of presentation, the staff is able to

1. Differentiate between absorbable and non-absorbable sutures
2. Describe uses of chromic gut sutures
3. State 2 examples of non-absorbable sutures
4. Describe different types of suture needle points
SIZES REVIEW

Smallest

10-0  Typically used in the most delicate surgeries. Common in both Ophthalmic (eye) surgery and for repairing small damaged nerves often due to lacerations in the hand.
9-0  Used for repairing small vessels and arteries or for delicate facial plastic surgery.
8-0  Common for use in vascular graft sewing such as a carotid endarterectomy.
7-0  Used for larger vessel repair such as an Abdominal Aortic Aneurysm or skin closure.
6-0  Skin closure when there is a lot of tension on the tissue, closure of muscle layers or repair of bowel in general surgery.
5-0  For closing of the fascia layer in abdominal surgery, the joint capsule in knee and hip surgery or deep layers in back surgery.
4-0  For repair of tendons or other high tension structures in large orthopedic surgeries.
3-0  2-0
2-0  1-0
0-0  1-0

For closing of the fascia layer in abdominal surgery, the joint capsule in knee and hip surgery or deep layers in back surgery.

Largest
ABSORBABLE SUTURES
SURGICAL GUTS

- Collagen derived from sheep intestinal submucosa or beef intestine serosa
- Size: Ranges from 3 to 7-0
- Packed in alcohol & water to keep it pliable
- Must be rinsed; loses pliability if soaked

F.Y.I.
Collagen is the major insoluble fibrous proteins in the extracellular matrix and in connective tissue.
EXAMPLES

Plain Gut

- Used to ligate small vessels and suture subcutaneous fat
- Loses tensile strength in 5-7 days
- Digested within 70 days
- Not treated to resist absorption
- Sizes: 3 to 6-0

F.Y.I.

Fast absorbing surgical gut sutures differ from U.S.P. minimum strength requirements by less than thirty percent. Fast absorbing surgical gut sutures are intended for dermal suturing only.
EXAMPLES

Chromic Gut
- For ligation of larger vessels
- Support wound in 14-21 days
- Completely absorbed in 90 days
- Sizes: 3 to 7-0

F.Y.I.
Chromic guts are treated with chromic acids to delay absorption
SYNTHETIC ABSORBABLE POLYMERS

- Polymers are either dyed or undyed; monofilament or multifilament; or coated or uncoated.
- Absorbed by a slow hydrolysis process in presence of tissue fluids.
- Used for ligating or suturing.
EXAMPLES

- **Polydioxanone Sutures (PDS)**
  - Used in tissue in which slow healing is anticipated (fascia)
  - May be used in presence of infection
  - Does not harbor bacterial growth
  - Absorption: 90days-6mos
  - Tensile strength: 50% retained after 4 weeks
  - Sizes: Violet PDS – 2 to 9-0
    - Blue PDS (Ophthalmic) 7-0 to 10-0
    - Clear 1 to 7-0
  
  **F.Y.I.**
  Tensile strength refers to the point where sutures break and Fascia is a tough connective tissue that surrounds the muscles!
EXAMPLES

- Polyglactin 910 (Vicryl Sutures)
  - This suture maintains tensile strength longer than surgical gut but shorter than polydioxanone.
  - May be coated or uncoated
  - Absorption: 40 days (minimally) - 90 days (rapidly)
  - Sizes: Uncoated – 9-0 to 10-0 for ophthalmic procedures
    Coated – 2 to 9-0 (dyed violet)
    1 to 8-0 (undyed)

F.Y.I.

"Coated" means the suture is coated with a material that prevents it from flaking and facilitates smooth passage through the tissue and it does not affect absorption!
NON-ABSORBABLE SUTURES
SURGICAL SILK

- Animal product made from fiber spun from silkworm larvae
- Fibers are braided or twisted to form multifilament
- Surgeons prefer braided for ↑ tensile strength
- Commonly dyed black and most commonly used non-absorbable suture
- Use dry because ↓ tensile strength when wet
- Absorption: takes 2 years to disappear
- Size: 5 to 9-0
EXAMPLES

- Virgin Silk
  - Consists of seven natural silk filaments drawn together and twisted to form 8-0 to 9-0 sutures

- Dermal Silk
  - Strands of twisted silk fibers encased in non-absorbing coating
  - Used for suturing skin
SYNTHETIC NON-ABSORBABLE POLYMERS

- Used primarily because of ↑ tensile strength and less tissue reaction
- More difficult to tie knots than silk
Example:

- **Surgical nylon**
  - Polymer which produces minimal tissue reaction
  - High tensile strength but degrades 15%-20% per year
    - Monofilament – Smooth, single strand e.g. Dermalon
    - Coated multifilament
    - Uncoated multifilament

F.Y.I: Tissue reaction to sutures encourages infection and slow healing
EXAMPLE

- Polyester Fiber – braided into multifilament suture strand
  - Uncoated
    - Provides a flexible, pliable strand that is easier to handle
    - Has tendency to drag or has tearing effect on tissues.
    - Size: 2-0 to 11-0
  - Coated polyester
    - Has lubricated surface for smooth passage
    - Retains strength indefinitely
    - Widely used in cardiovascular procedures
EXAMPLES

- Polypropylene (Prolene Suture, Surgilene Suture)
  - Extruded into a monofilament strand
  - May be left in place for prolonged healing
  - Can be used in presence of infection
  - Material of choice for plastic surgery and cardiovascular procedures
  - Used for continuous abdominal fascia closure, retention sutures, etc
  - Size; Blue 2 to 10-0
    Clear 4-0 to 6-0
HANDLING OF SUTURES
HANDLING OF ABSORBABLE SUTURES

SURGICAL GUTS

- Sealed in fluid filled packets to keep materials pliable
- Carefully open packet to avoid splashing into eyes
- Rinsing necessary for ophthalmic suturing
- Should be used immediately after removal from packets
- Do not soak. Dip into water to soften it slightly
- Handle as little as possible. Do not jerk or stretch surgical gut.
- Do not run fingers down suture

SYNTHETIC ABSORBABLE POLYMERS

- Packaged and used dry
- Do not soak or dip in fluid
- Moisture reduces tensile strength

F.Y.I.
Stretching causes the suture to weaken. Running fingers down the suture causes fraying because of glove friction. Tug end gently to straighten.
HANDLING OF SYNTHETIC NON-ABSORBABLE POLYMERS

- Handle suture as little as possible
- Avoid pulling or stretching
- Should be handled without using instruments except when grasping ends
- Requires special knot-tying technique. Monofilament generally easier to tie
SURGICAL NEEDLES
SURGICAL NEEDLES COMPONENTS/PARTS

- Point
- Swaged end
- Body (shaft)
# POINT OF NEEDLE

<table>
<thead>
<tr>
<th>Taper Point Needle</th>
<th>Side Cutting Spatula Needles</th>
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<tbody>
<tr>
<td>TaperCut Point Needle</td>
<td>Soft Cutting Point - Coronar Needle</td>
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<tr>
<td>Reverse Cutting Needle</td>
<td>Conventional Cutting Needle</td>
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<tr>
<td>Blunt Needle</td>
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POINT OF NEEDLE

Reverse Cutting Needle

Conventional Cutting Needle
BODY OF NEEDLE

- May be curved, straight, or J-shaped
- Curvature of needle
PLACEMENT OF NEEDLE IN THE NEEDLEHOLDER

- Use appropriate side needleholder
- Never clamp needleholder over the swaged area
- Place needle securely in tip
- Clamp body of needle ¼ to ½ from swaged area to point
- When passing hold free end of suture to prevent from fraying

F.Y.I.
Swaged area is the weakest area because this is where sutures attach. It is hollow and may break needle.
ABSORBABLE OR NON-ABSORBABLE?

Non-absorbable
ABSORBABLE OR NON-ABSORBABLE?

Absorbable
SYNTHETIC OR NON-SYNTHETIC

Non-synthetic
SYNTHETIC OR NON-SYNTHETIC

Synthetic
SYNTHETIC OR NON-SYNTHETIC

Synthetic
CONVENTIONAL CUTTING

[Image of medical sutures]
REVERSE CUTTING
CONVENTIONAL CUTTING

Conventional Cutting
TAPER
BLUNT

Taper