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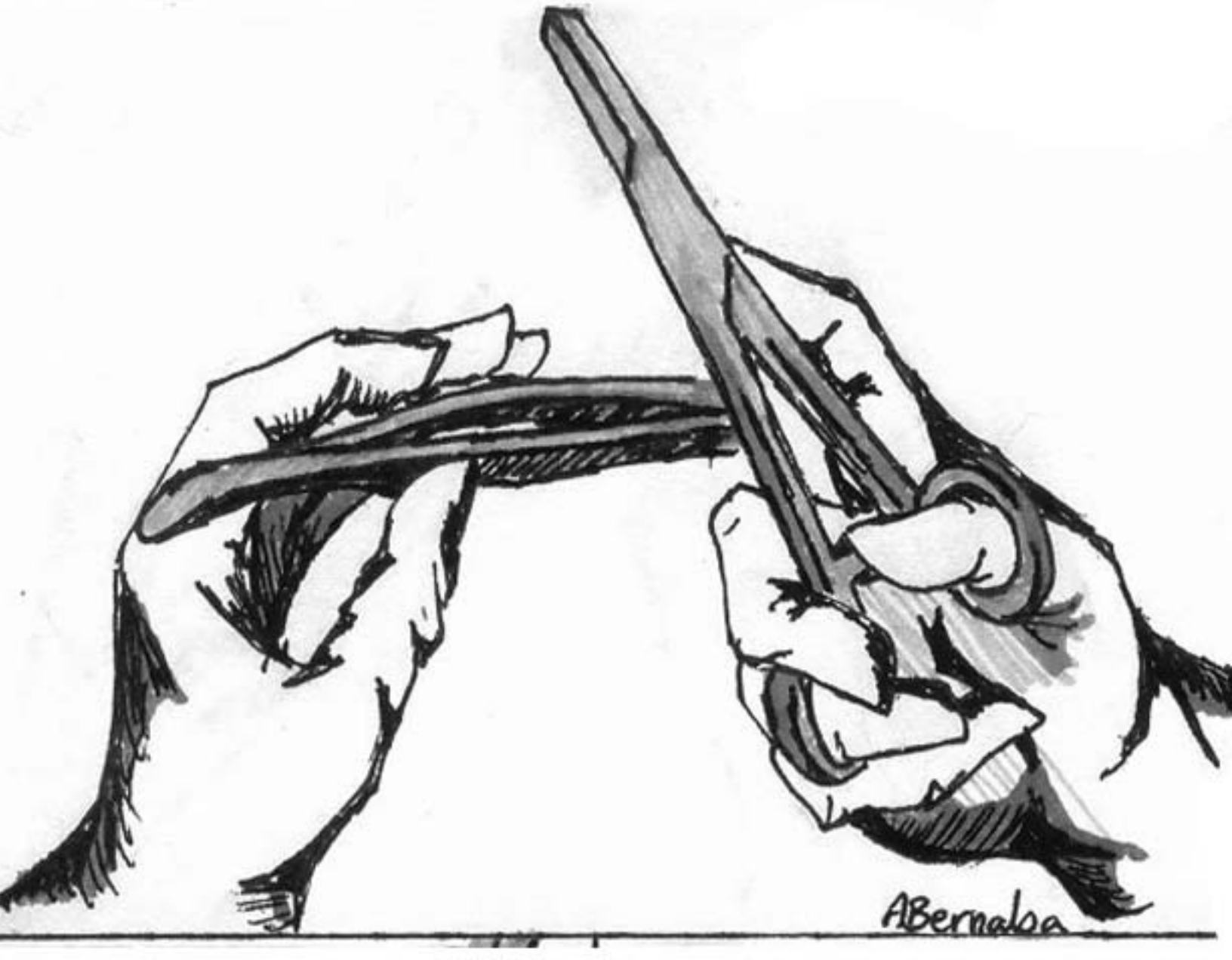
UC IRVINE EMERGENCY MEDICINE INTEREST GROUP

SUTURE MANUAL

A GUIDE TO THE BASIC AND ADVANCED SUTURE WORKSHOP

by the UC Irvine Emergency Medicine Interest Group



LACERATION

HISTORY TAKING

With any laceration, you must consider several things that will help guide treatment. Always ask exactly **how long ago** it happened, approximate amount of **blood loss**, and how long ago the patient's **last tetanus** shot was, Try to get an idea of how **contaminated** the wound is and how likely a **foreign body** is. You will be deciding: dT shot? (yes if unknown last shot or if last shot was >10years ago) Hypertet treatment? (if no known immunization) Antibiotics? Imaging studies? Closure? And if you decide to close it, what method will be best?

- The injury**:** The mechanism of injury is important in assessing the degree of risk of complications of a given wound. For example, the farmer who pierces his foot with a manure-laden pitchfork is at high risk for gas gangrene and sepsis. Management would include extensive local wound care and possible admission to hospital for intravenous antibiotics. Mammalian bites present another risk situation for infection. Is there likely to be a foreign body present in the wound? Does the force of injury suggest there is likely to be extensive trauma to deeper tissues and/or fracture?
- The patient: Consider complicating medical conditions such as diabetes, other immunosuppressed states or other major organ dysfunction (such as renal or hepatic failure) and peripheral vascular disease. These all may affect both resistance to infection and wound healing itself.
- Time of injury**:** The age of the wound is important in deciding the timing of closure, if at all.

Laceration	Age / Condition	Treatment
Extremity	< 12 hours and "clean"	suture primarily
Extremity	>12 hours older or "dirty"	Older or obviously contaminated or infected lacerations are best left alone for healing by secondary intention or tertiary intention (closure a few days later). Saline soaks and antibiotics usually will be required. If cosmetic or other functional considerations apply, then referral to a plastic surgeon is necessary.
Face	< 24 hours	suture primarily unless obviously infected (rare)

PHYSICAL EXAM

Don't be too distracted by the wound, do a thorough physical, then come to the laceration last. Look for signs of excessive blood loss (tachycardia, conjuctival pallor). Assess motor and sensory function distal to the wound, as well as circulation (pulses, capillary refill) and range of motion. Make careful note of the size and depth of the lesion, amount of necrotic tissue, contaminants, and involved tissues. Especially important to note is exposure of bone or transection of large artery or nerve. Visualize the wound base to be sure of depth and lack of foreign bodies. Better visualization will be achieved as you are flushing the wound.

CLOSURE

PRINCIPLES OF WOUND CLOSURE

- Minimize bacterial contamination
- Remove foreign bodies & devitalized tissue
- Achieve hemostasis
- Handle tissue gently.
- Approximate; don't strangulate

STEPS

1) **Assess**
   Once you have decided that the laceration should be sutured, determine what types of stitch (eg. simple interrupted, running subcuticular, vertical/horizontal mattress), and how many stitches you will use. Determine the appropriate type, size, and quantity of suture material based on the location, size, and complexity of the laceration.
2) **Gather materials**
   Bring the following items to the bedside:
   Lidocaine, 10cc syringe, 18 gauge and 25 gauge needle
   chucks
   basin
   flush kit, 500cc NS (OR a bottle of NS, a 30 or 60cc syringe, an 18 gauge IV catheter, and a medication cup)
   betadine, 4x4s
   procedure light
   mayo stand
   laceration tray
   suture material
   goggles
   sterile gloves
   4x4s or appropriate bandage material, tape
   antibiotic ointment
   Once you have everything together, make sure your field is well lit (use a procedure light if available) and free from any potential contaminators/obstructers (eg. patient clothing). Raise the bed so that you don't hunch over during the procedure. Make sure the mayo stand is within easy reach.
3) **Anesthetize**
   Clean the area you will be anesthetizing with sterile water or ChloroPrep. Warn the patient that this will sting/burn, but assure them it is the most painful part of the procedure. Choose 1% lidocaine with epinephrine for most procedures. Consider adding Bicarbonate to the lidocaine to potentially decrease the burn while infusing. Use lidocaine without epinephrine when anesthetizing digits and appendages that are in danger of ischemia. Use bupivicain for longer procedures (it has a longer duration of action but also takes longer for onset). Draw up the anesthetic with a 10cc syringe and a large needle, then use a small needle to inject, making sure the air is out of the syringe before you insert the needle. Insert the needle through the wound into the subcutaneous tissue, attempt to aspirate before infusing (to make sure the needle is not in a vein), then make a weal under the skin around the wound margins. Don't be shy, use plenty of anesthetic.
4) **Flush**
   Wear your eye protection! Make absolutely sure that all foreign bodies have been removed from the wound by thoroughly inspecting down to the base of the wound. With chucks under the patient, and a basin to catch runoff, flush wound with copious (more than you want to) amount of saline. Aim a high power stream directly into the wound. Some hospitals have a kit for flushing, which you can attach to an IV bag. Otherwise use a large syringe (however it must be small enough to fit into a saline bottle to draw up the saline) and IV catheter as propulsion

device. You can poke a hole in the bottom of a medicine cup and put the catheter through it so it acts as a splash guard. When you are done flushing remove the basin and wet chucks so the patient isn't sitting in a pool. Dry the skin, being very careful not to contaminate the wound.

5) **Prep**
Using ChloroPrep or Sterile water clean the skin around the wound. Use of Betadine has fallen out of favor for cleaning and prepping wounds. Use sweeping circular motions starting at the wound margin and spiraling outward. Make the area of sanitized skin at least as wide as the whole in your drape, so there will be no contaminated skin in your field. Do three spiral swipes with three clean applicators to be thorough. Let it dry, and dab off any excess with sterile gauze. Open the kit, then open the suture material onto the tray. Put on sterile gloves, then place your drapes.

6) **Sew**
Using forceps and a needle driver, close the wound appropriately. Make sure ALL sharps are disposed of in sharps container before leaving the bedside.

7) **Bandage**
Cover the nicely approximated laceration with ointment and sterile gauze. Instruct patient on how to care for the wound, and tell them where and when to go for suture removal.

SUTURE TYPES RECOMMENDED FOR SKIN CLOSURE

A. Deep (dermal or buried) Absorbable Sutures
   1. Polyglecaprone 25 (Monocryl)
   2. Polydioxanone (PDS)
   3. Polyglactin-910 (Vicryl)
   4. Polyglycolic acid (Dexon)

B. Superficial, monofilament Nonabsorbable Sutures
   1. Nylon (Ethilon)
   2. Polypropylene (Prolene)

SUTURE SIZE

A. General
   1. Superficial facial lesions: 6-0 nylon
   2. Other superficial skin lesions
      a. Low skin tension areas: 5-0 nylon
      b. Higher skin tension areas: 4-0 nylon

B. Annotation for suture size indications below
   1. Skin: Superficial monofilament Nonabsorbable Suture
   2. Deep: Dermal Absorbable Sutures

C. Size O: Largest suture

D. Size 2-O: Can be used to suture in G-Tube or Chest Tube

E. Size 3-O
   1. Skin: Foot
   2. Deep: Chest, Abdomen, Back

F. Size 4-O
   1. Skin: Scalp, Chest, Abdomen, Foot, Extremity
   2. Deep: Scalp, Extremity, Foot

G. Size 5-O
   1. Skin: Scalp, Brow, Oral, Chest, Abdomen, Hand, Penis
   2. Deep: Brow, Nose, Lip, Face, Hand

H. Size 6-O

1. Skin: Ear, Lid, Brow, Nose, Lip, Face, Penis

I. Size 7-O: Smallest Suture
   1. Skin: Eyelid, Lip, Face

SUTURE INDICATIONS BY LOCATION

A. Scalp, Torso (chest, back, abdomen), Extremities
   1. Superficial Nonabsorbable Suture: 4-O or 5-O
   2. Deep Absorbable Suture: 3-O or 4-O

B. Face, Eyebrow, Nose, Lip
   1. Superficial Nonabsorbable Suture: 6-O
   2. Deep Absorbable Suture: 5-O

C. Ear, Eyelid
   1. Superficial Nonabsorbable Suture: 6-O

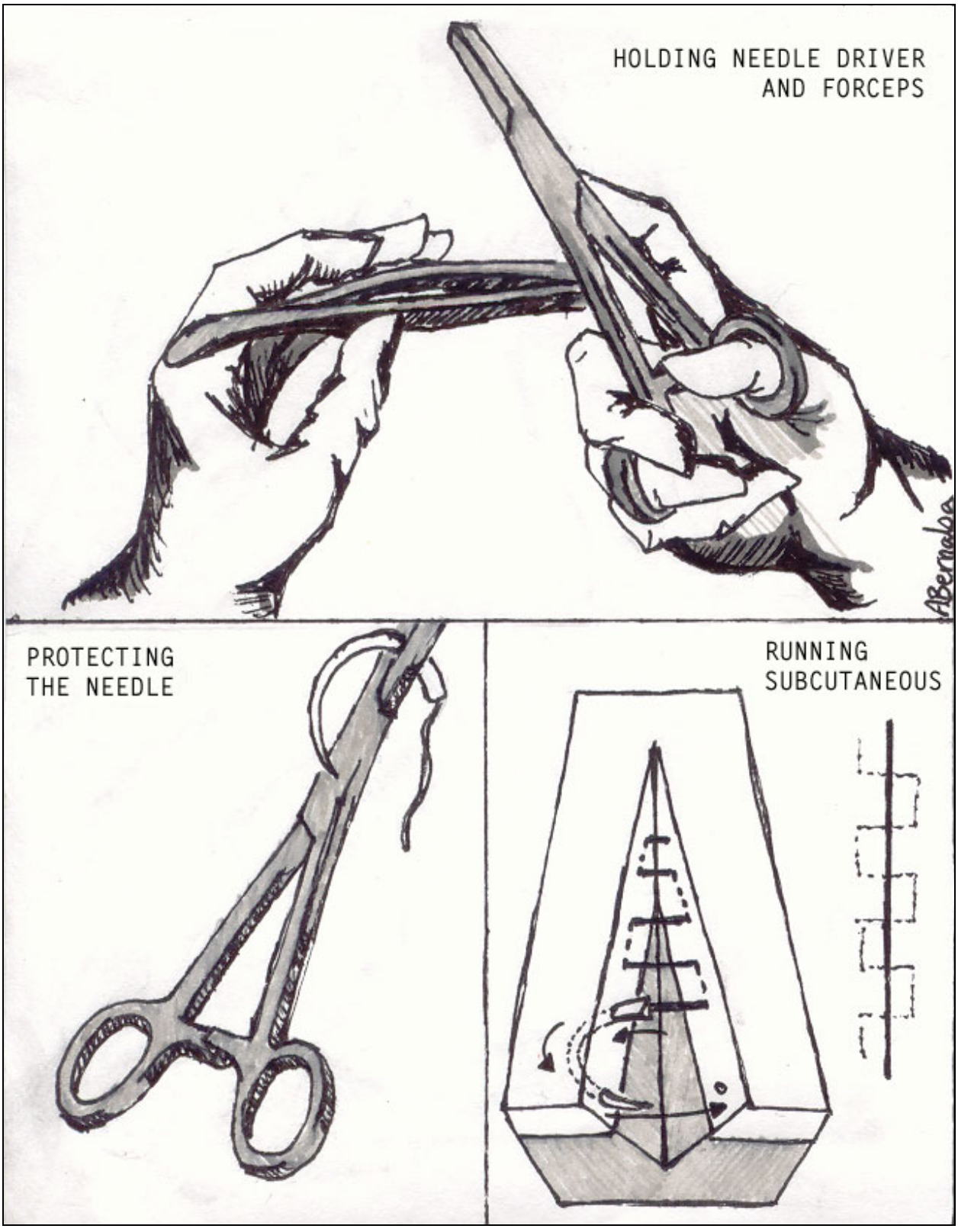
D. Hand
   1. Superficial Nonabsorbable Suture: 5-O
   2. Deep Absorbable Suture: 5-O

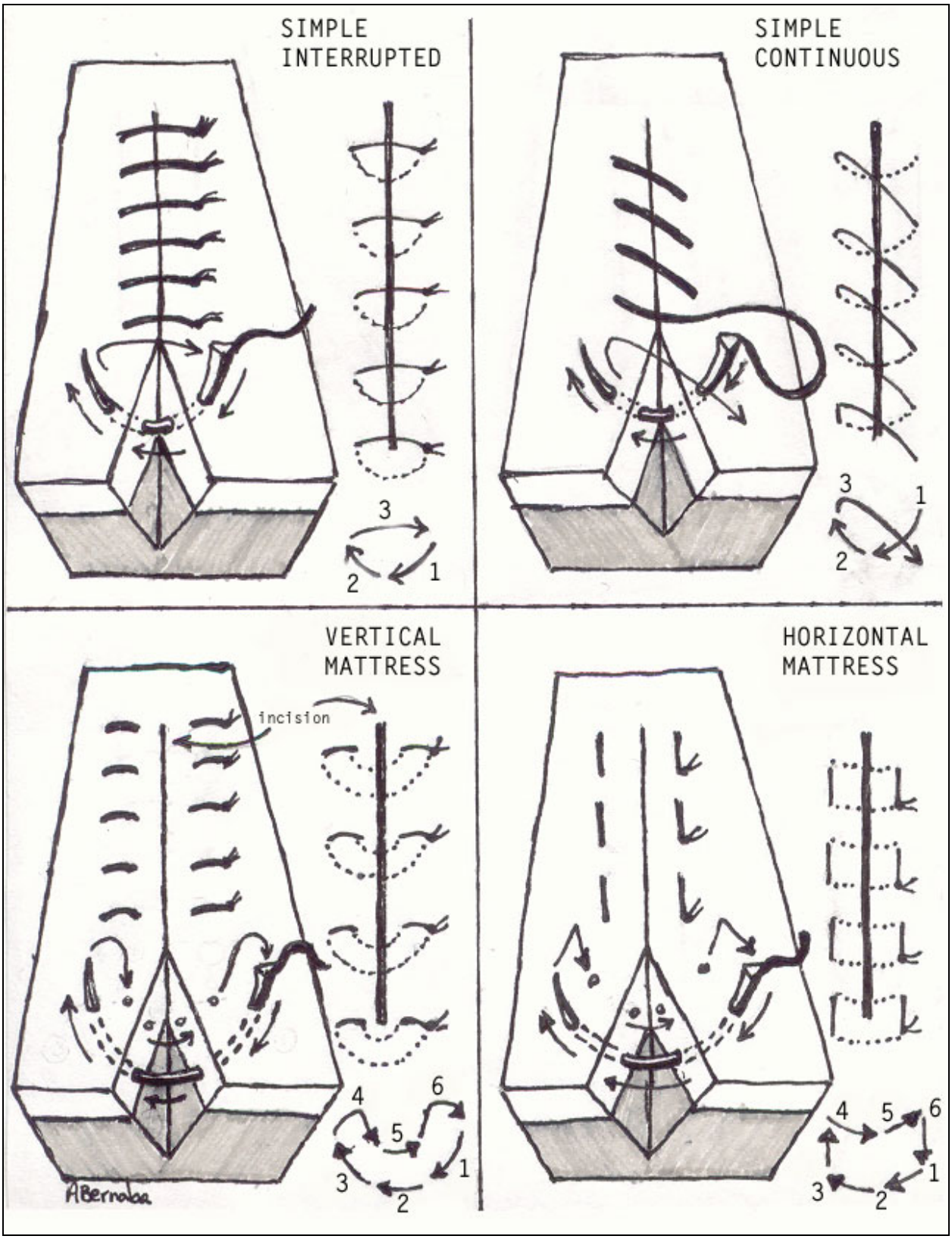
E. Foot or sole
   1. Superficial Nonabsorbable Suture: 3-O or 4-O
   2. Deep Absorbable Suture: 4-O

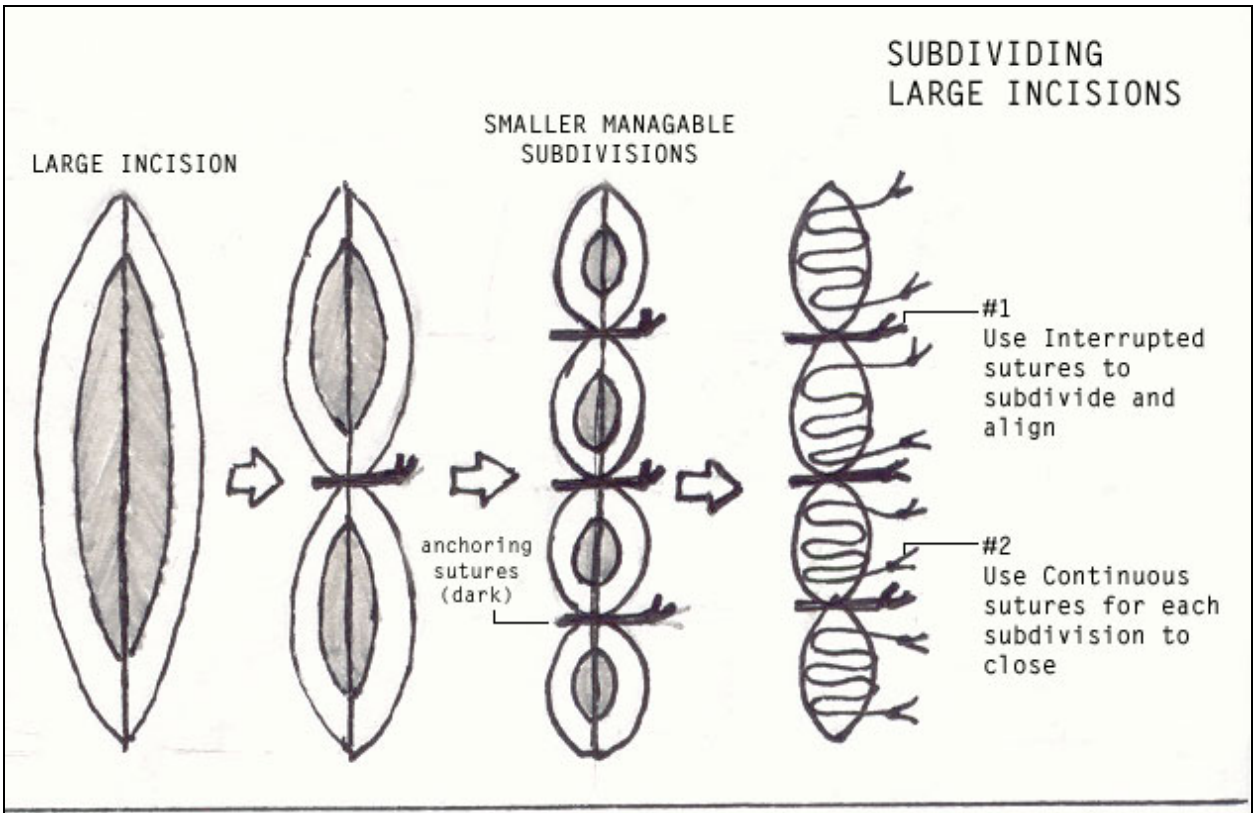
F. Penis
   1. Superficial Nonabsorbable Suture: 5-O or 6-O

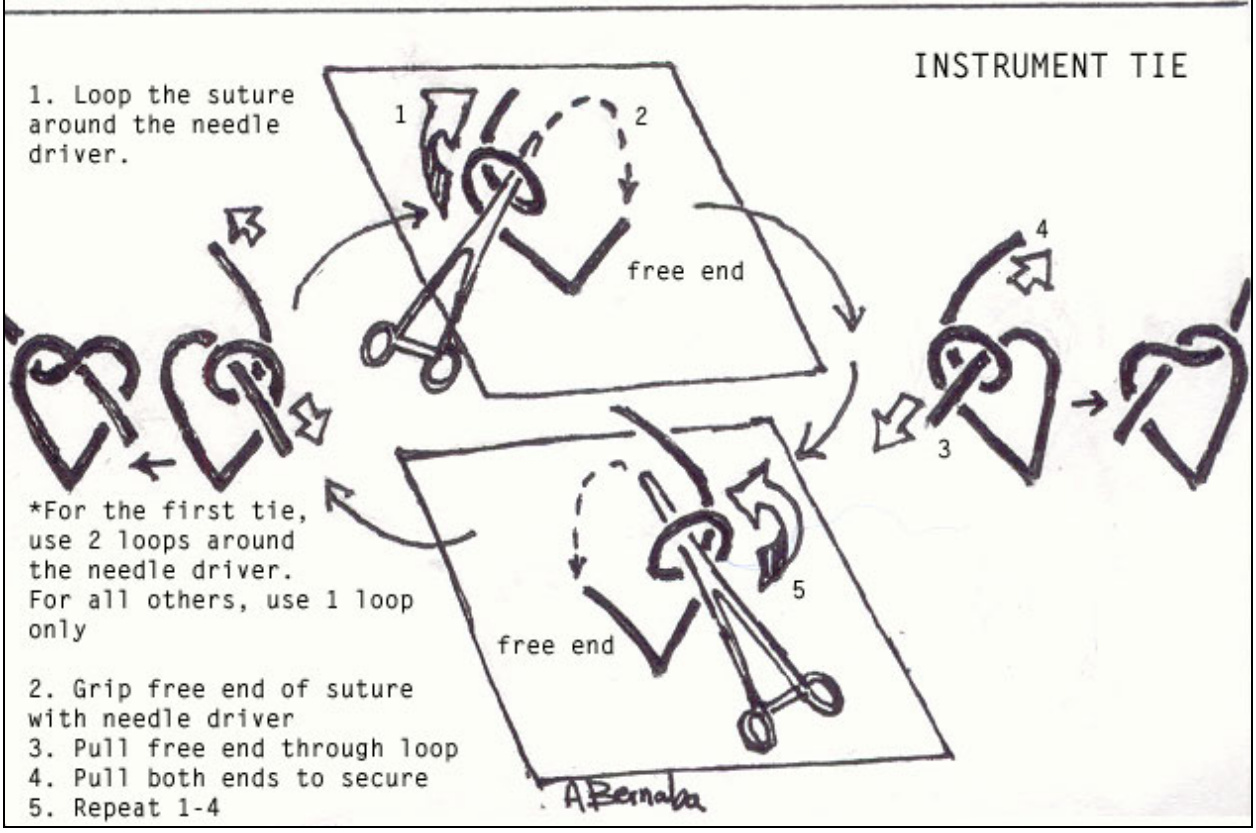
Suggested Removal Times for Interrupted Skin Sutures

Area	*Removal time (days)*
Face	3 to 5
Neck	5 to 8
Scalp	7 to 9
Upper extremity	8 to 14
Trunk	10 to 14
Extensor surface hands	14
Lower extremity	14 to 28


HOLDING NEEDLE DRIVER
AND FORCEPS
ABernaba
PROTECTING
THE NEEDLE
RUNNING
SUBCUTANEOUS


SIMPLE
INTERRUPTED
3
2
1
SIMPLE
CONTINUOUS
3
1
2
VERTICAL
MATTRESS
incision
4
6
5
1
3
2
ABernaba
HORIZONTAL
MATTRESS
4
5
6
3
2
1


SUBDIVIDING
LARGE INCISIONS
LARGE INCISION
SMALLER MANAGABLE
SUBDIVISIONS
anchoring
sutures
(dark)
#1
Use Interrupted
sutures to
subdivide and
align
#2
Use Continuous
sutures for each
subdivision to
close


INSTRUMENT TIE
1. Loop the suture
around the needle
driver.
1
2
free end
4
3
5
free end
*For the first tie,
use 2 loops around
the needle driver.
For all others, use 1 loop
only
2. Grip free end of suture
with needle driver
3. Pull free end through loop
4. Pull both ends to secure
5. Repeat 1-4
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