

1

## Discussion points

- aseptic vs sterile technique
- common surgical instruments
- choice of anesthetic
- preparing the wound
- correct knot tying methods
- wound closure with a variety of suturing techniques
- common pitfalls
- practical tips on improving your technique
- guidelines for choosing the correct suture and needle

2

## Wound healing and scars

The goal of optimal wound closure is to obtain a fine line scar that maintains both the form and appearance of the tissue.

It is important to let your patient know that any time there is an incision there is going to be a scar. However with careful technique and close attention to tissue integrity this scar can be minimized.

Know when it is a closure that you should not attempt e.g. lip, eyelid, across a joint, tendon involved, or the web space of a hand.

3

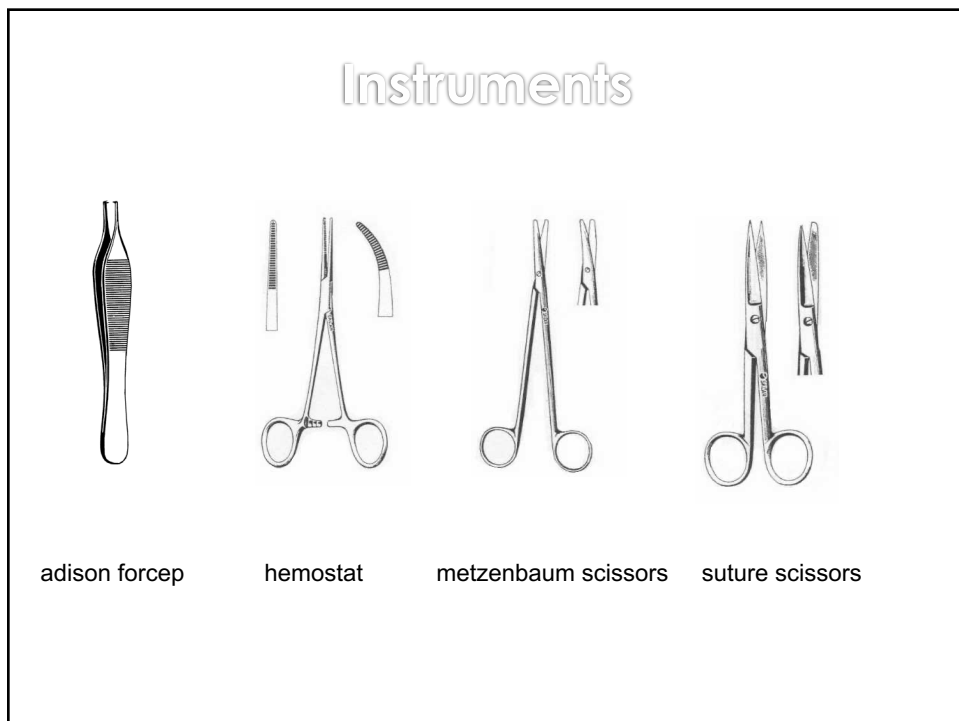
## Preparation

- Plan the incision or type of closure
- Gather equipment – irrigation, syringes, anesthetic, instruments, suture, drapes, dressing
- Time out:
  - Check patient name and sign a consent
  - Check what procedure is to be done
- Scrub, glove, and drape
- Prepare the skin – betadine on the outside
- Local anesthetic – lidocaine or bupivacaine
- Debridement or incision
- Undermining where necessary

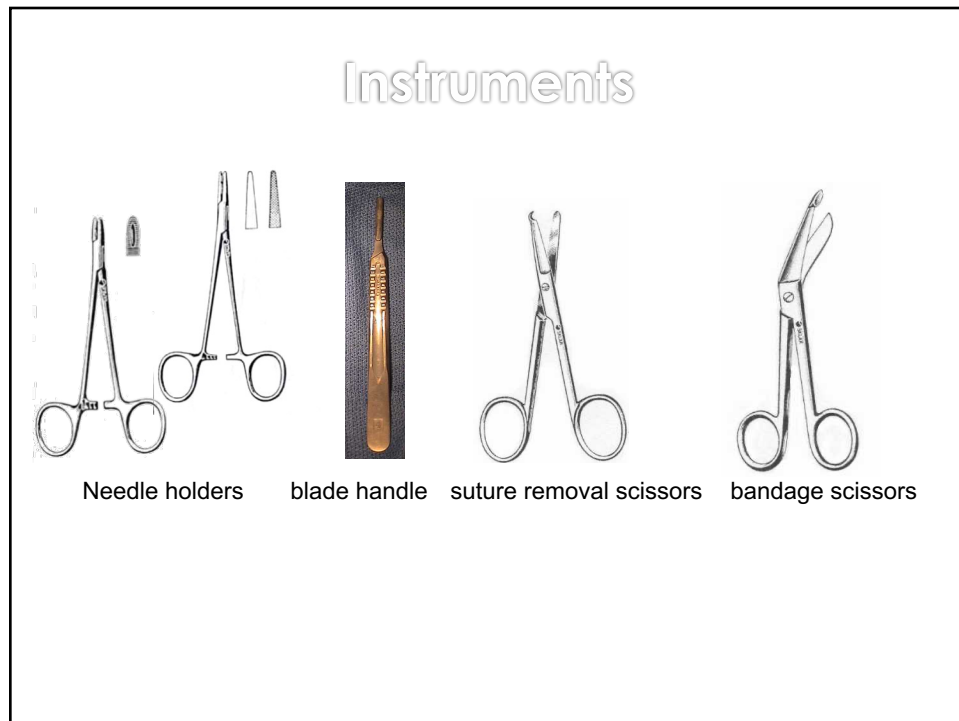
4



5



6



7

## Sterile instruments

- Instruments been sterilized and packed in sterile packages
- Indicator tape changes color with proper sterilizing
- Packages must remain sealed or double wrapped

Sterilize with:

- Autoclave 15- 20 psi 220 to 250 degrees F
- Gas
- Liquid

8

# Anesthetic

Lidocaine 1% or 2% - inject locally or a regional block

- gives anesthesia and reduces muscle movement

Bupivacaine (Marcaine) 0.25% or 0.5%

- gives anesthesia only

lidocaine and bupivacaine can be mixed half and half

Epinephrine can be added to increase anesthetic time and decrease bleeding – **don't not use on, nose, toes, fingers, hose (penis)**

May be buffered - 9:1 with sodium bicarbonate, to reduce pain on injection (e.g. remove 2 mL of 1% lidocaine from 20 mL vial, and add 2 mL of sodium bicarbonate solution to vial)

9

# Anesthetic

**Local Lidocaine (Xylocaine)** 1% or 2%

- Onset: 2 minutes
- Duration: 1.5 to 2 hours
- Action : anesthesia and reduced muscle movement
- Max dose: 4 mg/kg to 280 mg (14 ml 2%, 28 ml 1%)

**Lidocaine with Epinephrine** 1:100,000 or 1:200,000

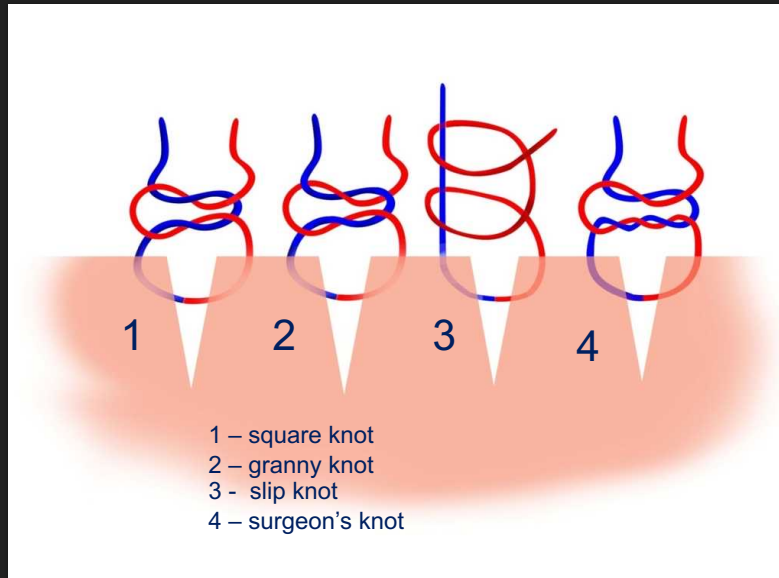
- Onset: 2 minutes
- Duration: 1 – 3 hours
- Action : anesthesia and reduced muscle movement
- Max dose: 7 mg/kg to 500 mg (25 ml 2%, 50 ml 1%)

**Bupivacaine (Marcaine)** 0.25%

- Onset: 5 minutes
- Duration: 2 to 4 hours
- Action : anesthesia only
- Max dose: 2.5 mg/kg up to 175 mg (50 ml 0.25%, 25 ml 0.5%)

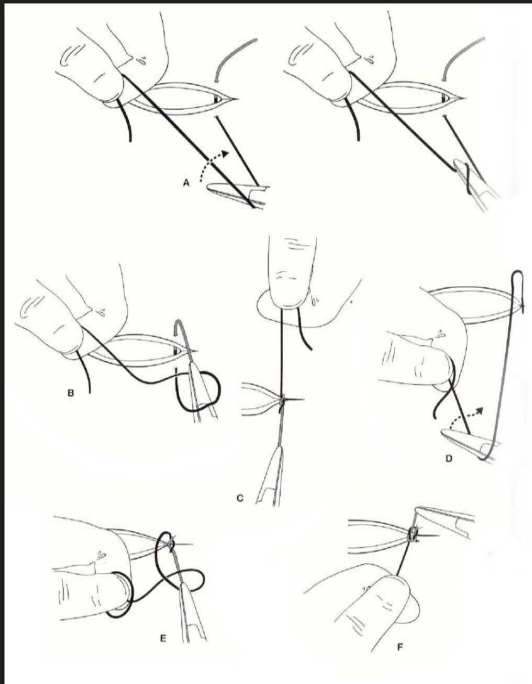
10

## Basic knot tying



11

## Instrument tying



12

## Surgical Wound Closure Guidelines

- Adequate debridement and hemostasis
- Atraumatic technique
- Alignment with the relaxed skin tension lines
- Angle of incision
  - Perpendicular to skin surface or slightly undermined
  - Angle incisions parallel to hair shafts
- Consider area of the body for vascularity and tension on the wound

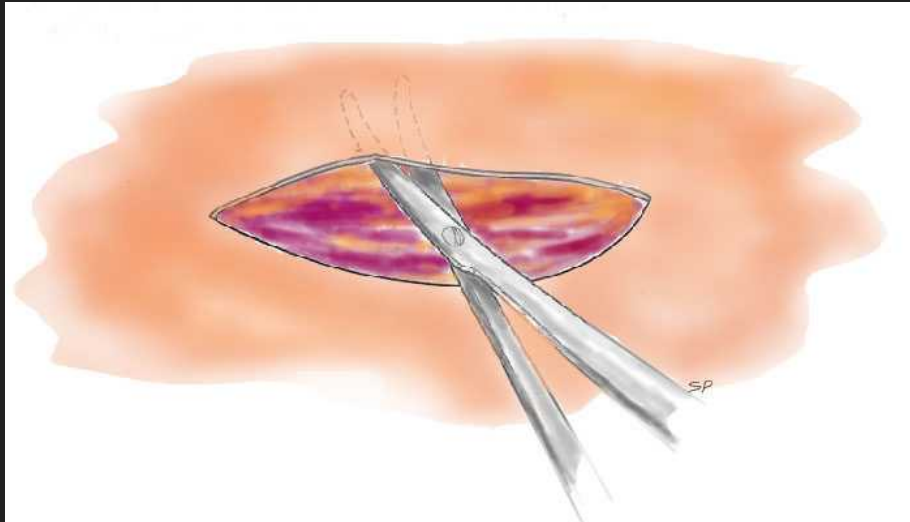
13

## Key Techniques

- Close dead space under the incision
- Close the tissue in layers
- Carefully align the wound edges
- Careful choice of the axis of incision or axis of closure of the donor skin flaps
- Correct choice of deep and cutaneous sutures

14

## Undermining



15

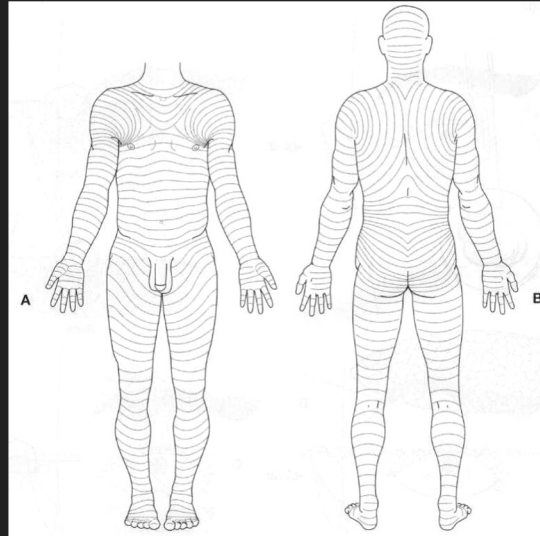
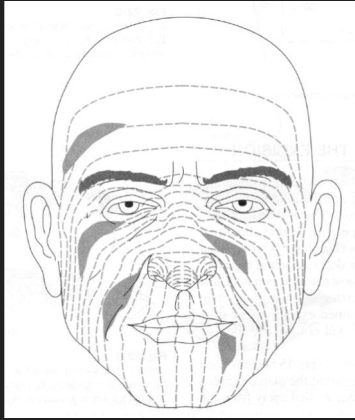
## Bleeding

- Control with pressure directly over the wound immediately
- Locate the nearest artery and put pressure there to give yourself room to work
- If necessary, tie off the bleeding vessel
- Use a pressure bandage

16

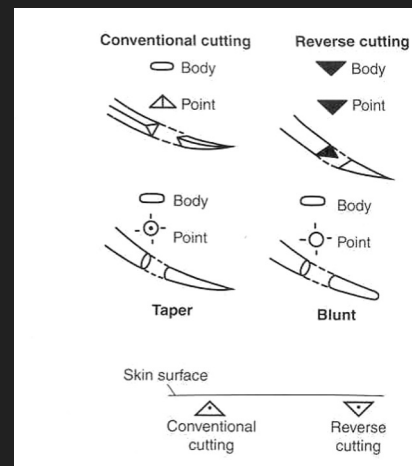
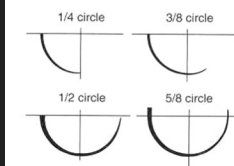
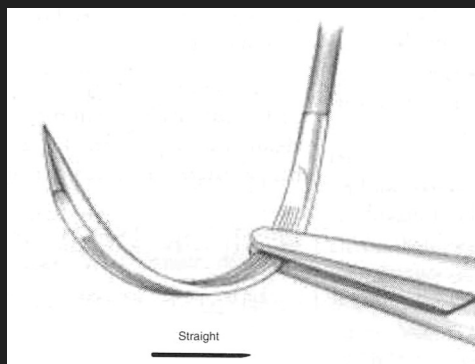


## Tension lines



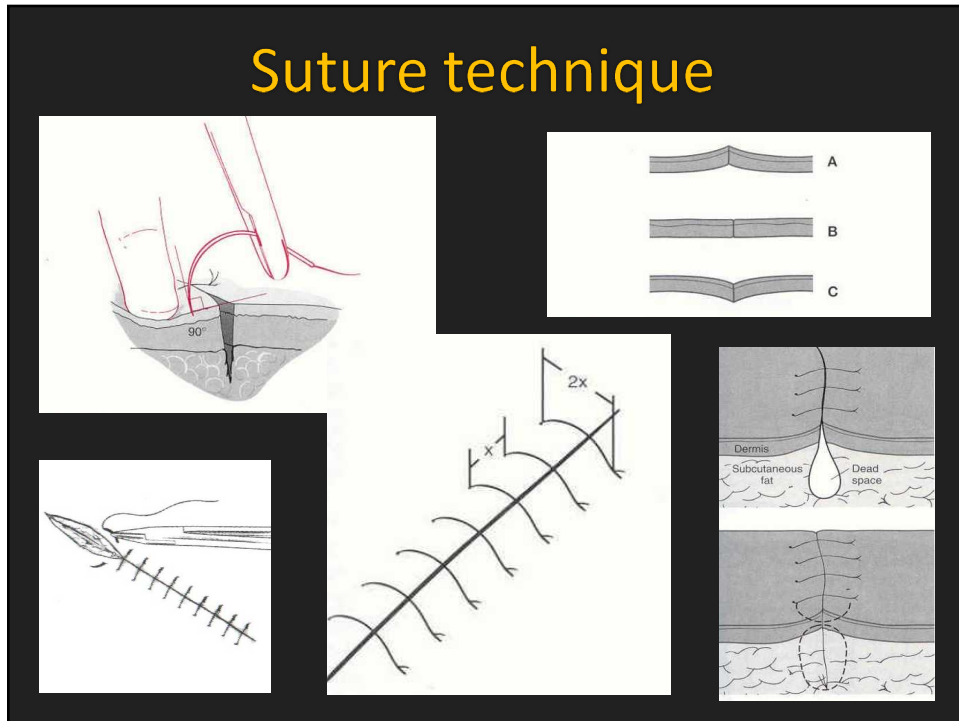
17

## All about needles



18

## Suture technique



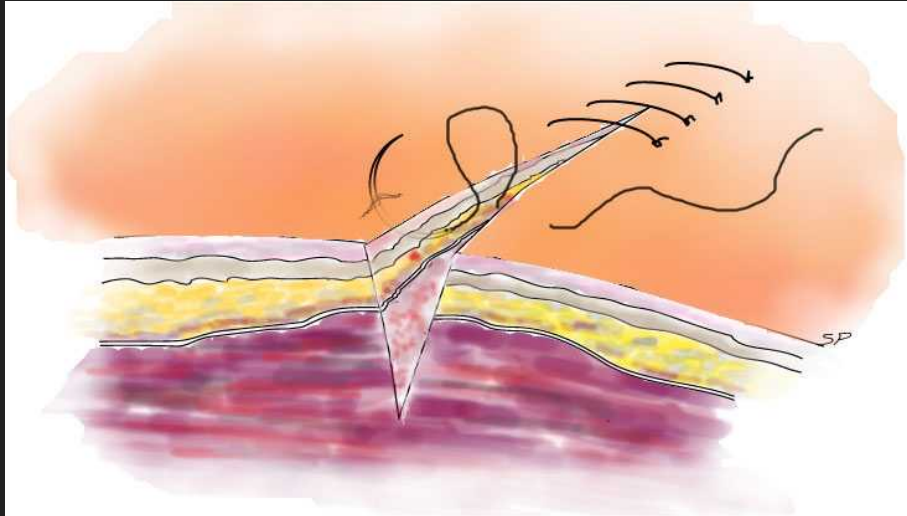
19

## Simple Interrupted Sutures

- This suture is used for simple laceration closures or closure of office procedures like biopsies or lesion removals
- It is also the basic suture used inside the wound to close deep sutures
- It is useful in that a few sutures can be removed at a time instead of all at once to allow for slower sound healing

20

## Simple Interrupted Sutures



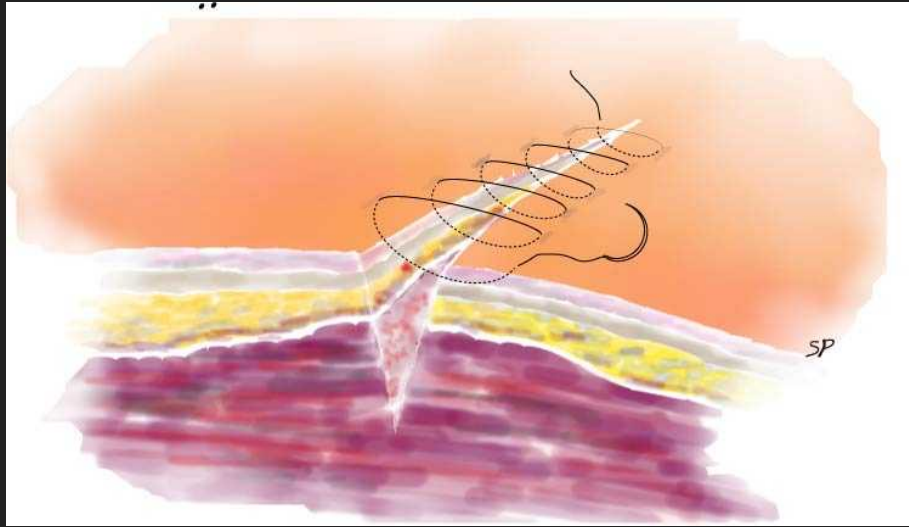
21

## Continuous Sutures

- The continuous suture as its name suggests, only has a knot at the beginning and the end
- There are several methods of continuous suture – locking and non-locking
- The knots must be very secure and minimal tension on the wound or the wound will come apart if one loop or knot gives way
- The advantage is that it is very quick and the wound tension is even across the wound

22

## Continuous Sutures



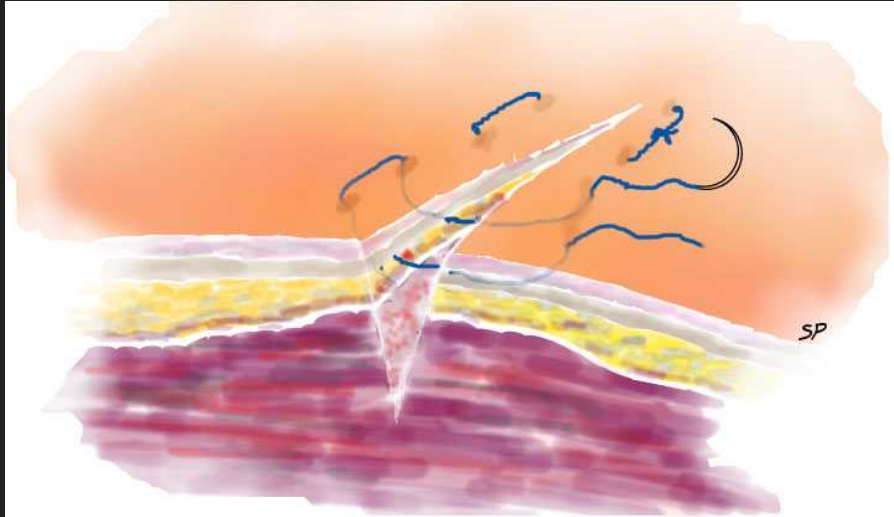
23

## Horizontal Mattress Suture

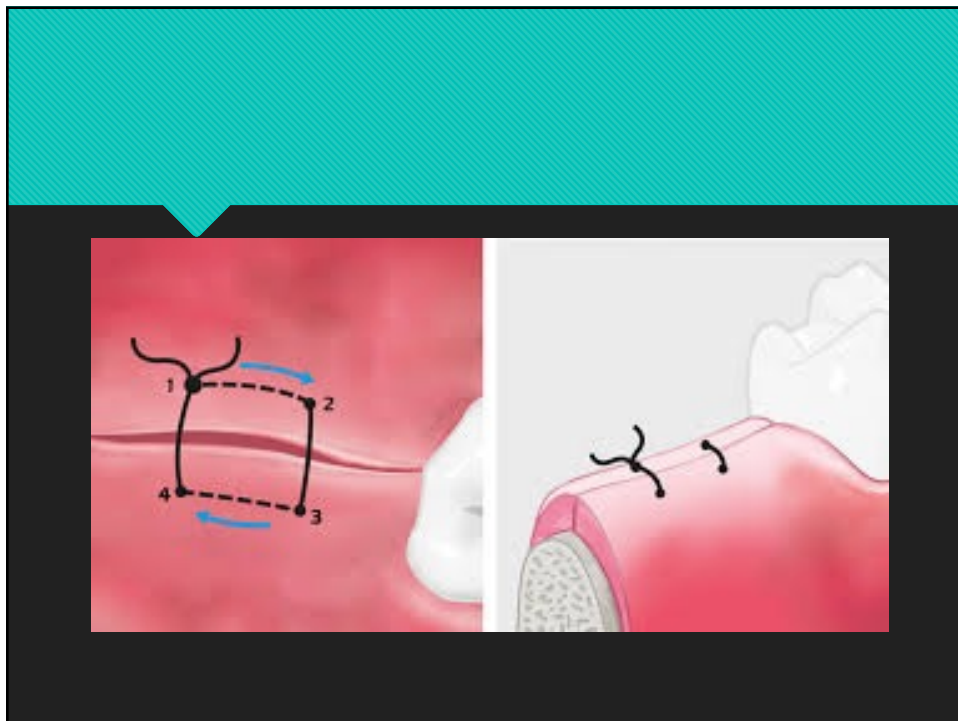
- Used with wounds with poor circulation
- Helps eliminate tension on wound edges
- Requires fewer sutures to close a wound
- Can be placed quite quickly
- Can be done as a continuous suture

24

## Horizontal Mattress Suture



25



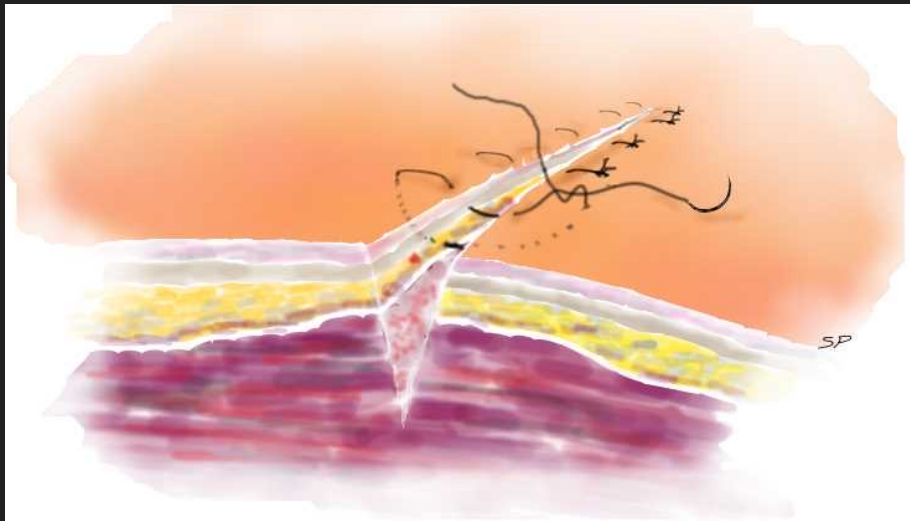
26

## Vertical Mattress Sutures

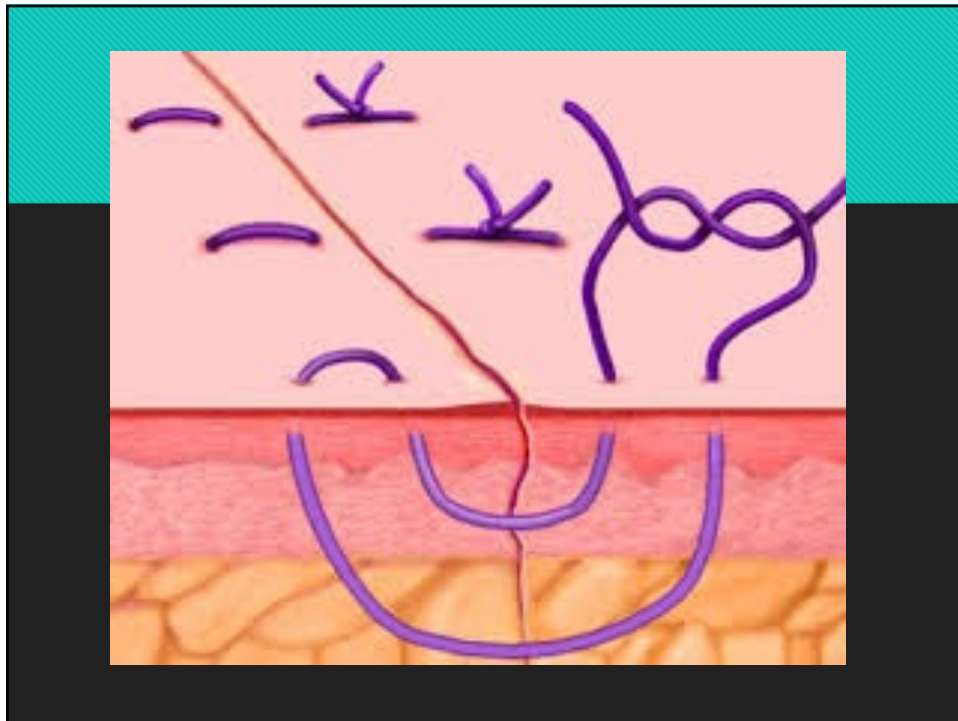
- Deep and shallow approximation of the tissue
- Can be used for wounds under tension
- Can be useful with lax tissue e.g. elbow and knee
- Should not be used on volar surface of hands or feet or on the face because of blind placement of the deep part of the suture

27

## Vertical Mattress Sutures



28



29

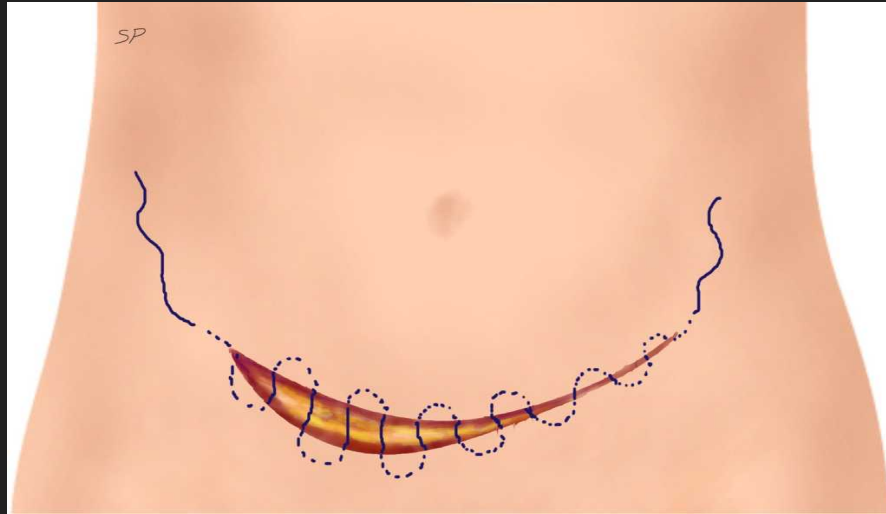
## Sub-Cuticular Closure

- Used for cosmetic closures
- Use an absorbable suture if you plan to leave the sutures in and bury the knots
- Use either nylon or prolene (best) and keep the suture sliding while you are closing. The suture then can be easily removed with no exterior marks. The ends can be taped or a knot on the skin
- At each entry point, enter across from the last exit with slight overlap

30



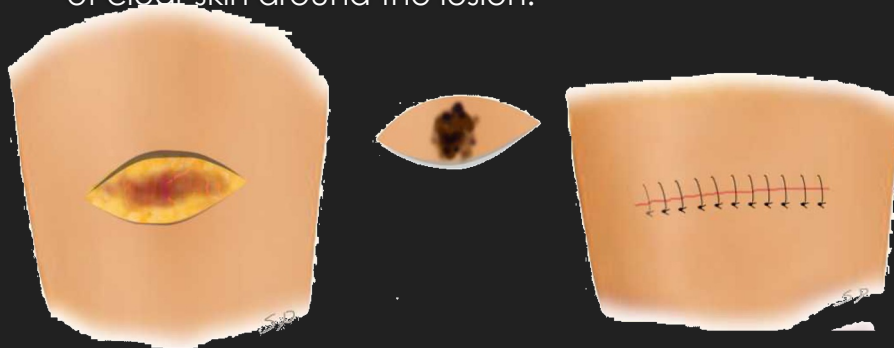
## Sub-Cuticular Closure



31

## Elliptical Incision

The ellipse should be three times as long as it is wide. This will make closure of the wound much easier. If the lesion you are removing is likely to be cancerous, make sure that you leave wide margins of clear skin around the lesion.



32



## Modified Ellipse



33

## 3 Cornered Suture

- Used to close a skin flap which comes to a point
- Helps close the wound, but maintain circulation to the tissue
- Places minimal tension on the wound edges

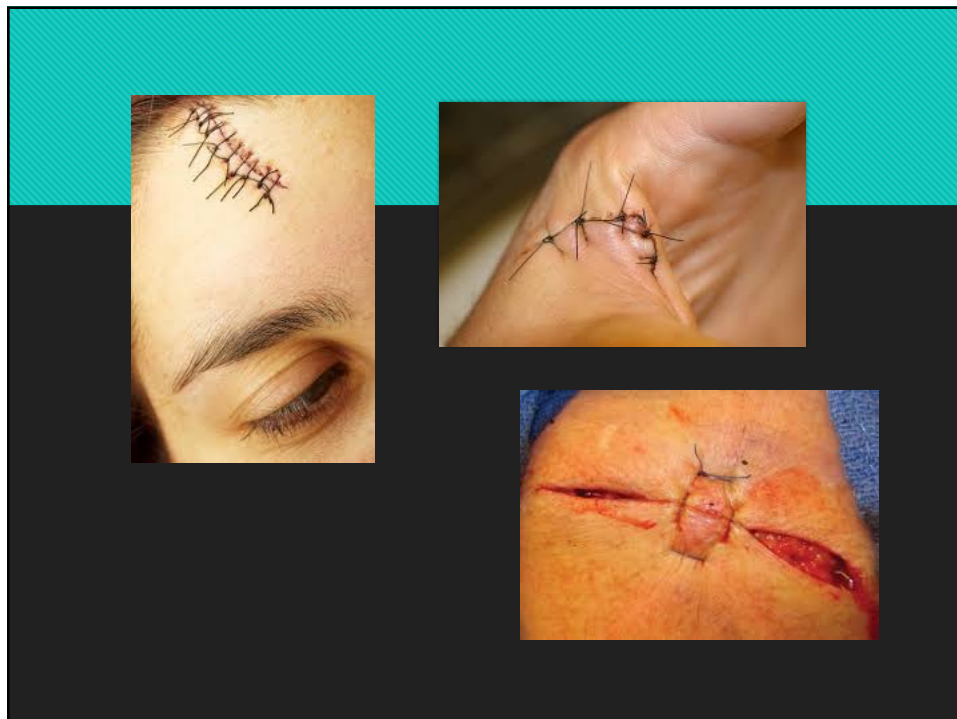


34

## Suture Materials

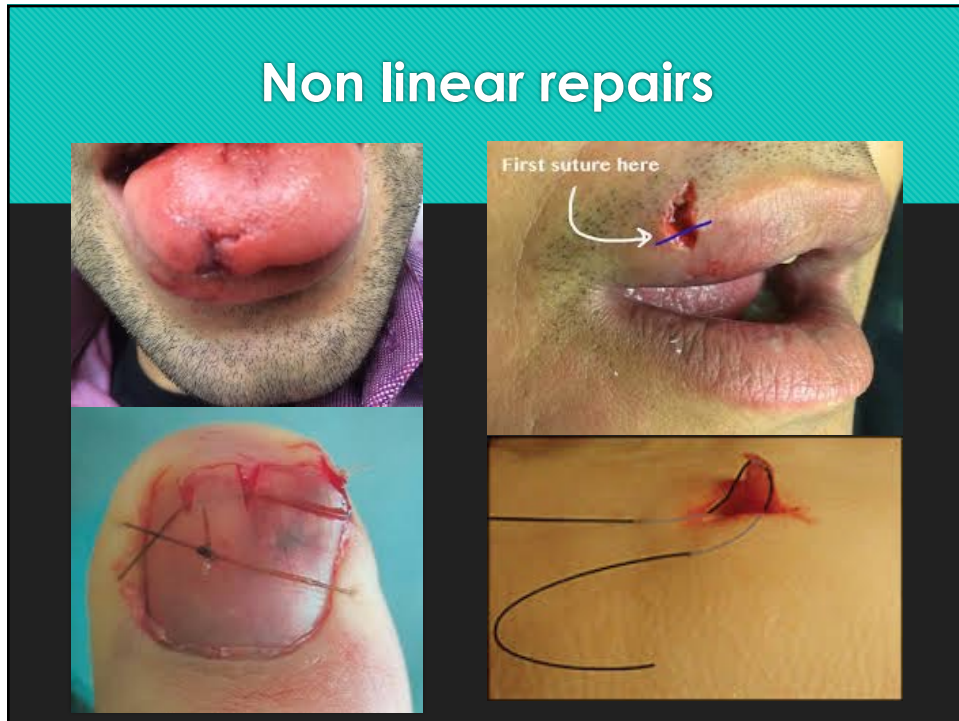
Suture material	filament	Absorbing properties	Tissue reaction	Tensile strength	Tensile strength retention	cost	Uses
plain gut	collegen	absorbable	moderate	poor	2-4 days	low	Inside the wound where it absorbs and wound healing is quick
chromic gut	collegen	absorbable	moderate	poor	7-10 days	low	Inside the wound where it absorbs and wound healing time is average length
polygalactic acid (Vicryl)	braided	absorbable	mild	poor	2-3 weeks	moderate	Inside the wound where it absorbs and longer wound healing time is required, such as tendons.
silk	braided	Non-absorbable	high	poor	1year	low	Skin closure or fascia
nylon	monofiliment	Non-absorbable	Very low	good	Loses 20%/yr	low	Skin closure or fascia or where long term strength is needed
Polypropylene (Prolene)	monofiliment	Non-absorbable	minimal	excellent	indefinite	high	Sub-cuticular skin closure or fascia or where permanent strength is needed.
Polyester (Mersilene)	braided	Non-absorbable	minimal	good	indefinite	high	Internally where low reaction braided suture is required to allow tissue to adhere to it.
stainless steel	monofiliment	Non-absorbable	low	excellent	indefinite	moderate	Bone , tendons, strong connective tissue where permanent strength is required

35

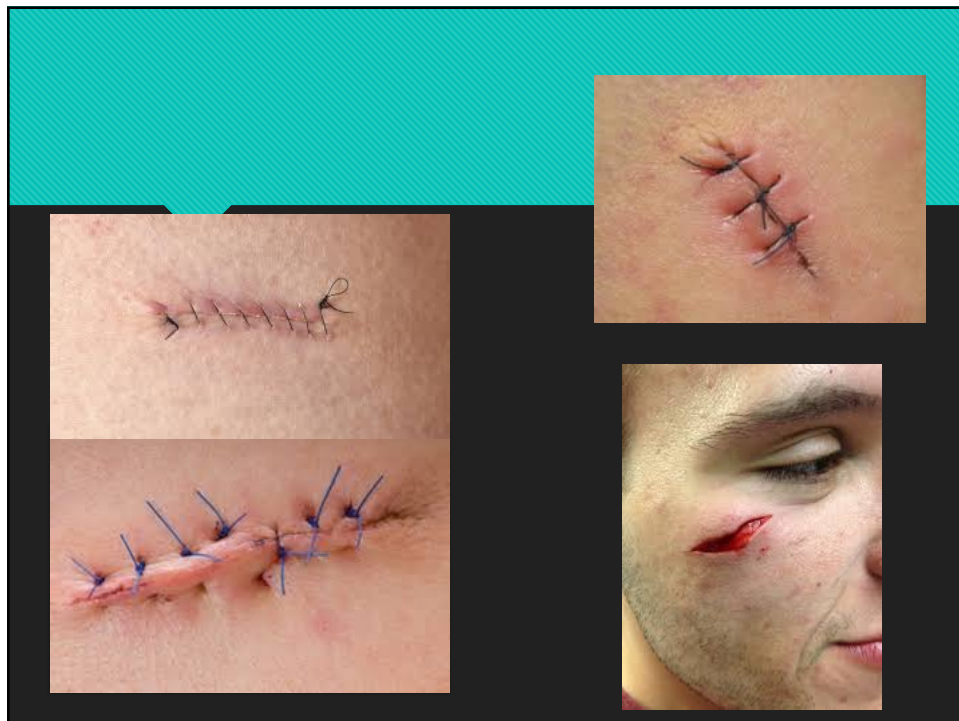


36

## Non linear repairs



37



38



39

## Skin Tear Repair



40





## Foreign Body

41

PROCEDURE - LACERATION REPAIR		Patient: _____
Family Healthcare & Minor Emergency Clinic, Inc.		
LACERATION #	1	2 3 _____
<b>WOUND DESCRIPTION</b>		
Location: _____	Length: _____ cm	
Depth: <input type="checkbox"/> superficial <input type="checkbox"/> subcutaneous <input type="checkbox"/> full-thickness		
<input type="checkbox"/> muscle involvement <input type="checkbox"/> tendon		
Type: <input type="checkbox"/> Linear <input type="checkbox"/> Irregular <input type="checkbox"/> Flap <input type="checkbox"/> Curved <input type="checkbox"/> Y Shaped		
<b>WOUND PREPARATION</b>		
<input type="checkbox"/> Wound irrigated with _____	large volume / approx _____ cc normal saline	
<input type="checkbox"/> Wound preparation with: <input type="checkbox"/> betadine <input type="checkbox"/> wound cleanser		
<b>PROCEDURAL ANALGESIA:</b>		
Sedation / Analgesia with:		
<input type="checkbox"/> Versed _____ mg IV / IM / PO / PR	<input type="checkbox"/> Fentanyl _____ mcg IV	
<input type="checkbox"/> Ketamine _____ mg IV / IM	<input type="checkbox"/> Morphine _____ mg IV/IM	
Anesthetic: _____ cc of	<input type="checkbox"/> Lidocaine 1% <input type="checkbox"/> 2% plain with epinephrine <input type="checkbox"/> Marcaine 0.25% <input type="checkbox"/> 0.50% plain with epinephrine <input type="checkbox"/> infiltrated locally <input type="checkbox"/> digital block <input type="checkbox"/> metacarpal block <input type="checkbox"/> nerve block	
Sterile prep & drape:		
<input type="checkbox"/> Wound explored: foreign material <input type="checkbox"/> absent <input type="checkbox"/> present	→ glass/dirt/wood/pebbles/mold	
<input type="checkbox"/> removed completely / partially		
Skin repaired with: # _____ 2-0 3-0 4-0 5-0 6-0	silk/nylon/propylene simple interrupted mattress H/V running	
# _____ staples / dermabond / steri-strips		
Sub-Q repaired with: # _____ 2-0 3-0 4-0 5-0 6-0	vicryl / chromic / gut simple interrupted mattress H/V running	
Muscle repaired with: # _____ 2-0 3-0 4-0 5-0 6-0	vicryl / chromic / gut simple interrupted mattress H/V running	
Nail bed repaired with: # _____ 5-0 6-0 7-0		
Wound edge approximation: <input type="checkbox"/> good <input type="checkbox"/> acceptable		
Wound edge eversion: <input type="checkbox"/> good <input type="checkbox"/> acceptable		
Wound hemostasis: <input type="checkbox"/> good <input type="checkbox"/> acceptable		
<input type="checkbox"/> Antibiotic ointment & dressing placed		
Patient counseled regarding: <input type="checkbox"/> wound care instructions <input type="checkbox"/> infection risk <input type="checkbox"/> foreign body		
Patient tolerated procedure: <input type="checkbox"/> well <input type="checkbox"/> adequately <input type="checkbox"/> poorly		
Practitioner Signature _____		
G: Nurse Files Procedure - Laceration Repair		

42

## Care of the patient

How will you care for your patient and maintain a safe environment?

43

## Discharge Instructions

- Antibiotic Therapy and for how long
- Wound Care
- Return Visits
- Suture Removal
- Post Suture Removal Care

44