

Surgery & Suturing Technique

HASPI Medical Anatomy & Physiology

Lab Activity

Background

Surgery

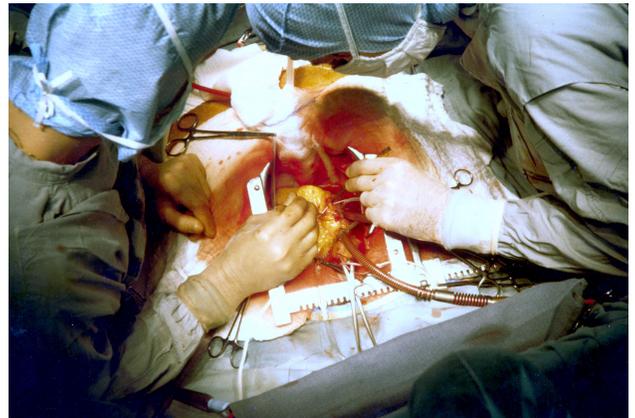
Surgery is used when physical intervention is required to treat a patient. In general, surgery involves excising or correcting tissues of the body. A non-invasive surgery refers to a surgery that does not penetrate the structure being excised or corrected, while invasive surgery does. There are many different types of surgery performed with the goal on becoming less invasive as medical technology improves.

Surgical procedures can be categorized by the type of procedure, body system(s) that are being treated, the degree of urgency, level of invasiveness, and/or the instruments being used in the surgery. The following list is only a small example of the types of surgical procedures used commonly in medicine today.

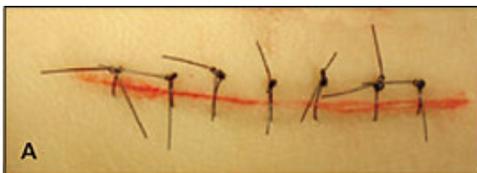
- **Emergency surgery** – life threatening and must be done
- **Elective surgery** – non-life threatening and occurs at the patient's request
- **Exploratory surgery** – used when a diagnosis has not been confirmed
- **Reconstructive surgery** – used to reconstruct injured or abnormal tissue
- **Cosmetic surgery** – used to reconstruct normal tissue
- **Transplant surgery** – used to replace tissue
- **Orthopedic surgery** – performed on muscles, bones, tendons, or ligaments
- **Cardiac surgery** – performed on the heart
- **Gastrointestinal surgery** – performed on the digestive system
- **Laparoscopic surgery** – a minimally invasive surgery that uses a small incision
- **Laser surgery** – uses a laser to perform surgical procedure
- **Endoscopic surgery** – uses an endoscope to perform surgical procedure
- **Robotic surgery** – uses surgical robots to perform surgical procedure

Name(s): _____

Period: _____ Date: _____



http://upload.wikimedia.org/wikipedia/commons/0/05/Coronary_artery_bypass_surgery_Image_657B-PH.jpg



Suturing

Suturing is used to close wounds and has been practiced for thousands of years. It is commonly known by the general public as stitches. While the materials used in suturing and techniques have changed during that time, the general goal has remained: minimize bleeding, reduce the risk of infection, close skin edges allowing for function and healing, and support and strengthen a wound until the body's own healing process takes over. There are many different types of suturing techniques based on the type of wound, location of the wound, skin thickness, and the desired result. Using the correct suture technique will reduce scarring and allow for proper function of the tissue.

<http://www.aafp.org/afp/2008/1015/afp20081015p945-f1.jpg>

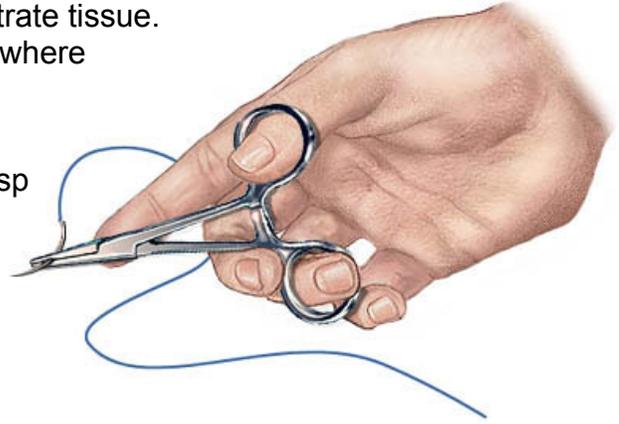
Basic Suturing Principles

The Needle

Suturing needles are most commonly curved and made of 3 sections. The point, or tip, is sharp and used to penetrate tissue. The body is the middle of the needle, and the swage is where the suturing material attaches.

The Needle Holder

The use of forceps or specialized needle holders to grasp the needle while suturing allows for greater dexterity while suturing. Using needle holders also prevents the chance of the suturing needle piercing the gloves or skin of the healthcare provider during suturing, and therefore reducing the risk of contamination. The forceps may also be used to grasp and hold the tissue during suturing.



<http://agarypharm.com/images/sutures.jpg>

The Suture Material

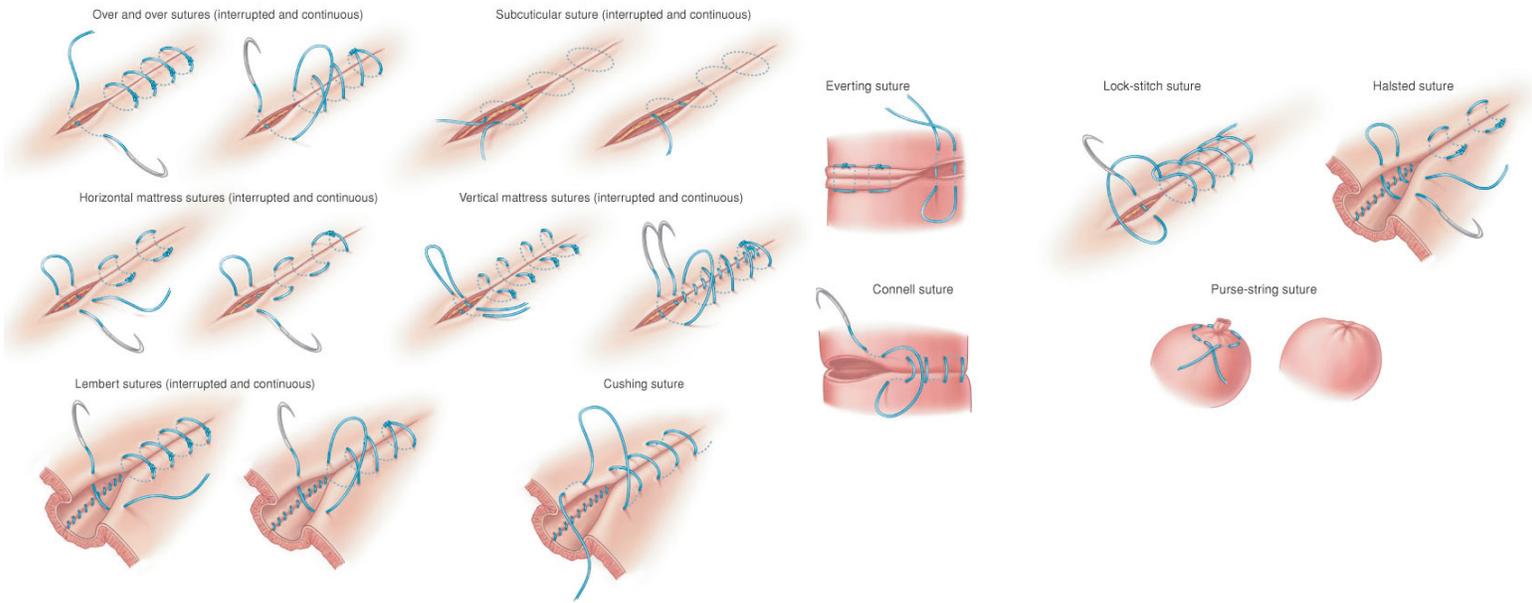
There are many different types of suture material. The material may be synthetic and require later removal, or come from an organic source that will eventually be broken down or pushed out by the body. The most common organic sutures are called catgut, but are usually collagen from bovine intestine. Polyglycolide and polydioxanone are the most common synthetic sources of suture material.

Knot Tying

The square knot is the most commonly used knot for cutaneous suturing procedures. The square knot allows for the suture material to hold tightly and can easily be made with suture material.

Suturing Technique

Suturing technique refers to the type of stitching used to create the suture. The following diagram shows some most common suture techniques used.



<http://mtresources.tripod.com/images/suture1.jpg>

Surgery. 2013. Types of Surgery. www.surgery.com.

Mackay-Wiggin, J. and Elston, D.M. 2012. Suturing Techniques. Medscape Reference, Article 1824895, www.emedicine.medscape.com.

Body Substance Isolation

When working with patients, it is important to ensure that the environment is clean and that the safety of the patient and healthcare workers is a priority. Body substance isolation, or BSI, involves isolating body substances and fluids of the patient and healthcare workers to reduce the risk of disease transmission. These substances may include blood, feces, urine, and vomitus. BSI practices are universal in every healthcare/treatment setting.

Personal protective equipment (PPE) used to ensure BSI may include:

- Non-sterile and sterile gloves
- Surgical face masks
- Safety goggles or masks
- Hospital gowns
- Shoe covers
- Hairnets

Not all PPE is worn for every treatment or patient. For example, a healthcare worker taking a blood sample may only wear gloves and goggles. On the other hand, orthopedic surgery often requires all PPE and even doubling up on specific items, such as gloves, to ensure there is a reduced risk of bone infection transmitted by contamination during the surgery.



<https://www.hponline.com/inside/September%2005/gownsDrapes/Precept-Excel-Surgical-Gown.jpg>

Materials

Patient mat	Suture material	Facemask
Scalpel	Forceps	Gown
Gloves	Hairnet	Dissecting kit (optional)

Procedure

In this activity you will be part of a surgical team performing four surgeries on your patient. You will each have a role and that role will switch between each surgery. This activity is meant to allow practice using surgical and dissecting tools as well as to learn some basic suturing techniques.

Choose Surgical Team Roles

Everyone will switch roles between the four surgeries. If you only have 3 members in your team, combine the responsibilities of the scrub and circulating nurse.

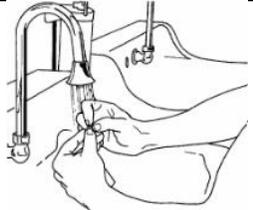
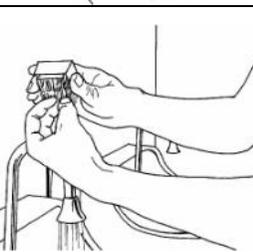
- The [chief surgeon](#) will perform the incision, locate the issue, and respond accordingly
- The [assisting surgeon](#) will suture the incision
- The [scrub nurse](#) will prepare and handle equipment for the surgeon
- The [circulating nurse](#) will oversee the procedure and ensure the directions are followed

Prepare the Surgical Room

- Collect the patient and place her comfortably at your lab table
- Collect your scalpel, forceps, sutures, and face mask
- Lay a paper towel out next to the operating table and lay each tool on the paper towel where it can easily be picked up during the surgery

Let's Scrub In!

There is a protocol for scrubbing in and preparing for surgery. It may differ slightly from hospital to hospital. Follow the directions to prepare for surgery.

Hand Washing and Scrubbing		
1	Open the surgical scrub kit and place it near the sink. The surgical scrub kit will be shared amongst your surgical team.	
2	Use several drops of soap and work it into a heavy lather with the hands. Wash the hands and arms all the way to the elbow.	
3	Rinse the soap from the hands and arms.	
4	Remove the small plastic nail cleaner from the scrub kit. Clean under the fingernails under running water.	
5	Lather the fingertips with the sponge of the brush, then use the bristle side to scrub under the fingernails of both hands. Use 30 circular strokes for each hand. Add soap and water to the brush at any time if it starts to get dry.	
6	Move to the fingers and use the sponge to lather the fingers. Use the bristle to scrub on all four sides of each finger, including between the fingers. Use 20 circular strokes for each hand.	
7	Lather the palm and back of the hand with the sponge. Use the bristles to scrub with 20 circular strokes for each hand.	
8	Lather the wrist and forearm with the sponge. Use the bristles to scrub with 20 circular strokes for each arm.	
9	Thoroughly rinse hands and arms. Use a hand towel or paper towel to thoroughly dry the hands and arms. In an actual surgery, the towel would be sterile and you would avoid touching any surface that would contaminate your clean hands/arms.	

www.brooksidepress.org/Products/Scrub Gown and Glove Procedures/lesson 1 Se

Gowning

1	In this simulation, there may be only one gown for your team. In this case, the chief surgeon will be wearing the gown and the team will assist the gowning process.	
2	The chief surgeon will now avoid touching anything, while the surgical team picks up the gown and lets it unfold. Open and locate the sleeves/armholes.	
3	Place arms into sleeves. The gown will tie at the back.	
4	Hold the arms up and out. Have the circulating nurse pull the gown closed in the back and tie the gown closed.	

http://medical.tpub.com/14295/img/14295_109_1.jpg

Hairnet and Facemask

1	If you have long hair, secure it in a ponytail.	
2	Place your hairnet on your head, ensuring no hair is visible outside the hairnet. The hairnet should cover your ears.	
3	The facemask will either loop behind the ears or tie at the back. Once your facemask is on, it cannot be removed! If you have a hard time breathing with it on, you can pull the bottom out slightly for a breath of fresh air.	

<http://www.elderstore.net/Images/products/Medline/MLnon37385FaceMaskHypo>

Sterile Gloves

1	Putting on sterile gloves is very different than non-sterile gloves. The surface of sterile gloves cannot be touched by your hands or they will be contaminated!	
2	Place a pair of gloves on a paper towel with the thumbs facing up. Fold the bottom cuff up exposing the inside of the glove (see image). FROM HERE ON OUT, YOUR HANDS SHOULD ONLY TOUCH THE INSIDE OF THE GLOVE!	
3	Using your non-dominant hand, grab the folded cuff of the glove for your dominant hand. For example, if you are right-handed use your left hand to grab the cuff of the glove for your right hand.	
4	Pull the glove onto your dominant hand <u>only</u> using the folded cuff.	
5	Now that you have one sterile glove on, you can only touch a sterile surface with the gloved hand! Slide your gloved hand <u>under</u> the cuff of the second glove.	
6	Pull the second glove onto your non-dominant hand.	

http://medical.tpub.com/14295/img/14295_110_1

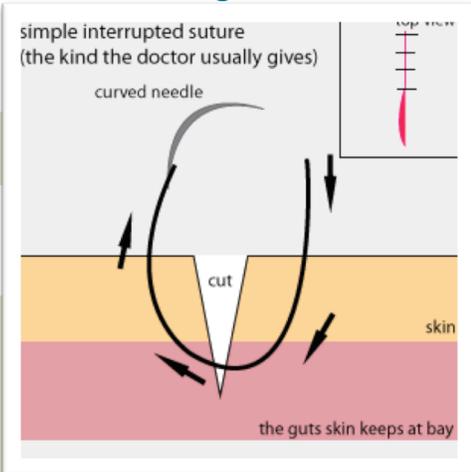
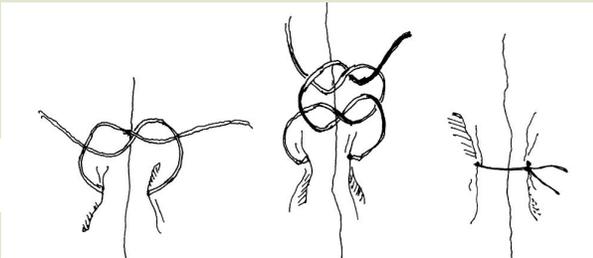
Now you are ready for surgery (and you look good, too!) In an actual surgery, the room and equipment would also be sterilized. For this activity, we will assume that everything that has been setup has been sterilized. You should still avoid touching any part of your skin, hair, or clothes while wearing the sterile gloves.

Procedure

Part A. Exploratory Open Heart Surgery

Your patient is a 26-year-old female who just underwent open-heart surgery to correct a defect in the mitral valve 5 weeks ago. She has not been healing well and a recent chest x-ray was suspicious. Today your surgical team has decided to reopen the chest and determine what is going on with her heart. Follow the directions below to complete the surgery.

✓when complete

Step 1	Everyone on the surgical team needs to wear a facemask. Yes they are uncomfortable, but they must stay on for the duration of the surgery!!!	
Step 2	The chief surgeon will use the scalpel to make only a 1 to 2-inch vertical incision on the medial line of the chest, directly over the sternum. Do not push too hard! If you puncture or cut any underlying organs you could damage your patient!	
Step 3	Use the forceps to lightly pull the sides of the skin apart to look into the thoracic cavity of the patient. Find the heart and identify whether there are any abnormalities.	
Step 4	Remove any abnormality that is visible and tape or glue it in the analysis section for Part A.	
Step 5	The assisting surgeon will use the forceps and scalpel to suture the incision. For this surgery we will use a simple interrupted suture.	
Step 6	To start a simple interrupted suture, push the point of the needle into the skin on one side of the incision and curve the needle up through the skin on the opposite side of the incision. See Diagram A.	
Step 7	Pull the suture material (string) through the skin leaving about 2-3 inches of string on the free end.	<p>http://eastforkspring.com/wp-</p> <p>If you need further instruction on the square knot visit the following site for an animation: http://www.troop824-gslac.org/Book/squareknot.htm</p>
Step 8	Tie a square knot by crossing the needle and string and pulling tight enough to pull the incision together, but NOT to cause an overlap of the skin. See Diagram B for an example of a square knot.	 <p>http://imgur.com/LYhda.jpg</p>
Step 9	Trim the suture material to complete the suture.	
Step 10	Apply one more simple interrupted suture to close the incision in the chest.	

Part B. She's Crashing!

Your team has just completed the exploratory open-heart surgery, but the patient is crashing! It appears she may have some internal bleeding caused by a gastric ulcer. Switch surgical team roles and follow the directions below to save her life!

✓ when complete

Step 1	The chief surgeon will use the scalpel to make a 1-inch horizontal incision over the left upper quadrant of the abdomen. Do not push too hard! If you puncture or cut any underlying organs you could hurt your patient!	
Step 2	Use the forceps to lightly pull the sides of the skin apart to look into the LUQ of the abdominal cavity of the patient. Find the stomach.	
Step 3	Unfortunately, the stomach is completely ulcerated and a large portion will need to be removed through gastric bypass.	
Step 4	Remove the part of the stomach that is visible and tape or glue it in the analysis section for Part B.	
Step 5	Using the directions for suturing in Steps 6-9 in Part A, the assisting surgeon will place two simple interrupted sutures to close the incision in the LUQ.	

Part C. A Second Heartbeat???

Your team has just completed the gastric bypass when the nurse notices something strange. As she listens to the abdominal aorta she notices a second heartbeat, and it is getting fainter. Your patient is pregnant and must not have known! You must work fast to save the baby's life. Switch roles again and follow the directions below to save her life!

✓ when complete

Step 1	The chief surgeon will use the scalpel to make a 1-inch horizontal incision over the pelvic region. Do not push too hard! If you puncture or cut the fetus you could lose your medical license and harm the baby!	
Step 2	Use the forceps to lightly pull the sides of the skin apart to look into the pelvic region and find the fetus.	
Step 3	Deliver the baby and tape or glue it in the analysis section for Part C.	
Step 4	Using the directions for suturing in Steps 6-9 in Part A, the assisting surgeon will place two simple interrupted sutures to close the incision in the pelvic region.	

Part D. Whoops!

Your team has just completed the cesarean section, but when you were moving the patient to a gurney she slipped and slammed her left knee on the floor. X-rays show that the patella is shattered. Switch roles and follow the directions below to remove the bone fragments in her knee.

✓ when complete

Step 1	The chief surgeon will use the scalpel to make a 1-inch vertical incision over the left kneecap. Do not push too hard!	
Step 2	Use the forceps to lightly pull the sides of the skin apart to look at the knee. Find the patella.	
Step 3	Remove the shattered patella and tape or glue it in the analysis section for Part D.	
Step 4	Using the directions for suturing in Steps 6-9 in Part A, the assisting surgeon will place two simple interrupted sutures to close the incision in the knee.	

Analysis

Tape or glue whatever was removed during each surgery in the space provided for each surgery. Write the name of the team member that fulfilled each role for the surgeries.

<p style="text-align: center;">Part A Exploratory Open Heart Surgery</p> <p>Chief Surgeon: _____ Assisting Surgeon: _____ Scrub Nurse: _____ Circulating Nurse: _____</p>	<p style="text-align: center;">Part B She's Crashing!</p> <p>Chief Surgeon: _____ Assisting Surgeon: _____ Scrub Nurse: _____ Circulating Nurse: _____</p>
<p style="text-align: center;">Part C A Second Heartbeat?</p> <p>Chief Surgeon: _____ Assisting Surgeon: _____ Scrub Nurse: _____ Circulating Nurse: _____</p>	<p style="text-align: center;">Part D Whoops!</p> <p>Chief Surgeon: _____ Assisting Surgeon: _____ Scrub Nurse: _____ Circulating Nurse: _____</p>

Questions - *on a separate sheet of paper complete the following*

1. What is surgery?
2. What is the difference between invasive and non-invasive surgery?
3. How are surgical procedures categorized?
4. What is the difference between elective and emergency surgery? Give an example of a surgery that would be elective and an example of a surgery that would be considered emergency.
5. On what part of the body would neurosurgery be focused?
6. On what part of the body would dermal surgery be focused?
7. What is suturing and what are the general goals?
8. Why is it important to use the correct suture technique?
9. What is the difference between synthetic and organic suture material? Explain why it would be better to use organic sutures on internal organs?
10. What is the most common knot used in suturing?
11. What suture technique (stitch) was used in this activity?
12. Name the surgeries were performed in this activity?
13. **CONCLUSION:** In 1-2 paragraphs summarize the procedure and results of this lab.