SUTURING MATERIALS AND TECHNIQUES

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I. INTRODUCTION

Suturing is a fundamental skill used in surgery to close wounds or incisions. It is a technique employed by healthcare professionals, such as doctors and surgeons in order to promote wound healing and reduce the risk of infection. Suturing is commonly performed in various medical settings, including emergency rooms, operating rooms, and outpatient clinics.

The primary goal of suturing is to bring the edges of a wound together, allowing the body's natural healing processes to take place efficiently.
By closing the wound, sutures help to

- **Minimize bleeding:** Sutures help control bleeding from the wound site, reducing the risk of excessive blood loss.
- **Prevent infection:** Closing the wound helps to protect it from external contaminants, lowering the risk of infection.
- **Promote healing:** Suturing assists in aligning the tissues, which enables quicker and more organized healing.

The Process of Suturing Involves Several Steps

1. **Assessment:** Before suturing, the healthcare provider examines the wound to determine its size, depth, and location. They also assess the patient's medical history and potential allergies to suture materials.
2. **Anesthesia:** Depending on the nature of the wound and its location, local anesthesia may be administered to numb the area and minimize pain during the procedure.
3. **Cleaning and Preparation:** The wound area is cleaned and sterilized to reduce the risk of infection. Any foreign debris or non-viable tissue is removed.
4. **Selection of Suture Material:** There are various types of suture materials available, including absorbable and non-absorbable sutures. The choice of suture depends on the location of the wound, the type of tissue being sutured, and the expected duration of wound healing.
5. **Suturing Technique**: The needle is attached to the suture material to pass through the skin and underlying tissues. Different suturing techniques may be used depending on the wound's characteristics, such as simple interrupted, continuous, or mattress sutures.

II. PRINCIPLES OF SUTURING TECHNIQUE

1. The needle should be grasped approximately 1/3rd the distance from the eye and 2/3rd from the point
2. The needle should enter perpendicular to the tissue surface
3. The needle should be passed through the tissues along its curve
4. The suture should be passed at an equal depth and distance from the incision on both sides
5. The needle always passes from the movable tissue to fixed tissue
6. The needle always passes through the thinner tissue to the thicker tissue
7. The needle always passes from the deeper tissue to the superficial tissue
8. The tissues must never be closed under tension
9. The sutures should be tied only to approximate the tissue not to blanch
10. The knot should never lie on the incision line
11. Sutures on the skin are removed in 5days and intraoral sutures in 7 days.

III. DIFFERENT SUTURING TECHNIQUES

1. **Simple Interrupted Suture:** This is one of the most basic suturing techniques. It involves individually placing stitches through the wound edges, tying each stitch separately. It provides good wound edge alignment and is suitable for most wound types It is time-consuming for long wounds but offers excellent control and security.

2. **Continuous Suture (Running Suture):** In this technique, the suture thread is run continuously along the wound edge, with each stitch catching a small amount of tissue on either side. Continuous sutures are faster to place than interrupted sutures and can be used for long incisions or wound edges with minimal tension. If the suture is accidentally broken, the entire wound can unravel, which is a drawback.

3. **Vertical Mattress Suture:** The vertical mattress suture is designed to evert the wound edges, making it ideal for skin closure, especially on the face or areas where cosmetic outcomes are essential. It involves two sets of bites: the first set is deep and far from the wound edge, and the second set is shallow and close to the wound edge. The resulting "mattress" appearance provides excellent wound edge eversion and strength.

4. **Horizontal Mattress Suture:** Similar to the vertical mattress, this technique also everts the wound edges but is more suitable for long wounds with significant tension. It involves two sets of bites, both relatively deep, on either side of the wound, creating a "criss-cross" pattern. The horizontal mattress suture distributes tension along the wound, reducing the risk of wound dehiscence (reopening).

5. **Figure-of-Eight Suture:** This technique is useful for wounds on uneven surfaces or where there is a risk of wound edge inversion. It involves placing a suture in a figure-of-eight pattern around the wound, gently cinching the wound edges together.

6. **Subcuticular Suture (Intradermal Suture):** Subcuticular suture is placed just below the surface of the skin, entirely within the dermal layer, making it suitable for cosmetic closure. It is often used to close wounds after the surface skin has been approximated with

other suturing techniques. This technique reduces the risk of suture marks on the skin and minimizes the need for suture removal.

IV. CLASSIFICATION OF SUTURE MATERIAL

1. **Absorbable vs. Non-absorbable:** Absorbable sutures are designed to break down and be absorbed by the body over time. They do not require removal because the body's natural processes gradually degrade them. These sutures are commonly used for internal tissues or wounds that heal relatively quickly. Examples include:
   Polyglycolic acid (PGA)
   Polyglactin 910 (e.g., Vicryl)
   Poliglecaprone 25 (e.g., Monocryl)
   Polydioxanone (PDS)

   Non-absorbable sutures on the other hand are not broken down by the body and need to be manually removed once the wound has healed. These sutures are suitable for external tissues or wounds that take longer to heal. Examples include:
   Nylon (e.g., Ethilon)
   Polypropylene (e.g., Prolene)
   Silk
   Stainless steel (used in special cases like cardiovascular surgery)

2. **Natural vs. Synthetic:** Natural sutures are made from materials derived from biological sources. These materials have been used for centuries.
   Examples include:
   Silk: Derived from the silkworm cocoon.
   Catgut: Made from sheep or cow intestines.

   Synthetic sutures are manufactured from man-made materials, providing more consistent properties and predictable degradation rates.
   Examples include the
   Absorbable sutures mentioned earlier (e.g., PGA, Vicryl) and non-absorbable materials like Nylon and Polypropylene.

3. **Monofilament vs. Multifilament:** Monofilament sutures consist of a single strand, which makes them less prone to harboring bacteria. They are easier to pass through tissues but can be more challenging to tie securely due to their slipperiness.

   Multifilament sutures are made up of several smaller strands braided or twisted together, providing better flexibility and handling characteristics. However, they can potentially trap bacteria within the suture.

4. **Coated vs. Uncoated:** Coated sutures have a surface coating that reduces friction, making them easier to handle and pass through tissues. This coating can also improve knot security. Uncoated sutures lack any additional surface treatment.

   The choice of suture material depends on factors such as the type of tissue being sutured, the expected healing time, the surgeon's preference, and patient-specific considerations.

Different surgeries may require different types of sutures to achieve optimal wound closure and healing.

Surgeons often consider factors such as tissue reaction, tensile strength, knot security, and the likelihood of scarring when selecting the appropriate suture material.

V. COMPLICATIONS OF SUTURING

Wound dehiscence (wound reopening).
Infection.
Poor cosmetic outcomes.

In some cases, especially with more complex wounds or those located in delicate areas, healthcare professionals may use techniques beyond suturing, such as staples, tissue adhesives, or advanced closure methods.

VI. CONCLUSION

Suturing is a crucial medical procedure that plays a significant role in wound management and patient care allowing the body to heal effectively and restoring the injured tissue's integrity.

