MODULE 3

SUTURES AND SUTURING TECHNIQUES

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I. OBJECTIVES

By the end of this laboratory session participants should be able to:

1) Describe the various forms of suture construction, their advantages and disadvantages, and their appropriate use.
2) Describe the different types of suture material and their unique properties.
3) Describe the various suture needles and the conditions for their use.
4) Describe various suturing techniques and indications for their use.
5) Describe proper preparation of the surgical field for suturing.
6) Demonstrate proper needle loading onto needle driver.
7) Demonstrate a simple interrupted stitch.
8) Demonstrate a simple running stitch
9) Demonstrate a running subcuticular stitch.
10) Demonstrate vertical and horizontal mattress stitches.

II. ASSUMPTIONS

The participant will have completed the module on knot-tying, and understand proper use of forceps.

III. SUGGESTED READINGS


IV. DESCRIPTION OF LABORATORY MODULE

In this laboratory, participants will first hear an overview of basic suturing principles and view an expert video of suturing techniques. Residents will then rotate through four stations where they will perform a simple interrupted suture, a running subcuticular suture, a vertical mattress suture, and a horizontal mattress suture.
V. DESCRIPTION OF TECHNIQUES AND PROCEDURE

A. Technique for loading of needle onto needle driver.
   a. Grasp curved needle 2/3 of the way from sharp end, using tips of driver.
   b. Hold needle at slight angle to axis of needle driver.

B. Technique for simple interrupted stitch.
   a. Using toothed tissue forceps for traction, insert needle into skin edge, starting with needle perpendicular to skin surface, and coming out in the wound.
   b. Insert needle on opposite wound edge, an equivalent depth to the initial placement. The needle should traverse downward through the epidermis, and dermis, and take a small bit of the subcutaneous tissue.
   c. On opposite wound edge, the needle should follow a reverse path, exiting the skin equidistant to the opposite side.
   d. Hand or instrument tie so that the skin edges are approximated without undue tension.
   e. Sutures should be placed 0.5 to 1.0 cm apart.

C. Technique for running simple stitch.
   a. Place simple stitch at one end of wound, cutting tail end.
   b. Using toothed forceps for tissue traction, run suture with simple stitch in a continuous fashion from one wound edge to the other.
   c. Each bite should be equidistant from the skin edge and evenly placed.
   d. At end of stitch, leave a loop for tying to finish the stitch.

D. Technique for running locked stitch.
   a. Begin as in simple running stitch.
   b. As needle tip exits the skin, place needle through previous loop to lock it. Proceed in this manner for each throw.

E. Technique for running subcuticular stitch.
   a. Start by anchoring suture to dermis with a simple stitch.
   b. Insert needle horizontally into dermis without traversing epidermis, starting with needle perpendicular to dermis and following its curve, and purchasing small bit of dermis.
   c. Place a similar bite on the opposite edge, backstepping approximately 1/4 the distance of the last bite.
   d. Alternate from side to side, ensuring congruent tissue approximation.
   e. Apply finishing knot.
F. Technique for vertical mattress stitch.
   a. Using the “far-far, near-near” system, the needle is passed 4–8 mm from the skin edge deep into the subdermis, traverses the wound and exits the skin equidistant on the opposite wound edge.
   b. The needle is passed back with a shallow dermal bite 1–2 mm from the wound edge, taking a similar bite on the opposite side (“near-near”).
   c. The two ends of the suture are then tied on the side of the wound where the suturing began, without excessive tension.

G. Technique for horizontal mattress suture.
   a. Initiate by inserting suture needle 4–8 mm from wound edge, and take a bite of the opposite wound edge, exiting 4–8 mm away from edge.
   b. Advance along wound 4–8 mm and reinsert needle into skin for an identical but opposite bite of each wound edge.
   c. Tie the suture on the side of the wound where the suturing began.

VI. COMMON ERRORS

- A common error that can occur in any of the suture techniques described is too little or too much tension on the wound closure. Too little tension results in poor cosmesis and increased risk of infection. Too much tension can result in skin necrosis.

- A common error in the running suture is rippling of the wound closure. This is often due to failure to re-enter the skin directly across from the needle exit site. It is important that advancement along the wound occur with the suture bite itself rather than during crossing to the other side of the wound.

- Another error common to most suturing techniques is failure to provide eversion of skin edges. Eversion creates the best subsequent cosmesis as the wound heals. This error usually occurs in the simple interrupted suture by directing the needle tip toward the wound as opposed to slightly away from the wound as the needle enters the skin and subcutaneous tissue.

VII. EXPERT PERFORMANCE

See Video
VIII. RECOMMENDATIONS FOR PRACTICE

As suturing skills are so fundamental to all of surgical practice, it will be important to continue to practice these suturing techniques beyond the surgical skills laboratory session. Most surgical skills laboratories will make available synthetic skin or pigs feet for independent practice to improve both technique and speed of suturing.

IX. SUPPLIES AND STATION SET-UP

This laboratory can be conducted using either synthetic skin or pigs feet. Whichever is used, it would be important to have at least one segment of synthetic skin or one pig foot for each resident in the laboratory session.

Station 1: Simple Interrupted and Running Stitch
- 4-0 Vicryl on cutting needle
- Synthetic skin or pig’s foot
- Needle driver
- Adson forceps
- Suture scissors

Station 2: Running Subcuticular Stitch
- As in station 1

Station 3: Vertical Mattress Stitch
- 2-0 Silk on cutting needle
- Synthetic skin or pig’s foot
- Needle driver
- Adson forceps
- Suture scissors

Station 4: Horizontal Mattress Stitch
- As in station 3

X. SUGGESTED TIME LENGTH

90 minutes