I. Background

- Appropriate wound closure is important to avoid problems:
  - Infection
  - Wound coming apart (dehiscence)
- Important to select the proper sterile suture materials:
  - Suture material
  - Suture needles
  - Suture pattern

II. Tying Secure Square Knots

- Definition of Square Knot
  - Symmetrical knot.
  - Does not slip after tying.
  - Made by passing one end of suture over and around another first in one direction, then in the opposite direction.
- Illustrations of Square Knots
III. Recognition of Non secure Knots
   • Definition of Non secure Knots
     o Knots that will fail or will not hold tissue together.
     o Asymmetrical knots.
       ▪ Granny Knots
       ▪ Slip Knots / Half Hitch Knots
   • Illustrations of Non secure knots

IV. Types of Suture Material
   • Absorbable
     o Used to tie off vessels and close tissue other than skin.
     o Examples: Vicryl; Dexon; PDS; Maxon
   • Nonabsorbable
     o Used to close skin.
     o Examples: Prolene; Nylon, Silk

V. Other Types of Wound Closure Material
   • Surgical Glue (vetbond; nexaband)
   • Wound Clips / Surgical Staples
     o Illustration

VI. Suture Patterns
• Simple Interrupted
  o Definition
    ▪ Each suture is placed with a separate piece of material.
  o Advantages
    ▪ Allows adjustment of tension throughout the suture line.
    ▪ Failure of one knot will often not affect the incision suture line.
    ▪ More secure.
  o Disadvantages
    ▪ More time is needed to tie individual knots.
    ▪ More suture is often used.
    ▪ More foreign material is placed in the incision site.
  o Illustration

• Simple Continuous
  o Definition
    ▪ Suture is placed with a continuous, uninterrupted length of material.
  o Advantages
    ▪ Often a quicker pattern to place.
    ▪ Less foreign material is placed in the incision site.
  o Disadvantages
    ▪ Failure of a knot may lead to disruption of entire suture line.
    ▪ Less precise control of wound approximation and tension.
  o Illustration
VII. Suture Practice: Instrument Knot Tying
- Practice often until skill and comfort level well established
  - View videos and obtain individual coaching if needed
  - Use suture practice boards and inanimate objects
  - Use deceased rodent carcasses (with hair shaved)
- Illustrations

VIII. Suture Techniques for Good Wound Edge Closure
- **Equal Bites**: The “bite taken (with the needle) on one side of the incision line must be equal to the “bite” taken on the second side.
- **Equal Depths**: The depth that the needle passes through the tissue should be equal on both sides.
- **Perpendicular**: The needle should pass through the tissue perpendicular to the incision to help restore the anatomy correctly.
- **Square Knots**: Always use square knots to provide the best holding security.
• Illustration of good technique

IX. Suture Complications
• Suture line can become undone (= dehiscence).
• Suture line can become infected.
  o Use good aseptic technique to prevent.
  o Place, so not irritating animal (for example, not poking a body part or a fold of skin).
• Suture line can be placed too tight.
  o Wound margins will become moderately swollen.
  o Tight sutures strangulate tissue and are painful.
  o Animals chew and remove sutures if they are irritating.

X. Suture Removal
• Must remove suture or wound clips by 10-14 days after surgery.
• Time for suture removal can vary (for example, up to 14 days), depending on the surgical site and tissue healing.
• Suture removal steps
  o Clean incision site area with antiseptic, such as hydrogen peroxide to remove dried serum encrusted around the sutures.
  o Pick up one end of suture with thumb forceps or thumb and index finger, and cut as close to the skin as possible where the suture enters the skin.
  o Gently pull the suture strand out through the side opposite the knot with the forceps. To prevent infection risk, remove the suture without pulling any portion that has been outside the skin back through the skin.
• If incision closure materials are not removed, they become embedded in the skin and will cause irritation and possible infection.