

Surgical Skills II: Intraoperative and Immediate Postoperative Period

Surgical Skills

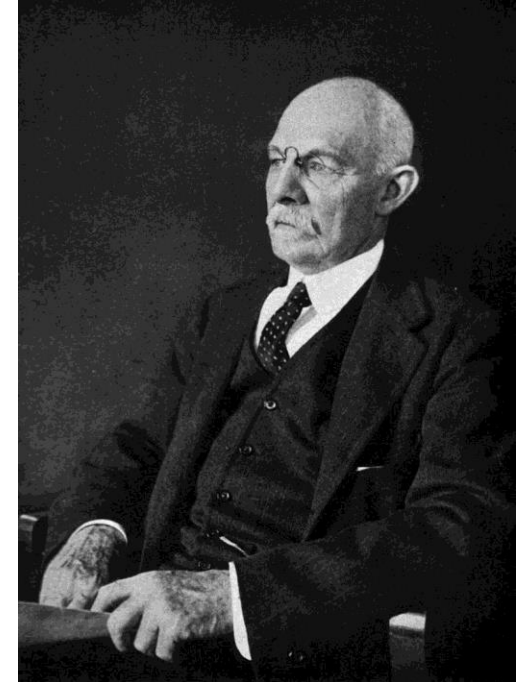


Lesson Objectives:

1. Define the role of the surgical technologist during the intraoperative period
2. Discuss Halstead's principles of surgery
3. Discuss different methods of hemostasis used during surgery
4. Demonstrate how surgical sponges are managed during surgery
5. Discuss the use of absorbable and nonabsorbable sutures
6. Demonstrate suture-handling techniques
7. Identify different types of wound drains
8. Identify commonly used wound dressing materials
9. Discuss postoperative wound complications

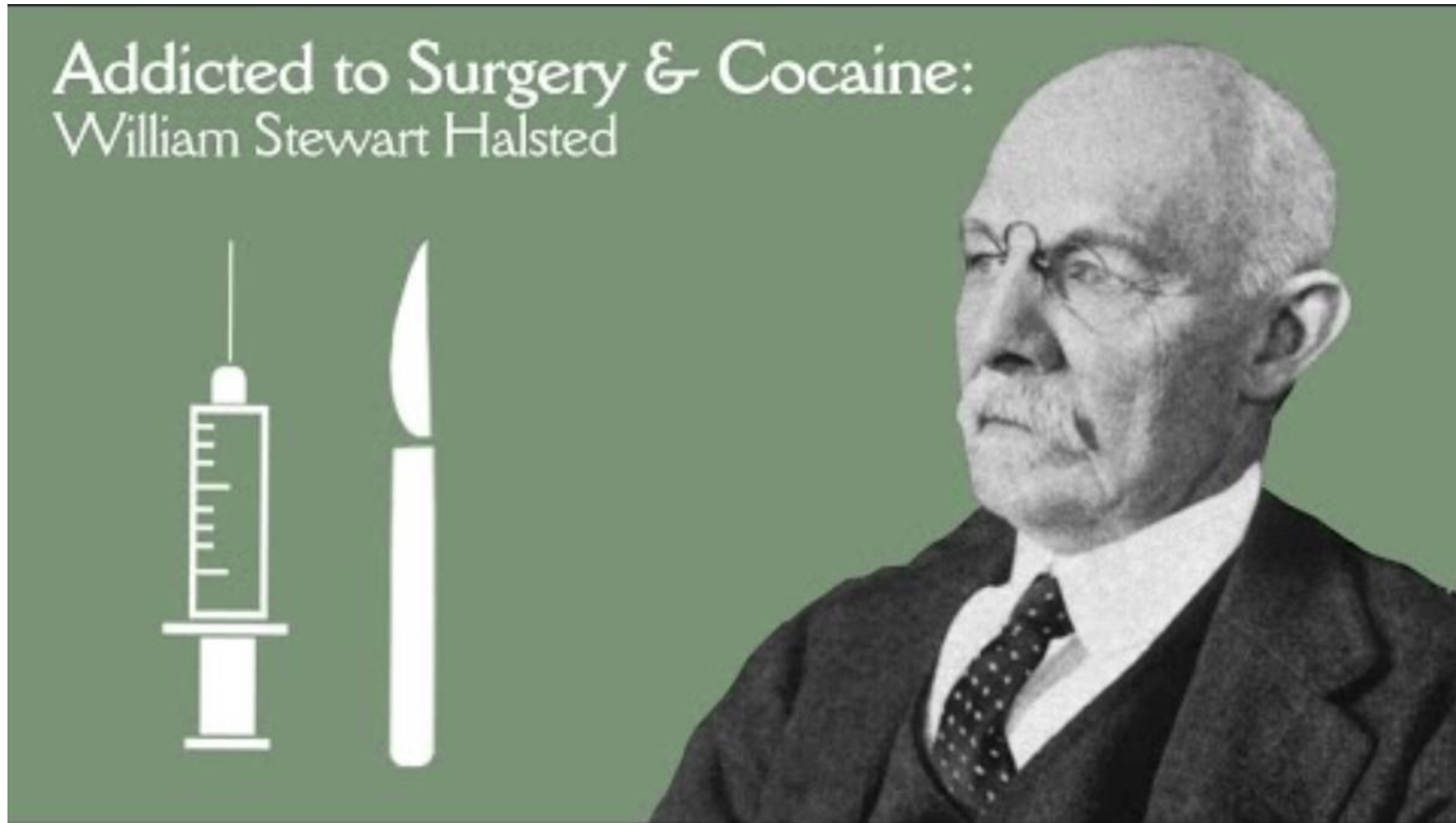
Halstead's Principles of Surgery

- **Method for effective wound and tissue management**
- **Principles Involve**
 - Gentle handling of tissue
 - Control bleeding
 - Preserve blood supply
 - Meticulous aseptic technique
 - Minimize tissue tension
 - Eliminate dead space



**Watch the "Halstead History" video for a brief overview
of his innovation in surgery**

Halstead History Video



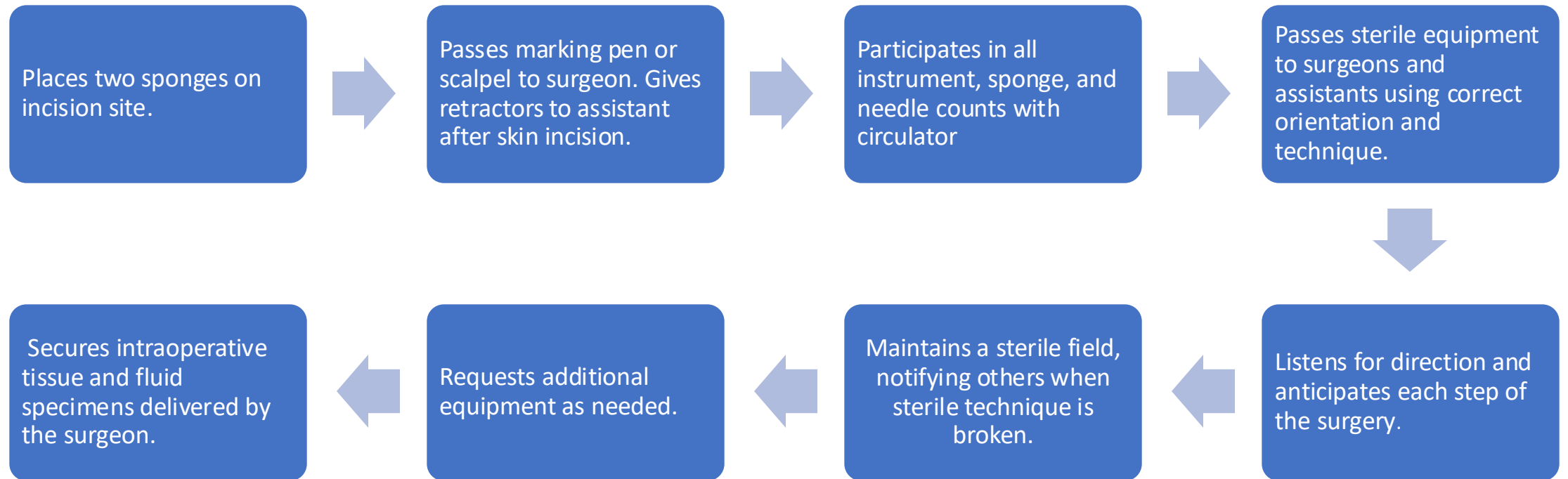
Halstead History Video

Summary of Video:

- Halstead was a pioneer in surgery
- Introduced many Antisepsis techniques after being influenced by Lister
 - Careful Tissue Handling
 - Hemostasis/Control of bleeding
 - Introduced operating with gloves
- Innovated new types of surgery

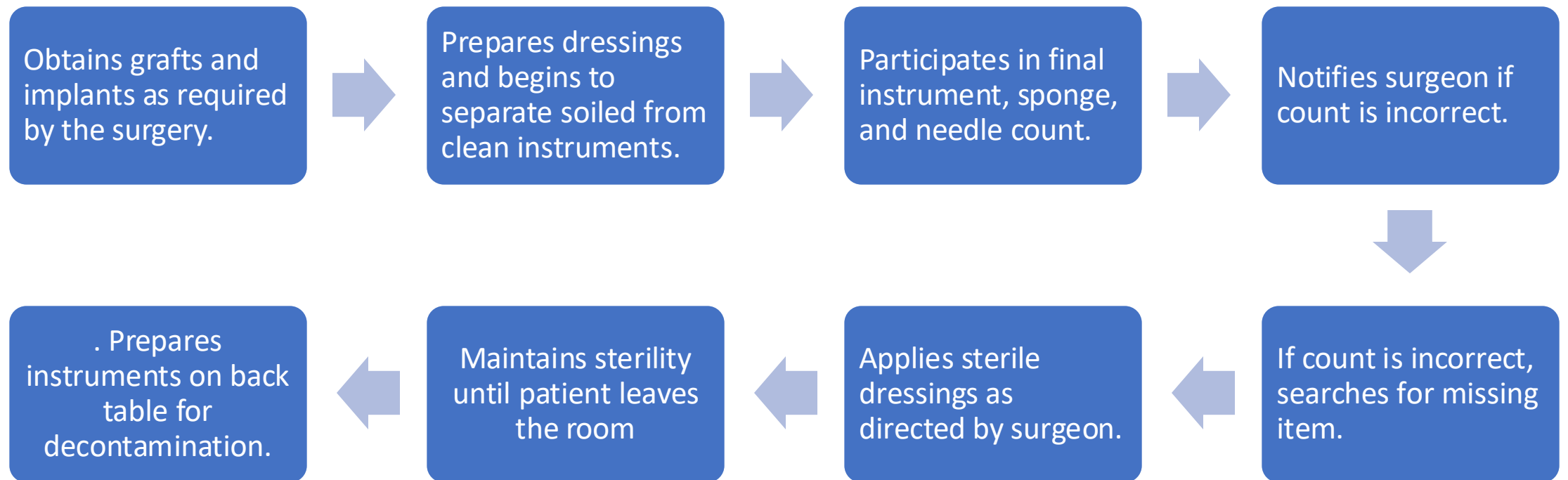
Responsibilities of ST (From Incision to End of Surgery)

(Slide 1 of 2)



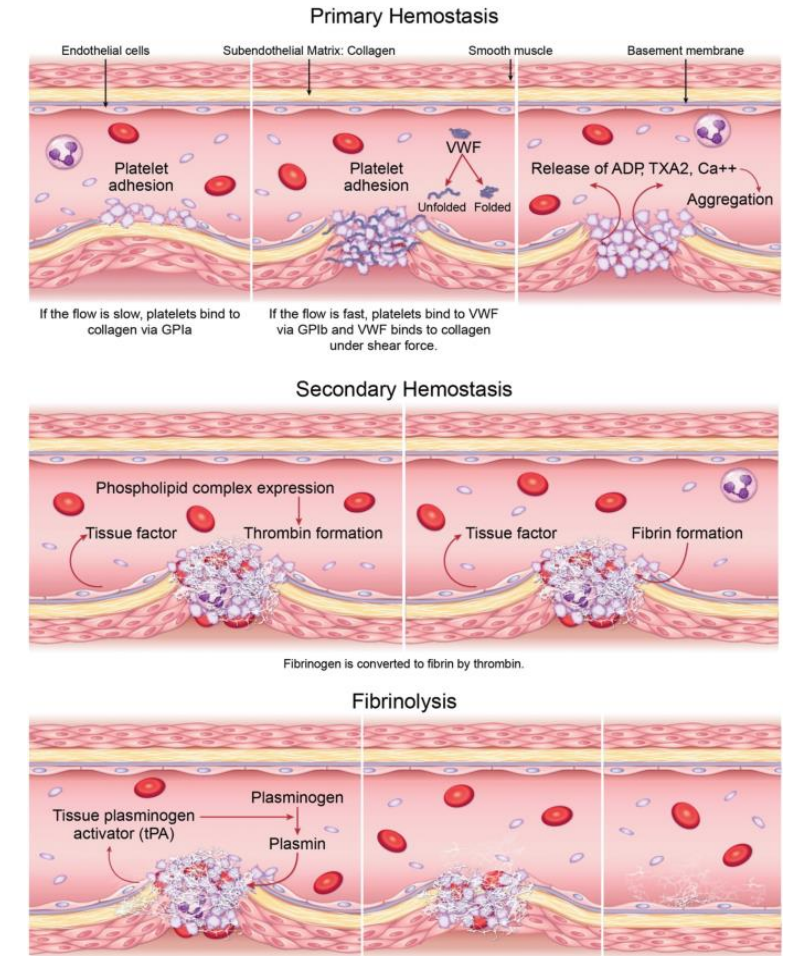
Responsibilities of ST (From Incision to End of Surgery)

(Slide 2 of 2)



Hemostasis During Surgery

- Physiological Mechanism: Body's natural way to control bleeding.
- **Importance in Surgery**
 - Prevents infection, facilitates healing, and prevents hematoma formation.
- **ST Responsibility**
 - Monitoring and anticipating hemostatic needs throughout the procedure.

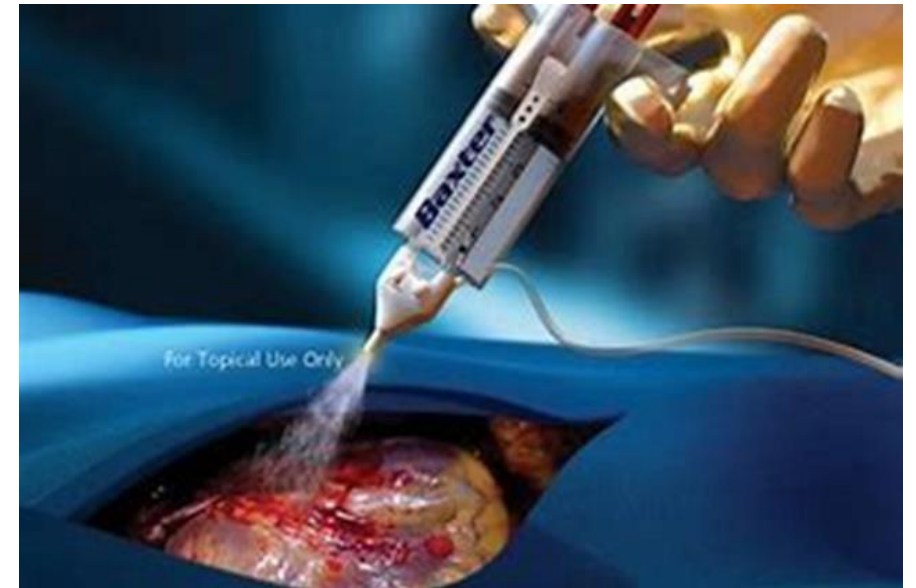


Methods of Hemostasis

- **Direct Pressure:** Compression to encourage clotting.
- **Clamps:** Grasping vessels or tissue to stop bleeding.
- **Electrosurgical Coagulation:** Using electrical current to desiccate tissue.
- **Ultrasonic Coagulation:** High-frequency vibration to liquefy and clot tissue.
- **Ligature:** Suture tie around vessels.
- **Hemostatic Agents:** Substances to enhance clotting or provide mechanical support.

Pharmacological Agents

- ❑ Hemostatic drugs slow or stop bleeding
 - ❑ Absorbable gelatin (Gelfoam®)
 - ❑ Collagen (Avitene®)
 - ❑ Oxidized cellulose (Nu-Knit®; Surgi-Cel®)
 - ❑ Silver nitrate
 - ❑ Epinephrine
 - ❑ Thrombin
 - ❑ Fibrin glue



Blood Loss and Blood Replacement




























- Estimated Blood Loss (EBL) is calculated
- **Blood Replacement Types**
 - Whole blood
 - Plasma
 - Packed red blood cells (RBC's)
 - Platelets
- Homologous blood
 - donor
- Autologous blood
 - self



Blood Types and Antibodies

RELATIONSHIPS BETWEEN BLOOD TYPES AND ANTIBODIES				
Blood Type	Antigens on Red Blood Cell	Can Donate Blood To	Antibodies in Cerum	Can Recieve Blood From
A	A	A, AB	Anti-B	A, O
B	B	B, AB	Anti-A	B, O
AB	A and B	AB	None	AB, O
O	None	A, B, AB, O	Anti-A and Anti-B	O

Blood Donors and Receivers

DONORS									
RECEIVERS		O-	O+	B-	B+	A-	A+	AB-	AB+
	AB+								
	AB-								
	A+								
	A-								
	B+								
	B-								
	O+								
	O-								

Management of Surgical Sponges During Surgery

- **Functions:**

- Absorption, Retraction, and Dissection: Surgical sponges serve multiple purposes, including maintaining dry wounds, retracting tissue, and gently dissecting tissue planes.

- **Radio-Opaque Feature:**

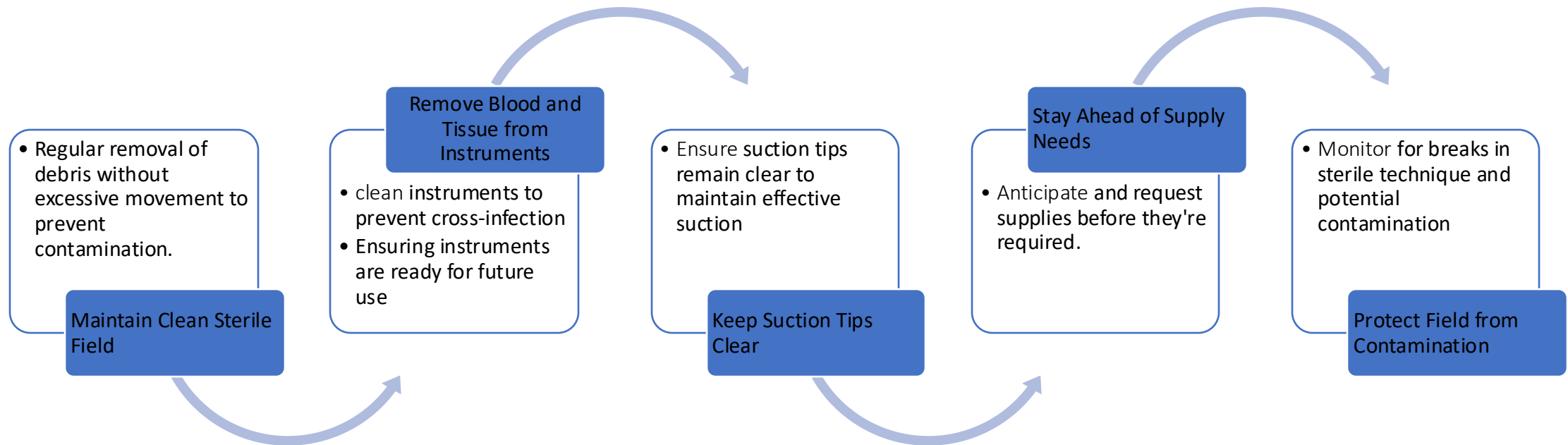
- Essential for X-Ray Visibility: All sponges and towels must contain radio-opaque material to prevent retained items.



Types of Surgical Sponges

- **Raytec 4 X 4 Sponge:** Large square gauze folded into a 4-inch pad, mounted on sponge forceps.
- **Laparotomy Sponge:** Used in major surgeries to absorb blood and fluids, usually moistened before use.
- **Sponge Dissector:** Small sponge covered with gauze for blunt dissection, packaged in groups for easy access.
- **Round String Sponge:** Used in tonsil surgery, with a string for retrieval to prevent airway blockage.
- **Flat Neurosurgical Sponges:** Compressed squares for hemostasis in neurosurgery, often moistened before use.

Management of Sterile Field – Role of STs



Management of the Surgical Wound

- **The role of the surgical technologist**
 - Protecting the wound from contamination – maintaining the sterile field
 - Hemostasis
 - Exposure
 - Protecting the tissue from injury
 - Contributing to tissue viability
 - Avoid tissue tension
 - Eliminating dead space



Management of Surgical Specimens

- **Responsibility for specimens**
 - Loss of a specimen is serious
 - Mishaps related to specimens
 - Incorrect identification
 - Loss of specimen
 - Failure to identify cancerous margins
 - Failure to identify tissue origin

Recommendations for Specimen Handling

- Tag or mark specimen
- Identify and label each specimen
- Do not pass specimen off until surgeon approves
- Do not use sponges to wrap specimen
- Do not distort specimen
- Never discard any tissue

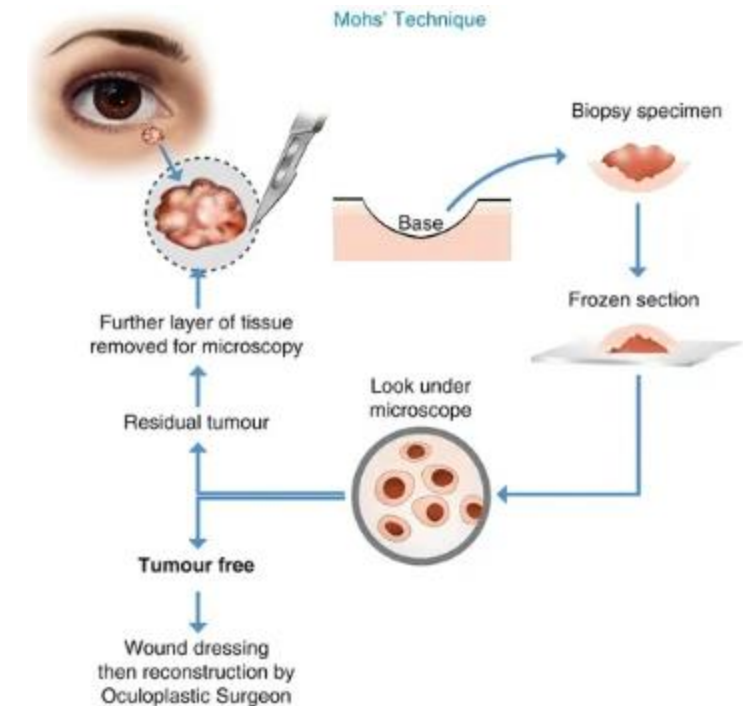
Tissue Biopsy and Frozen Section Specimens

- **Types of specimens**

- Tissue biopsy
- Excisional
- Incisional
- Fine-needle aspiration
- Core needle

- **Frozen section**

- During surgical procedures that require immediate analysis of tissue for malignancy, a frozen section is performed



Other Specimen Types

- Stones
- Amputated limb
- Cells (cytology)
- Products of conception
- Forensic specimens
- Medical devices
- Cultures
- Body fluids
- Muscle biopsy
- Cord blood, umbilical cord, and placenta
- Radioactive specimens
- Autologous tissue for implantation



Frozen Procedure

- **Procedure Planning**

- Pre-Scheduling: Pathologist availability coordinated before surgery.
- Specimen Boundary Verification: Sections marked for orientation.

- **Handling on Surgical Field**

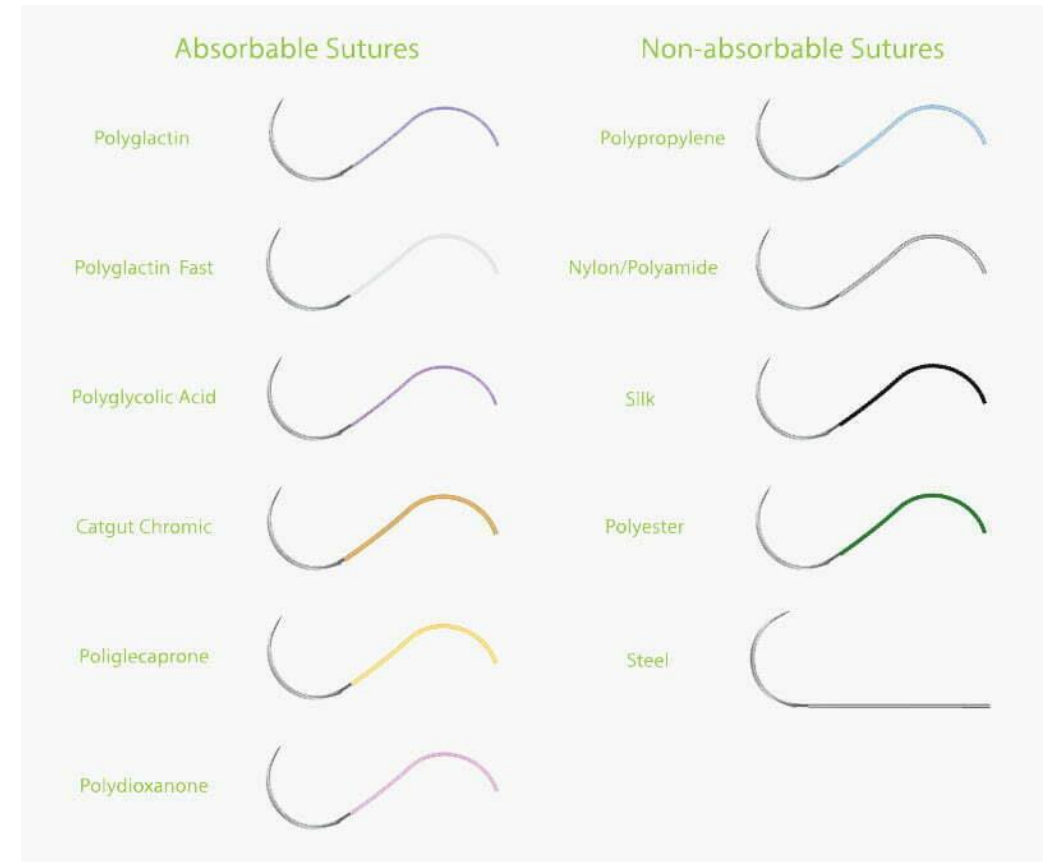
- Moistening Technique: Specimen kept in saline-soaked Telfa strip.
- Communication Importance: Clear detailing of tissue origin and location.

- **Post-Procedure Steps**

- Immediate Handling: Specimen usually passed off sterile field.
- Analysis Timing: Preparation and analysis take 20-30 minutes.
- Communication: Pathologist may communicate findings directly or through speaker call.

Sutures

- Used to approximate tissues and ligate blood vessels or tubal structures.
- Made from various materials including synthesized chemicals, animal protein, metal, and natural fibers.
- Regulated by FDA and USP standards in the United States, and EP standards in the EU.



Physical Structure of Sutures

Structurally, sutures are broadly divided into three categories:

- Monofilament
 - Single fiber
- Multifilament
 - Many fibers
- Twisted
 - Multiple fibers twisted in the same direction
- Braided
 - Multiple fibers intertwined
- Composite
 - A core strand of one material jacketed with another

Suture Size and Characteristics

- **Structure**
 - Based on the diameter of a single strand
 - Sutures range from 5 (thickest) to 12-0 (thinnest)
 - Numerically, when smaller than 0, the size is abbreviated
 - Example: 00 is 2-0, 000 is 3-0, etc
- **Characteristics**
 - Tensile Strength
 - Uniformity
 - Capillary Action

Suture Types

- **Absorbable suture**
 - Surgical gut
 - Plain
 - Chromic
- **Absorbable polymers**
- **Nonabsorbable sutures**
 - Silk
 - Nylon
 - Polyester
 - Polypropylene
 - Stainless steel

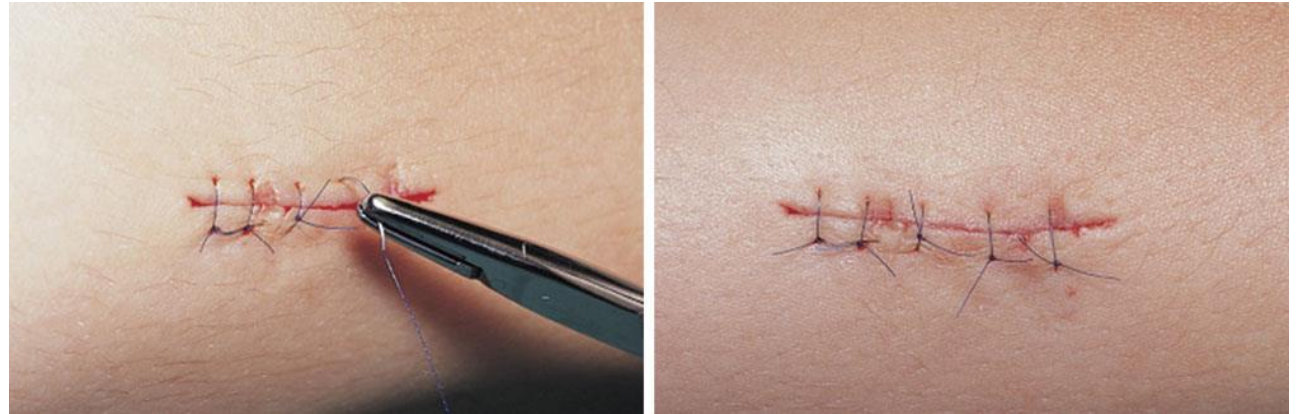


Variables of Suture Selection

- The selection of suture and needle for a particular tissue is based on the tissue type, wound category, the age and medical condition of the patient, and the healing prognosis.
 - Critical nature of the tissue
 - Healing time
 - Required strength during healing
 - Scar formation
 - Urinary tract
 - Risk of infection
 - Cosmetic closure

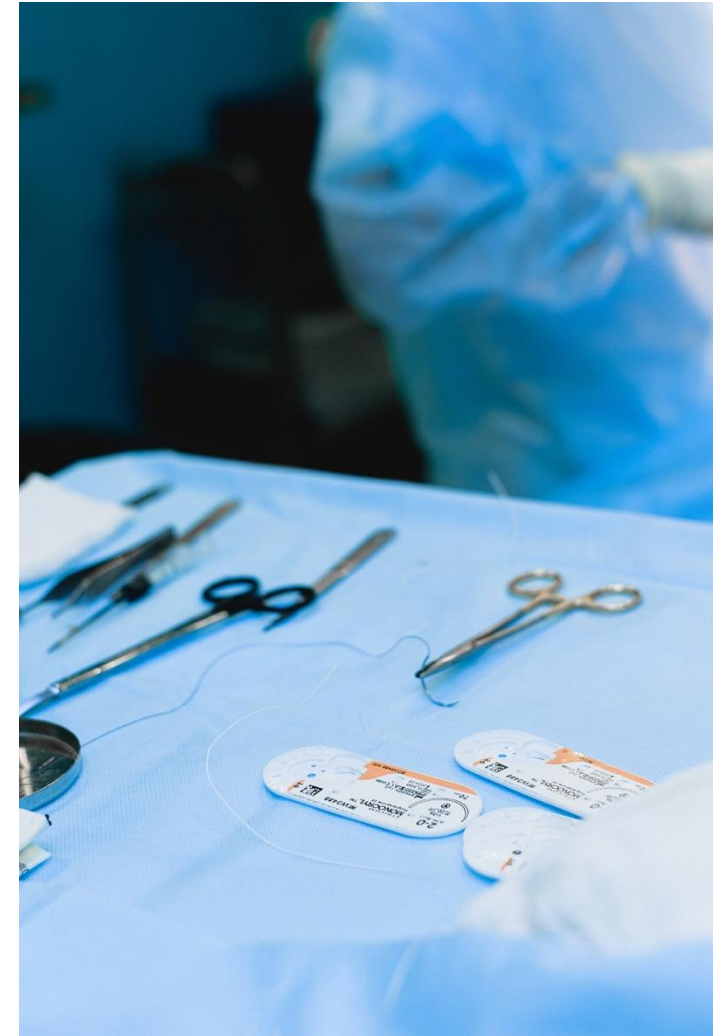
Suture Techniques

- Continuous suture
- Locking stitch
- Barbed suture
- Subcuticular suture
- Purse-string suture
- Interrupted suture
- Retention sutures
- Free ties and reels
- Suture ligature
- Tie on a passer
- Traction sutures and tags



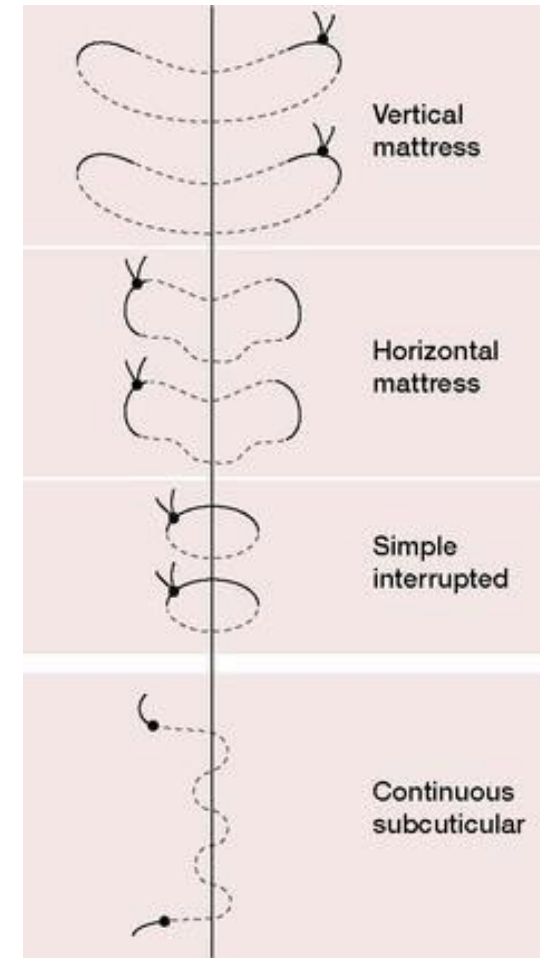
Techniques for Passing Sutures

- Mount needle about 0.5 mm from the swaged end
- Drape loose suture over your hand
- Pass armed needle holder so it can be used
- Needle position is dependent on hand dominance of surgeon



Suture Handling Techniques

- Suture ties
- Cutting suture
 - Use sharp, straight Mayo scissors or suture scissors
 - Hold scissors correctly
 - Steady the scissors, turn to 45-degree angle
 - Palm scissors when completing other tasks
 - Remove cut suture ends from the field
- Suture removal
 - Use straight hemostat



Watch the "Suture" Video for an explanation

Suture Video

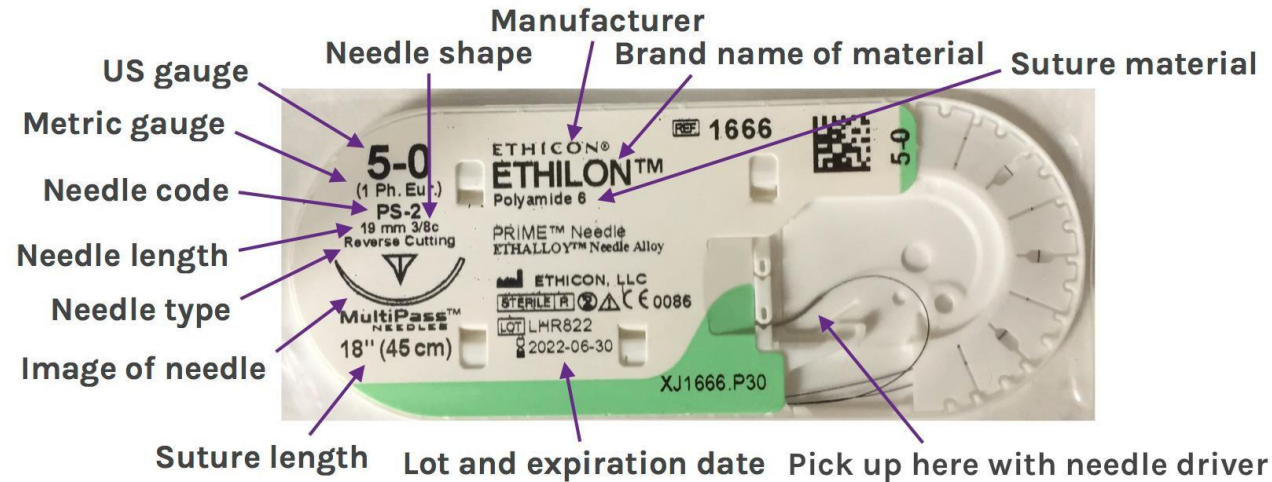


Suture Video

Summary of Video:

- Needles: Taper, Cutting/Reverse cutting, Taper/cut
- Types: Monofilament, Multifilament, Braided, etc
- Reading suture packages

Packaging of Suture



Surgical Needles

(Slide 1 of 2)

- **Surgical Needles**

- High-quality steel alloy or titanium construction.
- Available in various shapes, curvatures, and point styles.

- **Swaged (Atraumatic) Suture**

- Suture pre-attached to needle for seamless connection.
- Enables faster suturing with minimal tissue trauma.
- Detachable sutures used for rapid placement of multiple interrupted sutures.

- **Double-Armed Suture**

- Needle swaged to each end for circular incisions or hollow lumens.

QUALITY NEEDLES PVT. LTD. NOIDA (U.P.) INDIA

DRILLED- END TAPER CUTTING NEEDLES

EXAMPLE OF NEEDLE CODE
HSY165 40 100 51 DRS

1. SHAPE
D - 3/8 Circle
F - 5/8 Circle
H - 1/2 Circle
K - Half curved
X - Compound curve

2. POINT
SY - Round body taper Cutting

3. ANGLE OF CURVATURE
135° - (3/8 Circle)
160° - (1/2 Circle)
165° - (1/2 Circle)
170° - (1/2 Circle)
175° - (1/2 Circle)
180° - (1/2 Circle)
225° - (5/8 Circle)

4. LENGTH
Length of needle (in mm)

18	40
20	42
22	45
24	48
25	49
26	50
28	52
30	55
35	58
36	59
38	60

5. WIRE SIZE
Wire dia. of needle in hundredths of mm.

38	84
40	86
43	88
46	92
48	100
51	108
56	112
58	120
61	127
66	130
71	140
74	157
81	

6. HOLE SIZE
Diameter of drilled hole in hundredths of mm.

19	51
20	53
21	55
23	56
25	59
27	61
28	63
30	65
32	69
33	70
36	73
40	79
42	84
43	85
44	90
46	93
47	103
48	105
49	

7. GRADE OF STEEL
A - AISI 420
B - Custom 455(max. wire dia. 1.27mm)
D - AISI 302

8. RIBBED BODY
R - Ribbed body

9. SILICONISED
S - Siliconised

Surgical Needles

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- **Eyed Needles**

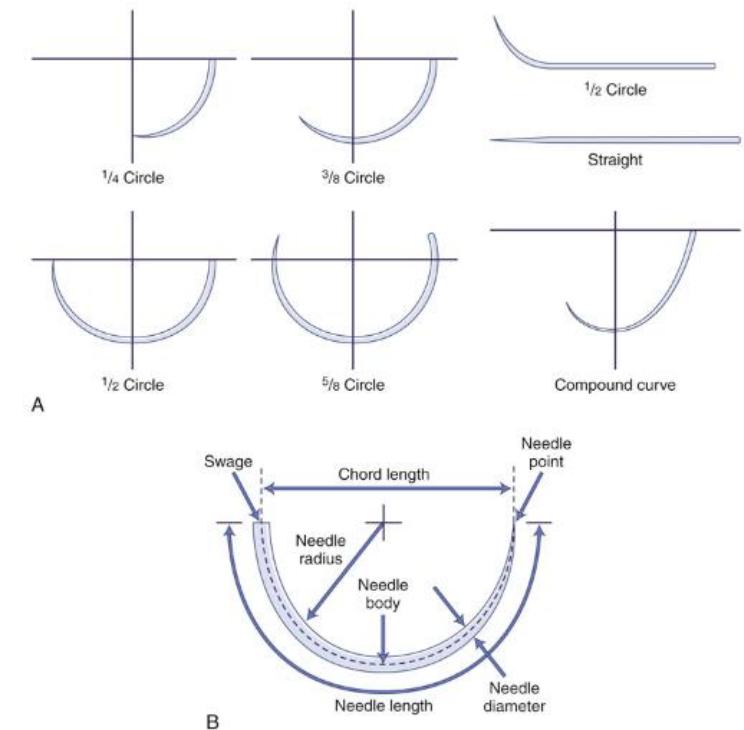
- Fewer surgeons use; round shape with round, rectangular, or square eye.
- French-eye needle pressed to snap suture into place.

- **Needle Shape and Size**

- Curvature measured as a circumferential fraction in a complete circle.
- Needle size identified by shaft diameter and tip-to-eye dimension.

- **Needle Point**

- Blunt: Safest, pushes tissue aside.
- Tapered: Punctures tissue, used for soft tissue.
- Cutting: Sharp edge for fibrous connective tissue.
- Taper-cut: Reverse cutting edge for dense fibrous tissue.



Surgical Wounds: Classifications

4 Categories based on contamination

Class I: Clean

- Sterile: NO dirty tract
- Total joint, CABG

Class II: Clean Contaminated

- Break in sterility: Entry into GI, respiratory, GU
- Appendectomy, tonsillectomy

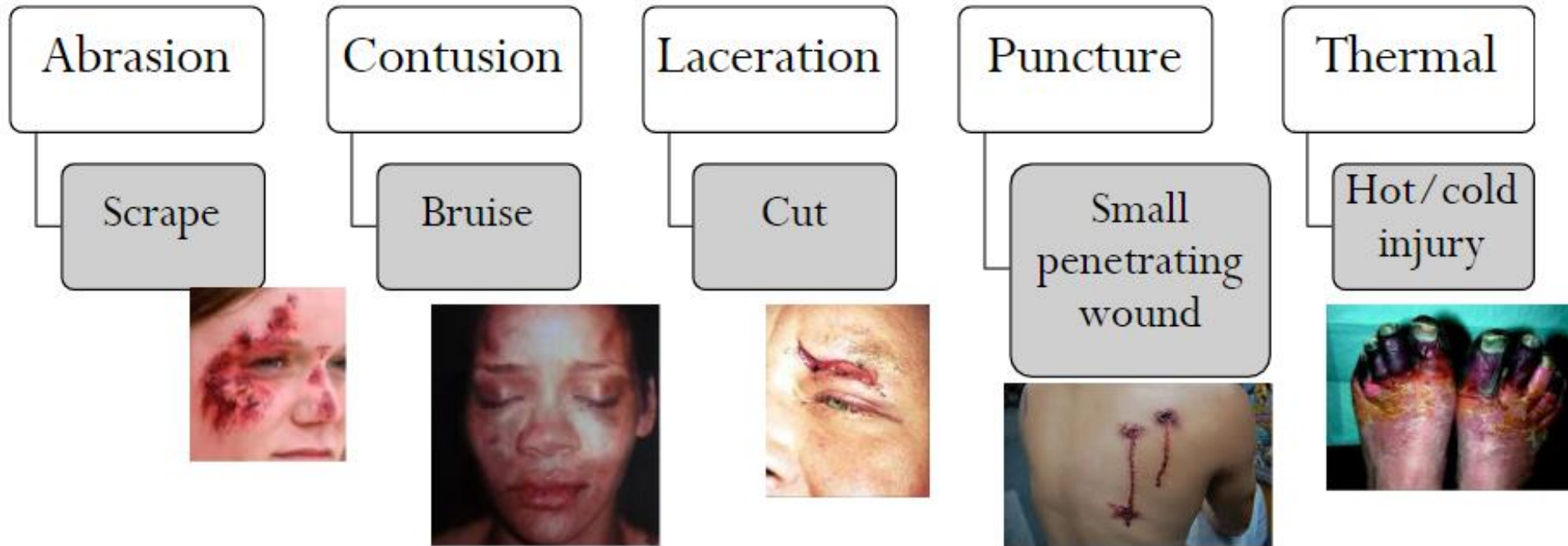
Class III: Contaminated

- Open wound, major break, Spillage of GI
- Open fracture, Penetrating trauma, Colon spillage

Class IV: Dirty/Infected

- Infection present
- Ruptured appendix, necrotizing fasciitis, trauma (4 hours)

Other Classifications



Wound Drainage

- Fluid sometimes accumulates in the wound after surgery
- To prevent this, a drain may be placed in the wound before closure.
- Simple drainage systems require a reservoir to collect the fluid.
- Drains are placed in the wound before complete closure or through a separate incision near the main incision
- The surgical technologist assists in this process

Wound Drainage

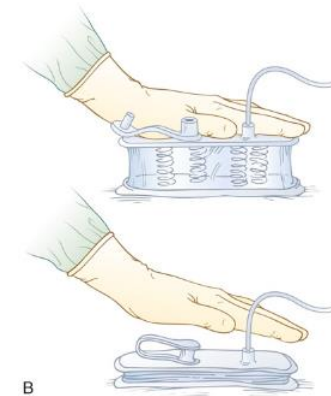
Passive Drainage Systems

- Penrose drain: Simple tubular material for minimal drainage.
- No reservoir needed; fluid collected with gauze dressing.
- Other types: T-tube, Pezzer, Malecot, Foley catheters.



Suction Drains

- Hemovac and Jackson-Pratt drains: Pull fluid using negative pressure.
- Effective for larger fluid volumes.



Wound Drainage

Water Sealed Drainage System

- Used post-thoracic surgery to restore negative pressure.
- Three water chambers prevent re-entry of fluid or air.
- Must be kept upright to prevent lung collapse.



Stoma Pouch

- Collects body fluids after stoma surgery.
- Provides leak-proof system for wound healing.



Watch the "Surgical Drains" Video for a brief explanation

Surgical Drains Video



Surgical Drains Video

Summary of Video:

- Drains evacuate fluids after surgery so they do not accumulate in the body
- Drains usually held in place with suture
- Parts of drain:
 - Drain tube inside body
 - Drain tube outside body
 - Collection container

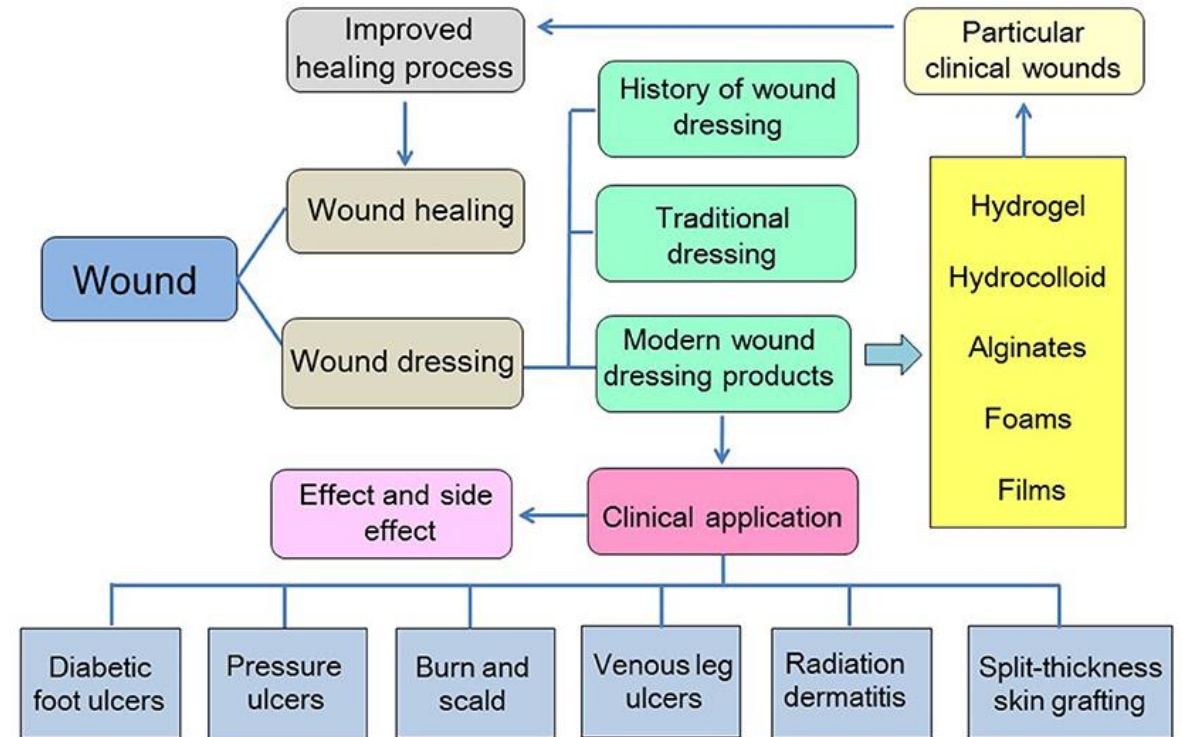
Functions of Wound Dressings

- Prevents contamination
- Prevents injury to the wound
- Absorbs exudate
- Provides support
- Provides constant source of antibacterial agents



Wound Dressing: Types

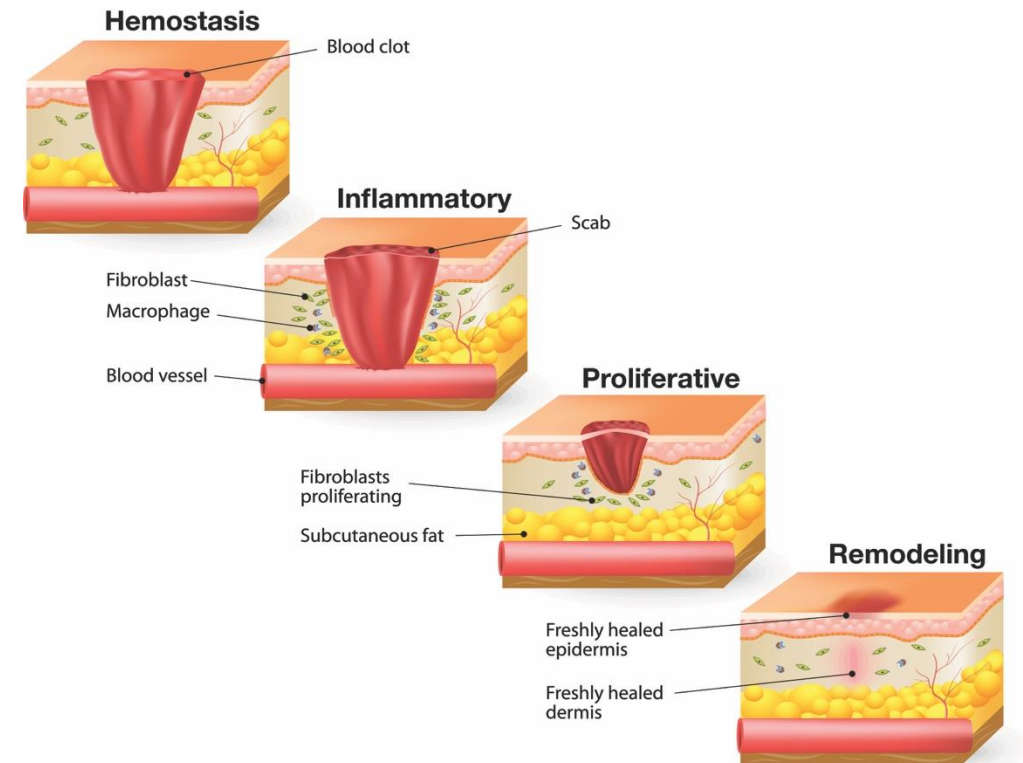
- Flat dressing
- Rolled dressing
- Gauze packing
- Ointments or bacteriostatic agent
- Adhesive tape
- Steri-Strips
- Occlusive film dressing (Opsite)



Phases of Healing

- **Phases of healing**
 - Inflammatory phase
 - Proliferative phase
 - Remodeling stage
- **Conditions that Affect Wound Healing**
 - Immune system
 - Chronic disease
 - Cleanliness
 - Health

WOUND HEALING



Wound Complications

- Surgical site infection
- Seroma or hematoma
 - Fluid or blood accumulation
- Dehiscence
 - Partial or total separation of previously approximated wound
- Evisceration
- Adhesions

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Thank you!

Get ready for your quiz and rest of the activities now. Best of luck!



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Lesson 19 is complete.