

## Basic Suturing

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### OAAPN 2019

## Presenters

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Lorrie Elchert DNP, APRN-CNP  
Tim Haupricht MSN, APRN-CNP, CNOR, FA  
Vaughn Hoblet MSN, APRN-CNP  
Renella Gauamis MSN, APRN-CNP

## Disclosure

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Lorrie Elchert DNP, APRN-CNP-NONE  
Tim Haupricht MSN, APRN-CNP, CNOR, FA-NONE  
Renella Gauamis MSN, APRN-CNP-NONE

Vaughn Hoblet MSN, APRN-CNP -PFIZER

## Assessment of the Wound

Careful evaluation of the wound is critical

Take your time, do not be rushed

- Look at the different layers
  - Epidermis
  - Dermis
  - Subcutaneous
  - Tendons
  - Ligaments
  - Nerves
  - Muscle

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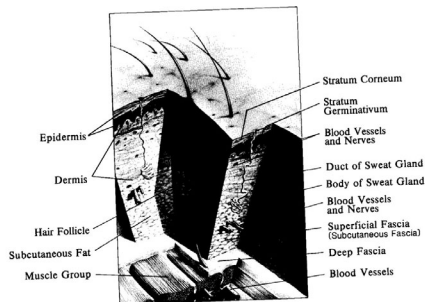
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## Information About Injury

Evaluate for control of hemostasis

- Direct pressure/ if no foreign body
- May need local tourniquet
- Cautery
- Suture ligature
- Instrument compression
- Hemostatic material

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## Condition of the Wound

### Assess for:

- Tendon injury
- Identification of any tendon injury
- Identification of any tendon function
- Nerve involvement
  - Location and distance of laceration
- Depth of wound
- Disruption of blood supply to involved area
- Damage to under structures
  - Bone damage

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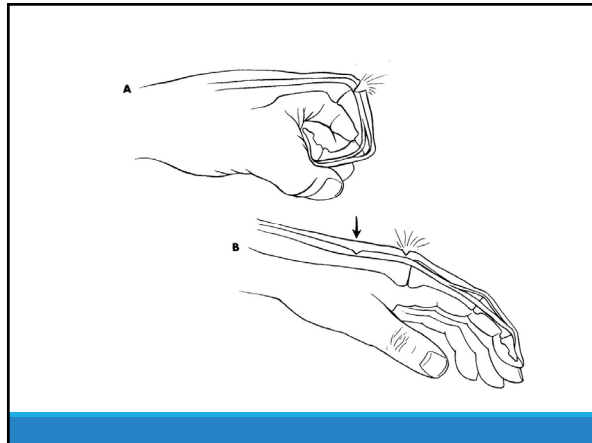
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## Type of Injury

- Abrasion
- Burn
- Skin Tear
- Laceration

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## Mechanism of Injury

### Abrasion

- Evaluate possibility of repair
- Debridement of wound

### Burns:

- Clean
- Debridement

### Sharp trauma

- Knife wound
- Glass wound
- Exam of area for glass fragments
- Generally easy to repair

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## Mechanism of Injury

### Blunt Trauma

- Cause by blunt object
- Crush injury
- Exam underlying injury
- Know underlying structure and anatomy
- Attention to tension lines
- Examination for destruction of tissue

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## Age of Wound

### Golden time

- Ideal time frame to close wound
- Less than 12 hours or
  - Healing can be impaired
  - Increased chance of infection
- 12-16 hours for facial and neck wound

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## Condition of Wound

### Neat:

- no devitalized tissue or debris

### Messy:

- dead tissue/ debris in wound a wound that needs to be cleaned up can be irrigated and or debrided converted to a neat wound

### Clean:

- low or little contamination of wound

### Contaminated:

- high probability of infection

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## Condition of Wound

### Simple Wound:

- Only dermis and fat lacerated

### Compound:

- Can involve nerves, ducts, tendons, blood vessels, fascia, muscle

### Non-complex Wound:

- Flat surface, perpendicular to skin surface, not involving critical areas of hands face or limb anatomy.

### Complex wound:

- Location in convexity, concavity, flexion, crease or at angle to normal skin crease. Non-linear with skin flaps, edge irregularities. Oblique to skin surface. Needs to be converted to non-complex configuration.

### Color of tissue

- Red to red : muscle
- Silvery white to silvery white Tendon, Ligament

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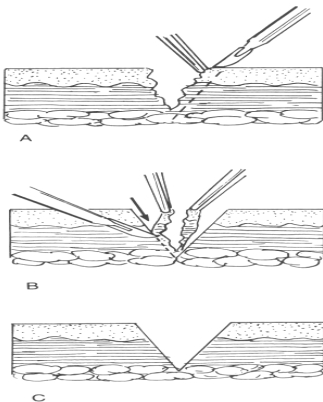
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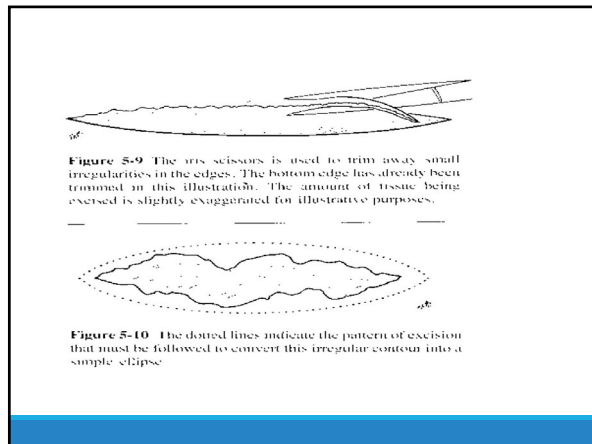
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## Wound Debridement

- Clean with antiseptic-antimicrobial skin cleaner
- Irrigation
- Solution to pollution is dilution
- Hair removal
- Assess for foreign body

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## Antibiotic Use

- Cleansers/Topical Antiseptics
- Oral Antibiotics

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## Wound Classification

**Laceration**-longer than deep

**Penetration**-deeper than long

**Amputation**-full thickness tissue loss

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## The Goal

Appropriate closure of a wound to minimize cosmetic disfigurement and maximize functionality.

Reduce the likelihood of infection

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## An Alternative to Consider

**Infection Risk** – Consider delayed primary closure

- Clean
- Irrigate and Debride
- Treat with broad spectrum Antibiotic
- Re-examine in 2 days and close if no evidence of infection (may need more debridement)
- Tetanus

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# Normal Healing

- Hemostasis**
- Vascular spasm
  - Nerve vascularization
  - Platelet aggregation
  - Coagulation
  - Inflammatory response cells infiltrate
  - Collagen formation
  - Re-epithelization

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# Factors Affecting Wound Healing

- Age
- Nutrition
- Oxygenation to the area
- Location
- Technical
- Associated conditions DM CA Immunity
- Drugs
- Herbs that prolong bleeding:
- cinchona, danshen, devil's claw, dong quai, garlic, ginkgo, papaya

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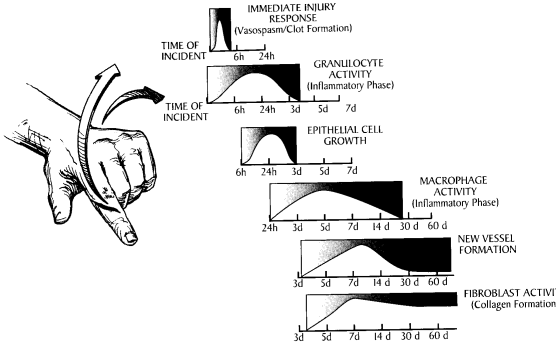
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# ACTIVITY OF WOUND HEALING COMPONENTS



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### Wound Closure Terminology

**First intention:**

- wound evaluated, cleaned and sutured closed

**Secondary Intention:**

- wound allowed healing by granulation

**Third intention:**

- wound cleaned, left open and closed about 72 hours later

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### Definition of Local Anesthetic

**Local anesthetic:**

- Produce loss of sensation of pain in a specific area of the body without loss of consciousness

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### Mechanism of Action

To block voltage-gated sodium channels and then blocking signal conduction

Works best on small-diameter neurons

A $\alpha$ -proprioception (muscle sense)

- A $\beta$ -touch, pressure, and vibration
- A $\delta$ -fast pain, cold
- C-Slow pain, warmth, and itch

<http://thepainsource.com>

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### Precautions

Diabetics  
Heart Disease  
Peripheral Vascular Disease  
Substantial tissue damage and bleeding  
Infection

- Do not use epinephrine

Children

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### Allergies

**Esters:**

- Cocaine, procaine, tetracaine, chloroprocaine and benzocaine
- Lidocaine is not an ester!

**Amines:**

- Lidocaine, mepivacaine, bupivacaine, articaine, & prilocaine
- No documented true allergy to amines that did not contain preservatives
- Preservative usually bisulfite

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### Allergic Signs and Symptoms

Generalized body rash or skin redness  
Itching, urticaria  
Bronchospasm  
Swelling of the throat  
Asthma  
Abdominal cramping  
Irregular heartbeat  
Hypotension  
Angioedema  
Anaphylaxis

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## Topical Local Anesthesia Agents



### Topical:

- EMLA, LET, TAC

### Advantages:

- Technically easy
- Minimal equipment

### Disadvantages

- Potential for large doses leading to toxicity
- Time to work

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## Local Anesthesia Agents

### Lidocaine (Xylocaine)

- Plain 0.5%, 1%, 2%
- Administer in small amounts
- Maximum in adults is 300mg
- Onset 1-5 minutes
- Duration 1-2 hours

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## Local Anesthesia Agents

### Lidocaine With Epinephrine: 1:100,000 or 1:200,000

- Advantages of epinephrine: longer retention of anesthesia, less bleeding with vasoconstriction
- Don't use on extremities: eyes, nose, fingers, toes, penis, scrotum and labia
- Limit: 5mg/kg total not to exceed 500mg
- Onset 1 minute
- Duration: 2-6 hrs.
- Avoid or use minimal amount with:

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## Local Anesthetic Agents

### Lidocaine with Bicarb

- Minimizes pain with injection
- Shelf life only 1 week (10 days if refrigerated)
- 9 parts of lidocaine (1-2%) to 1 part Bicarb

### Bupivacaine (Marcaine) (Sensorcaine)

- Last longer than Lidocaine
- 0.25%, 0.5%, 0.75%
- Maximum adult dose is 175 mg per procedure
- Onset: 2-3 minutes
- Duration: 4-8 hours

## Maximum Doses

	Mg/kg	Mg/lb	Max dose /70 kg pt.	Max No. of carpules/70kg pt.
Lidocaine (2%)	7.0 (4.4)	3.17 (2)	500 (300)	13.8(8.3)
Bupivacaine(.5%)	1.3	.59	90	10

## Local Anesthetics- Toxicity

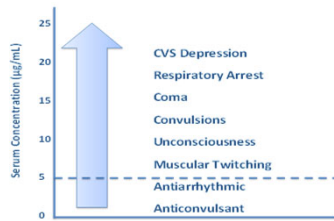
### Tissue toxicity-Rare

- Can occur if administered in high enough concentrations
- Usually related to preservatives added to solution

### Systemic Toxicity-Rare

- Related to blood level of drug
- Secondary to absorption site of injection
- Range from lightheadedness, tinnitus, seizures, and CNS/Cardiovascular Collapse

### Adverse Reactions



### Remember!

#### No epinephrine:

- Fingers,
- Toes, ears, noses, scrotum,
- Penis and labia



### Reasons Why Local Is Not Working

- Joint Hypermobility Syndrome
- Ehler-Danlos Syndrome
- Influence of Alcohol or Alcoholic
- Acidotic tissue
- Variations of nerve distribution from person to person
- Anxiety

### Serious Pain With Injection



Hitting a nerve

Injection into artery

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### Regional Block or Sedation

Use for complex laceration

Nail removal

Finger avulsion

Associated fracture

Partial amputation

Joint manipulation

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### Tools and Materials

Needle Holders

Forceps

Scissors

Needles

Suture Material

Staples

Glue

Steri-Strips

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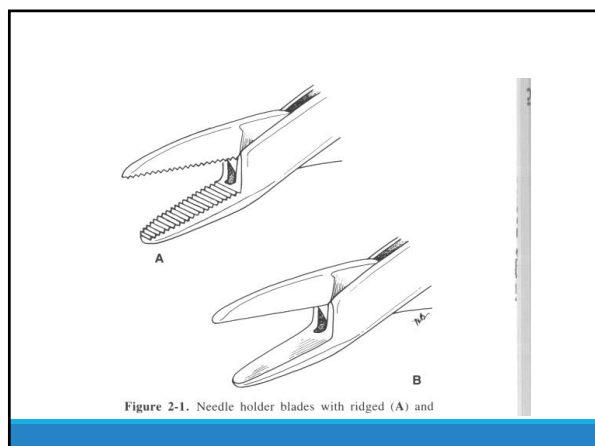
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## Basic Suturing



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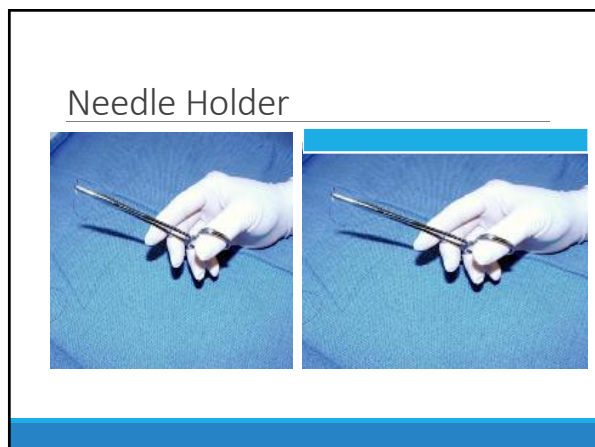
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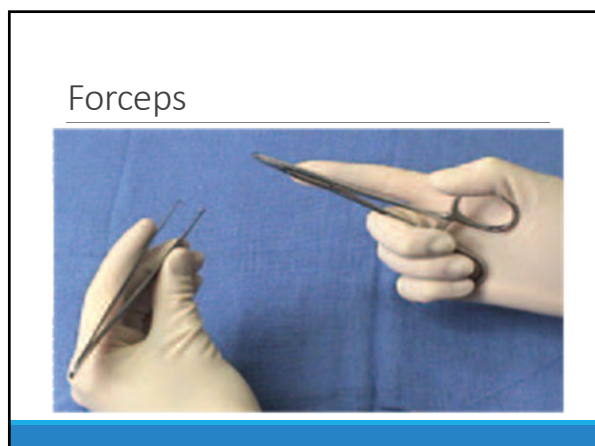
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### What Needle To Choose

- Cutting needles**
- Triangular shaped point
  - Cutting edge to penetrate tough tissue
  - Always used on skin
  - 3/8 circle needle shape
  - 16mm to 19mm length
- Taper Point needles**
- Used to closure of subcutaneous and fascia in the deeper wound

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### Absorbable Suture Material

SUTURE MATERIAL	ABSORPTION RATE
◦ Vicryl	◦ 14 days/complete 42 days
◦ Monocryl	◦ Complete 91-119 days

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### Non-absorbable Suture

SUTURE MATERIAL	ABSORPTION RATE
Prolene	Gradually encapsulated when left in-situ Tissue reaction is minimal
Ethilon	Does degrade 15-20% per year Nylon has a minimal acute inflammatory response

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### Skin Closure Suture Gauges

Scalp	3-0 or 4-0	absorbable
Skin	4-0 or 5-0	non-absorbable
Pinna		
• Perichondrium	5-0	absorbable
• Skin	6-0	non-absorbable
Face	5-0 or 6-0	non-absorbable
• Lip-skin	6-0	non-absorbable
Trunk		
• Subcutaneous/fascia	4-0	absorbable
• Skin	4-0	non-absorbable
• Hands and feet	4-0 or 5-0	non-absorbable

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### Types of Knots

#### Surgeon's knot

- Must be used for all synthetic monofilaments to ensure adequate knot security
- Consists of an initial double throw, followed by a single throw, followed by 1-2 additional locking throws for skin suturing

#### Square knots

- is sometimes used for synthetic absorbable suture. It consists of an initial single throw, followed by a single throw followed by 1-2 additional locking throws

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### Adhesives/Staples

#### Glue

- Bleeding must be controlled
- Small Area
- Not gaping
- Not in Eye area or mucous membranes
- Not on infected areas
- Less irritation
- Do not soak or scratch area-keep dry

#### Staples

- Decrease wound infection
- Use select areas

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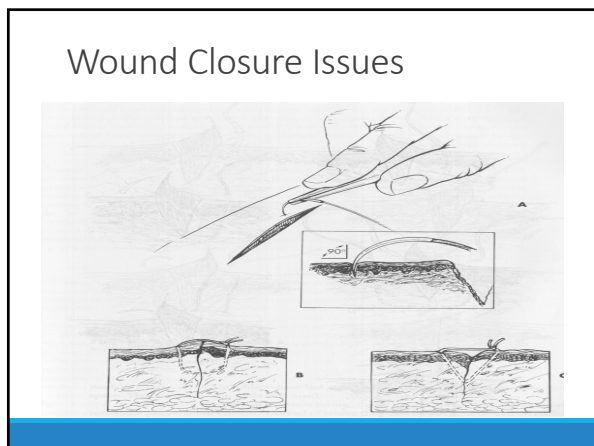
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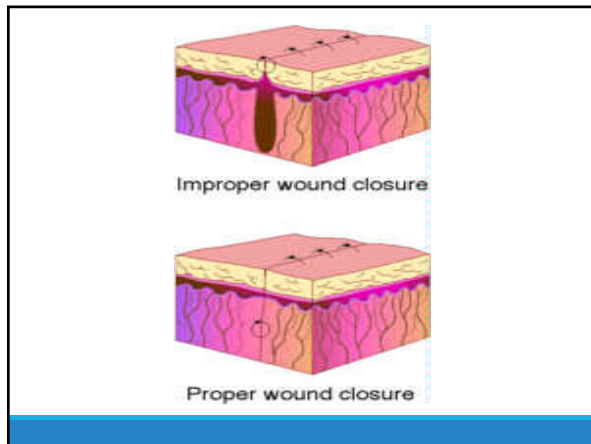
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## Basic Suturing



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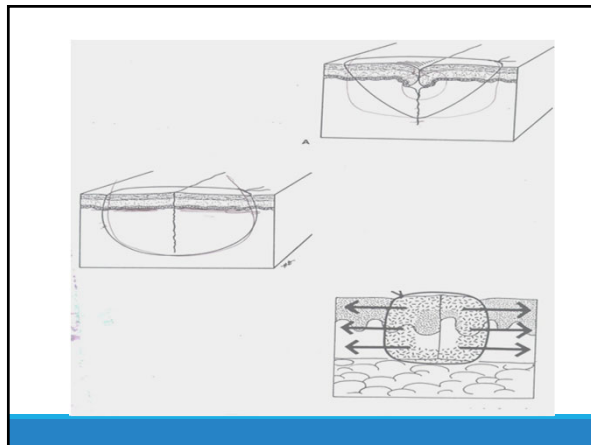
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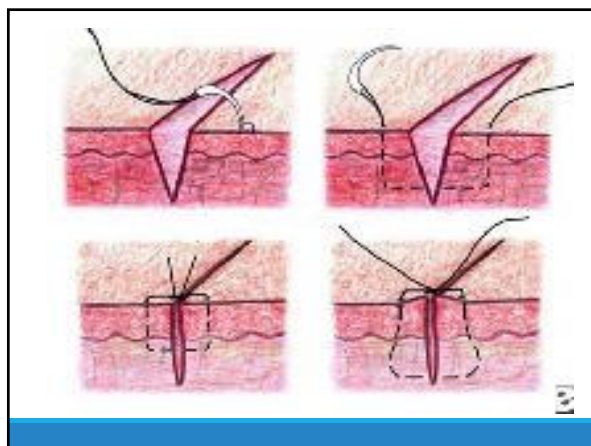
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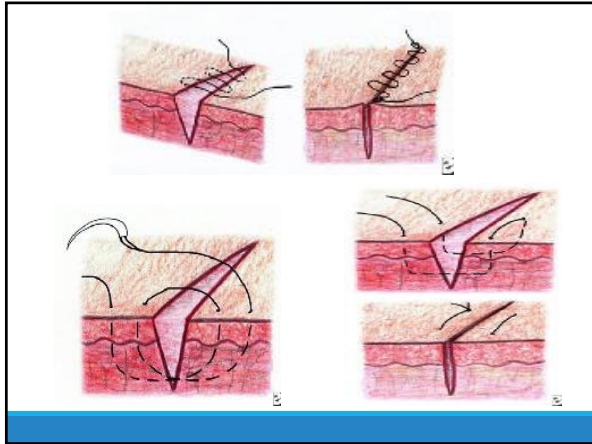
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## Basic Suturing



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### Wound After Care

Wound check  
Dressing  
Topical agents  
Do's and don'ts  
Tetanus



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### Areas for Special Consideration

Nose	Ears
Lips	Eyebrows
Scrotum	Penis
Vagina	Eyelids
Fingers	Fingernails
Palm of Hand	

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### Suture/Staple Removal

Anatomic Location	Removal
◦ Eyelid	2-3 D
◦ Face	4-5 D
◦ Neck	3-5 D
◦ Scalp	7-10 D
◦ Trunk	6-14 D
◦ Extremities	10-21 D
◦ Joints	12-14 D

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### Administration of Local

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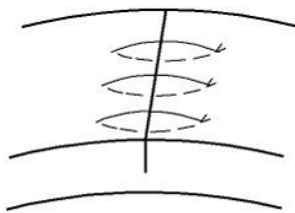
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### Simple Suture



Plain interrupted

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### Instrument Tie

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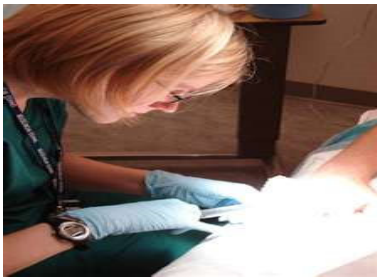
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### Lets Practice



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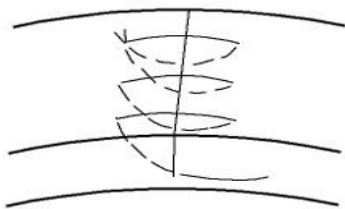
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### Running Simple



Plain continuous

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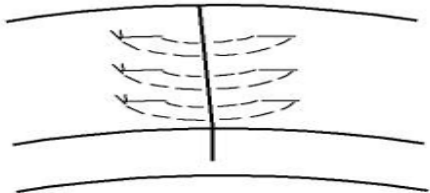
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Vertical Mattress



Mattress interrupted

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Thank you!



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