



Maritime Health Trainings for Seafarers and Doctors

«Training 12- Wound, Wound Healing and Infection (including Sterilization, Bandaging, etc)»

ERASMUS+ KA2 - Cooperation for Innovation and the Exchange of Good Practices
KA202 - Strategic Partnerships for vocational education and training



REPUBLIC OF TURKEY
MINISTRY OF HEALTH
GENERAL DIRECTORATE OF HEALTH
FOR BORDER AND COASTAL AREAS OF TURKEY



AP&A
GROUP

Wounds,Wound Healing and Infection

✓ Learning Objective;

The aim of this section is to provide the knowledge necessary to give immediate response about Wounds, Wounds healing and infection. Upon completion of this section, trainers will be able to:

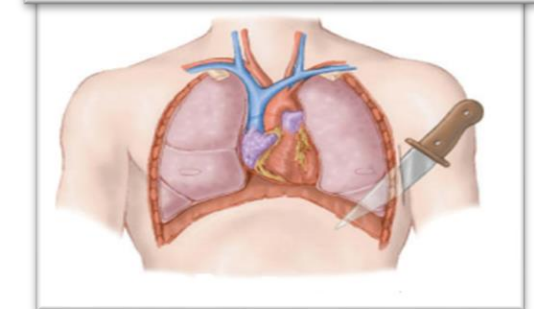
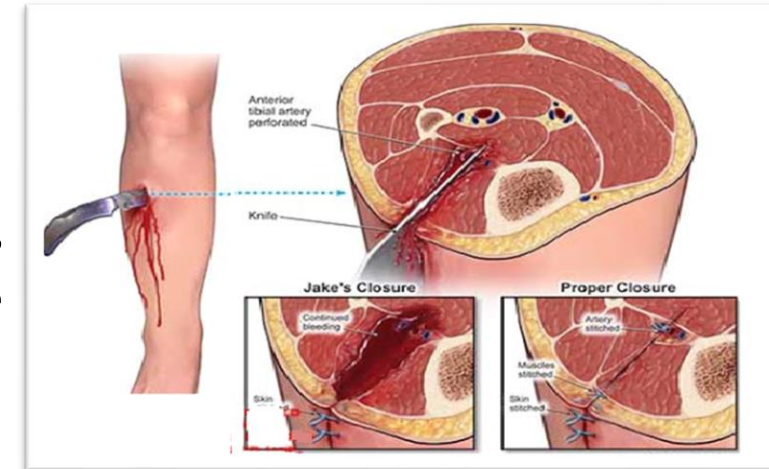
- Explain what caused the wounds
- Explain first aid for injuries
- Summarize Important Considerations in Injuries
- How to perform a wound dressing?
- Explain and perform the wound closure technique
- Explain Problems May Occur in Penetrating Chest Wounds
- Explain First Aid for Penetrating Chest Wounds
- Explain the Bandaging procedures and techniques

Key Questions in Injuries

- Wound is the disruption of the integrity of the skin or mucosa as a result of a trauma.

What Caused the Wound?

- If the wound is caused by a sharp, clean **blade**, the surrounding tissue is likely to be undamaged. There will probably be no inflammation in the wound.
- If the wound is caused by **bite**, the surrounding tissue is likely to have been crushed. There is a high probability of inflammation.
- If the wound is caused after **striking a blunt object**, the skin may tear, the wound is often irregular. Excessive crushing can appear in the surrounding tissues. The wound will likely become inflamed and leave a scar as it heals.
- If there is stabbing with a knife, dagger, etc., important organs may be damaged depending on the depth of the wound.



What Should We Do?



- Wash your hands.



- Wear gloves and goggles.

- Check if there is any foreign substance or dirt in the wound.
- Examine for any nerve or tendon injury.
- If you see any foreign body, remove it with tweezers.



- If you suspect a foreign body but cannot see it, then it is better not to touch the wound. Evacuate the patient at the nearest port.



First Aid for Injuries

- Evaluate vital signs (ABC)
- Evaluate the wounded area
- If there is, stop bleeding in the wound,
- Do not tamper with the inside of the wound,
- Cover the wound with a clean (and damp) cloth,
- Dress a bandage over the wound,
- Call the Tele Health Center.



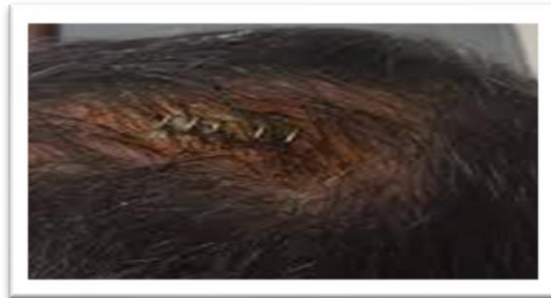
- Do not remove foreign objects stuck in the wound,



First Aid for Injuries

To Wash The Wound:

- You can use a syringe.
- Add 1 volume of povidone-iodine to every 10 volumes of potable water.
- Wash the wound with pressurized water to remove dirt, tissue fragments, bacteria.
- Wash off with approximately 250-500 ml of liquid.
- Make sure your eyes do not contact with blood or contaminated liquid.
- Decide how the wound will be closed.



What Should Not We Do?

- Do not shave around the wound.
- The risk of inflammation and the possibility of hair falling into the wound increases.

First Aid for Injuries

To Stop Bleeding In The Wound

1. Press with gauze for 10-15 minutes.
2. Wait for 10 minutes to check if the bleeding has stopped.
3. If bleeding continues, press again.

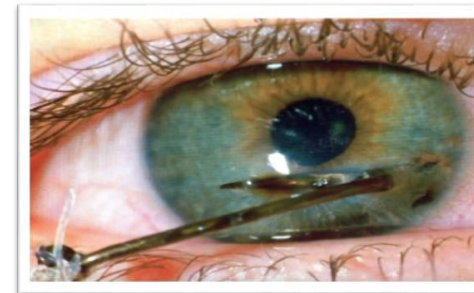
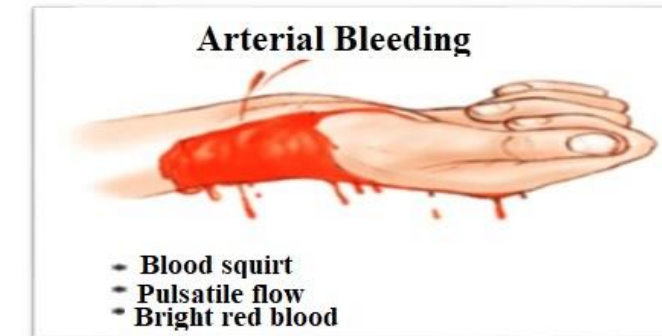


4. Do not try to clamp bleeding points blindly.
5. If a main artery is cut, call the Tele-Health Center and evacuate the patient.
6. If an artery is bleeding, you can apply pressure and suture the wound.

Important Considerations in Injuries

Immediately Call the Tele Health Center in the Following Situations

- Stabbing,
- Wounds which don't stop bleeding,
- Wounds in which muscle or bone is exposed,
- Wounds in which edges do not meet or are 2-3 cm,
- Wounds caused by long and sharp objects,
- Wounds that may leave visible marks
- Wounds with foreign objects,
- Human or animal bites,
- Jamming and crushing injuries; for example, if the hand is caught in the machine.



Wound Dressing



1. Wash your hands according to the hand washing technique and wear gloves.



2. Prepare the dressing materials.



3. Open the old dressing (with a scalpel blade or scissors).



4. Throw non-sterile gloves used with dirty dressing materials into the waste bin or trash can.



5. Wear clean gloves,



7. Choose the appropriate material from the dressing pack.

8. Remove the sterile tampon with forceps.

- Povidone-iodine (baticon-betadine) is a broad spectrum antiseptic. It is used for skin cleansing.



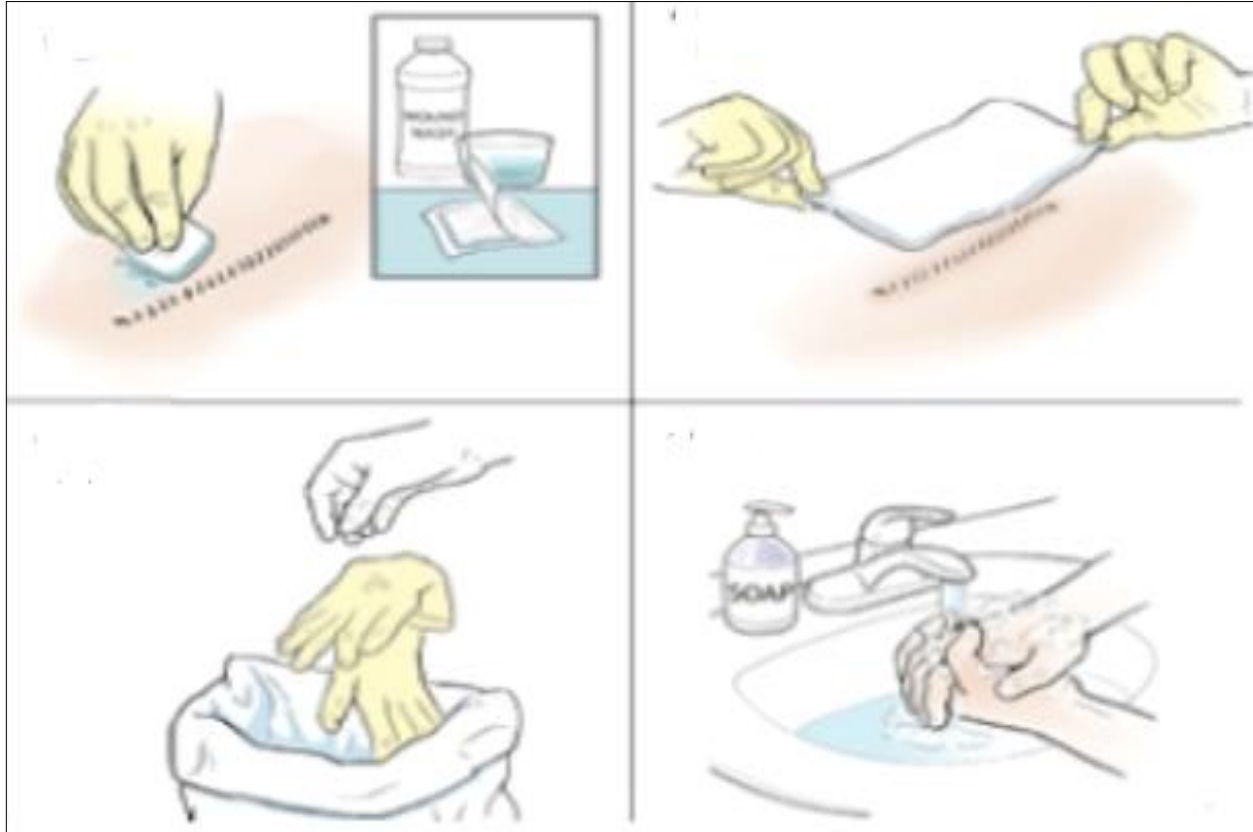
6. Evaluate the cut area for complications,



9. Attach the gauze or tampon with a suitable sterile material.

10. Wipe the edges of the wound from clean to dirty with a pad impregnated povidone-iodine (10%) and throw the dirty tampon into the waste bag.

Wound Dressing



11. Clean the wound area with gauze or tampon impregnated with 0.9% NaCl.
12. Cover the wound by placing a dry sterile pad over the gases.
13. Fix it with a hypoallergenic patch. Wrap a bandage or elastic bandage over it the way that it does not impair the circulation.

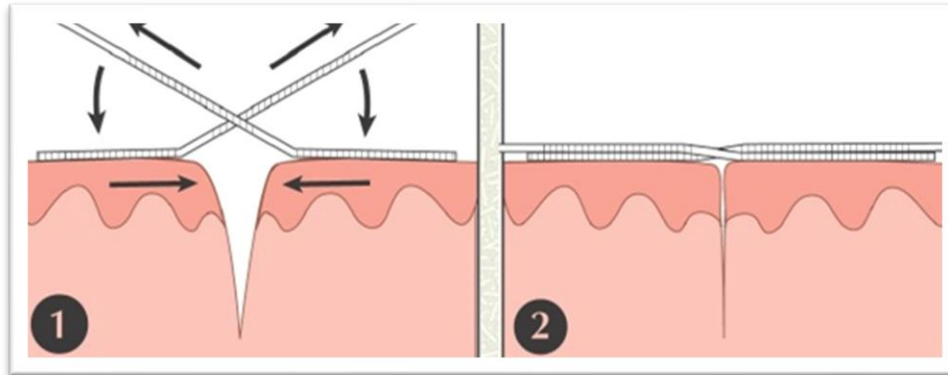
Sterile Dressing Set: It is a set containing sterile clamps, forceps, scissors, pad and gauze. A new, separate set should be used for each patient.

✓ Contaminated set should not be used without being sterilized.

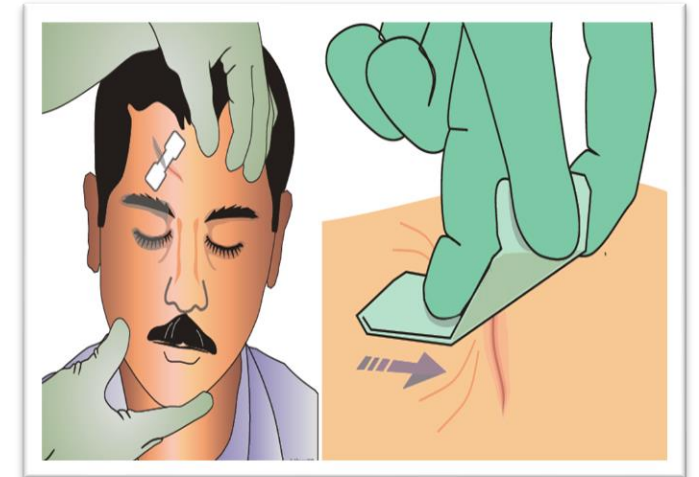
Wound Closure Techniques

Using Adhesive Skin Closures

- You can use 'butterfly closure' for small, clean cuts.
- This closure is good if the skin is elastic and can firmly adhere to the underlying structures.



- In this closure, 2 adhesive tapes are adhered with a narrow non-adhesive bridge between them.



Use of Sterile Wound Strips

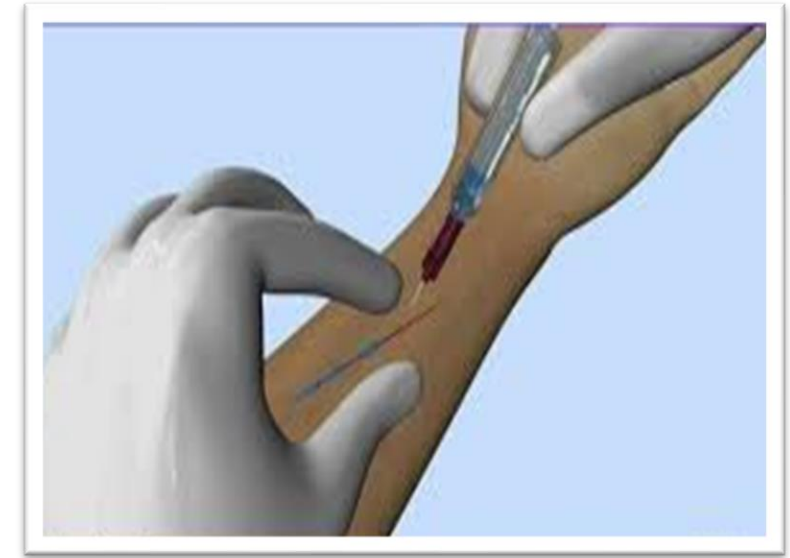
Wound Closure Techniques

Using Skin Adhesive

Cyanoacrylate skin adhesive compounds can be as effective as suturing in wound closure.

Skin adhesives are particularly useful in the following situations:

- In small wounds where it is difficult to keep the wound dry and the wound edges can be brought together easily without stretching.
- Skin adhesives also do not require the use of additional wound care products. They are waterproof and do not require regional (local) anesthesia.



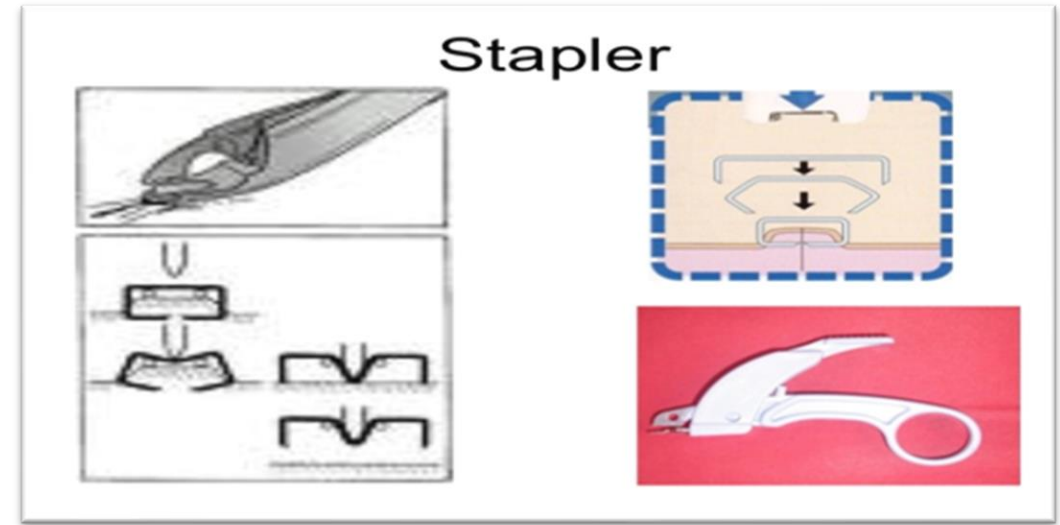
Skin adhesives should not be used on the following wounds:

1. Cuts on the joint.
2. Wounds in the mouth.
3. Dirty wounds.
4. Wounds in which the surrounding tissue is heavily damaged.

Wound Closure Techniques

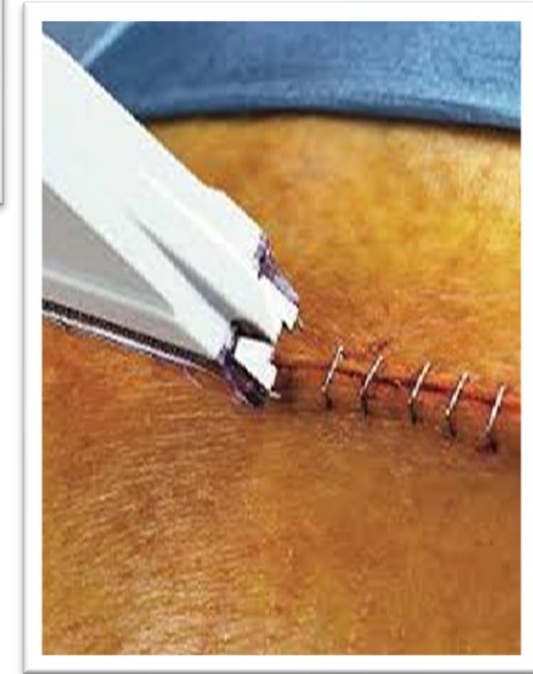
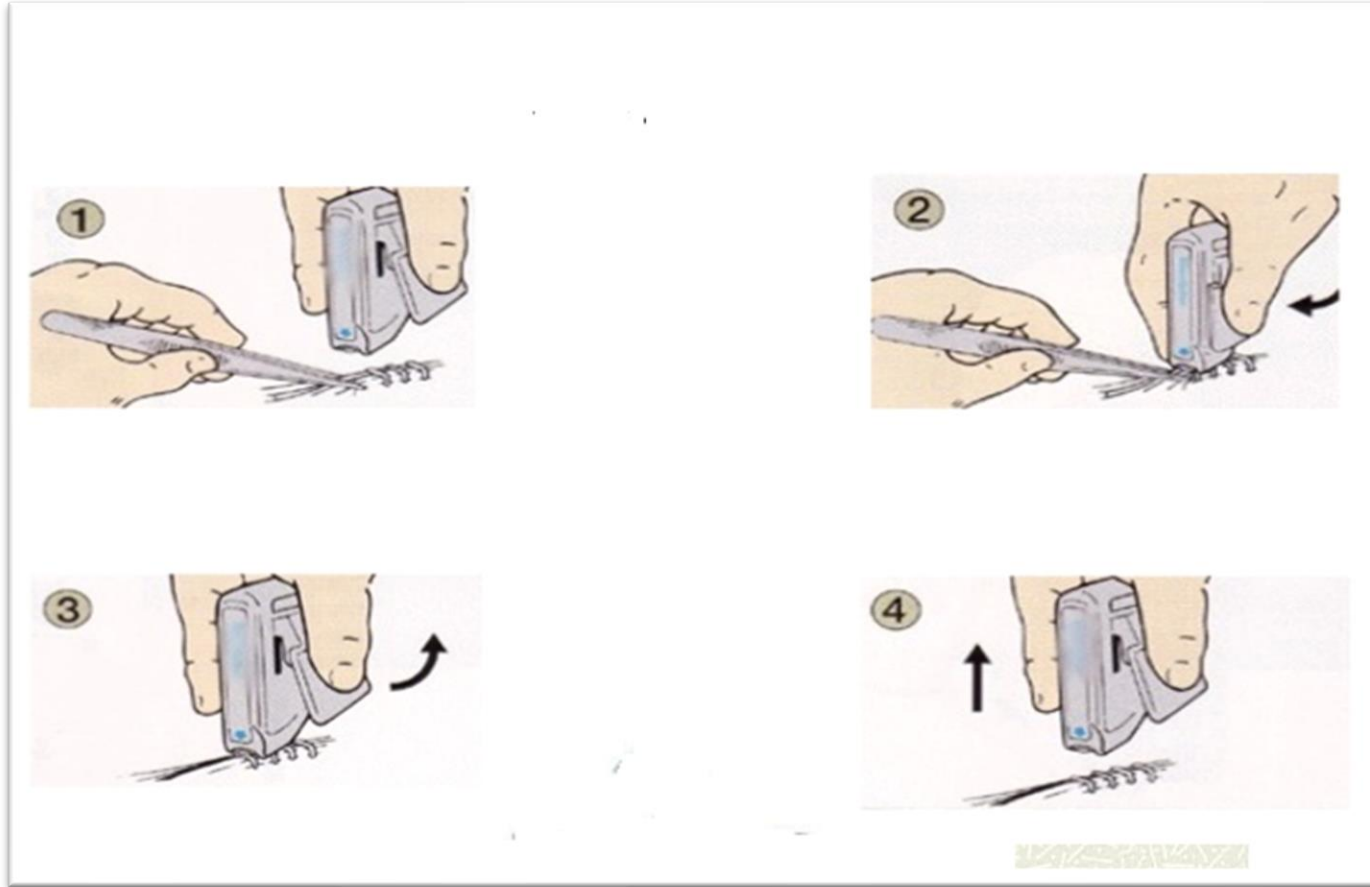
Disposable Suture (Stapler)

- The stapler is mostly applied to the hairy part of the head.
- It is a painful but fast method.
- It is a fast and effective method that can be preferred to stop bleeding in emergency situations.
- Apart from the head, it can also be applied to the back, thigh and leg areas.



It is removed within 10 days with its own extractor.

Wound Closure Techniques



Stapler Use

Wound Closure Techniques

Suture instruments



- Atraumatic suture suitable for the wound (needle and thread)
- A needle holder
- Small scissors
- Tissue forceps (toothed)
- Kidney dish



- ✓ If the suture materials are not sterile;
- Sterilize a needle holder, small scissors, tissue forceps (toothed), and a kidney dish by boiling for about 20 minutes.
- Put the sterilized materials in the kidney dish.

Wound Closure Techniques

1- Wash your hands.



2- Open the suture material package and put the needle and thread into the kidney dish.

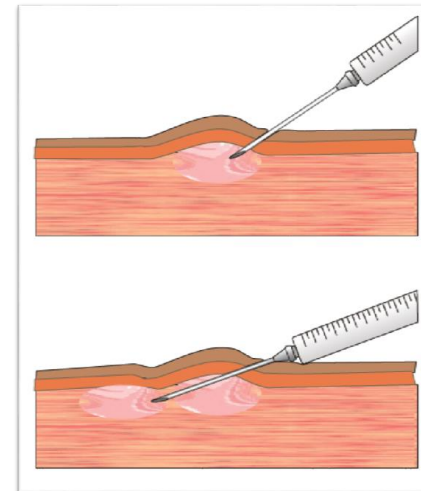


3- Wear clean gloves.

Local Anaesthesia

How to Anaesthetize?

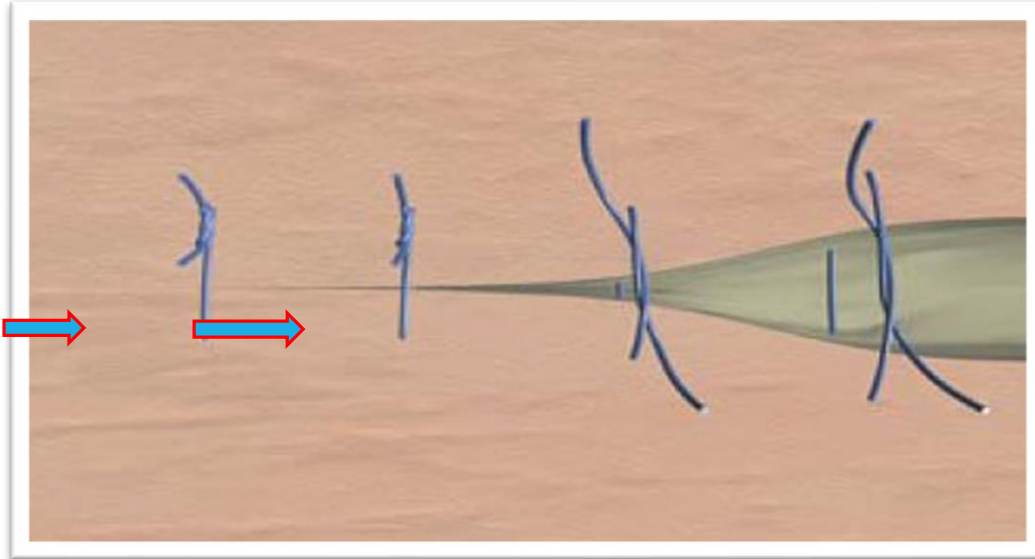
- For local anaesthesia, use lidocaine (1%) solution in an amount not more than 20 ml at a time.
- Lidocaine injection is painful until numbness. If too much is given, the medicine may cause abnormal heart rhythm and palpitations.
- Inject the anaesthetic agent directly into the wound's lips.
- Insert the needle 1 cm deep on each side.
- Before injecting the medication, pull back the plunger of the syringe to check if it is in the blood vessel.
- Local anaesthesia takes approximately 10 minutes.



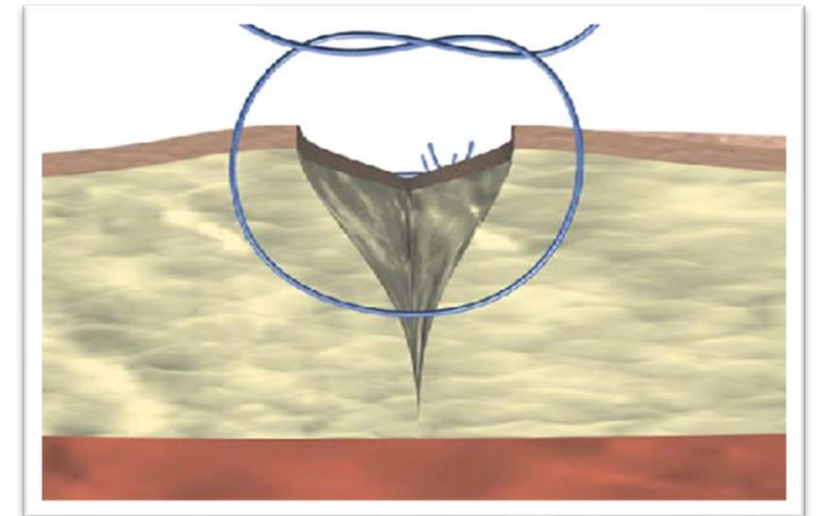
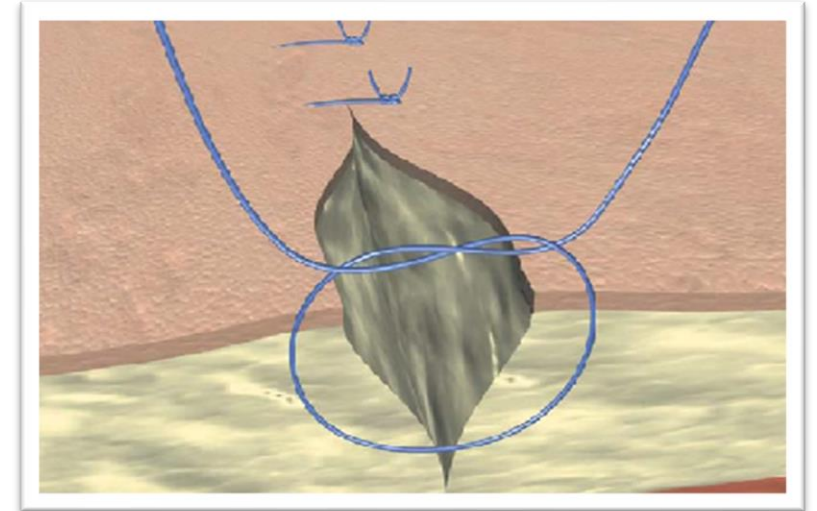
Wound Closure Techniques

Simple Interrupted Suture

- It is the most common technique to close a wound. Separate stitches are sutured to hold the edges of the wound together.



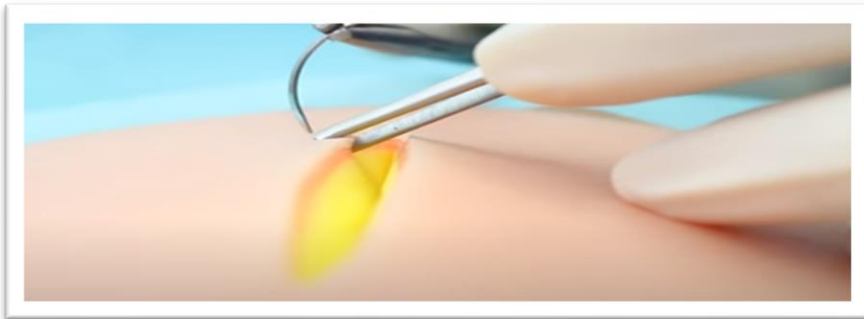
- It is very important that the suture is placed on one side so that it does not extend directly to the wound edge and disrupt the healing process.



Wound Closure Techniques



- Grasp the needle using the needle holder. Be careful to hold the mid-point of the needle.



- Use the tissue forceps (toothed) to grasp the corner of the wound.
- Hold the needle perpendicular to the skin and cover the skin in full-thickness.



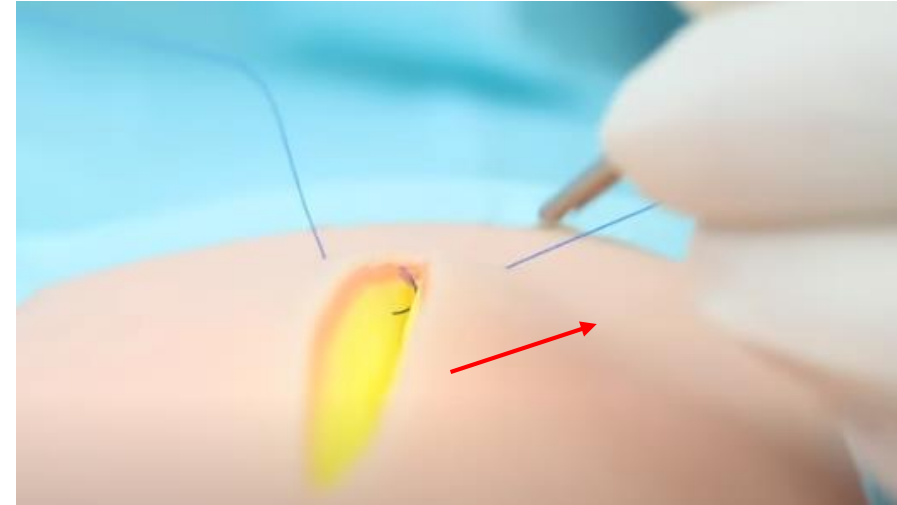
- Make sure that there is a distance of half the depth of the wound between the point where the needle enters and the edge of the wound.



- Turn the needle holder so that the needle tip is now parallel rather than perpendicular.
- See the needle comes out.

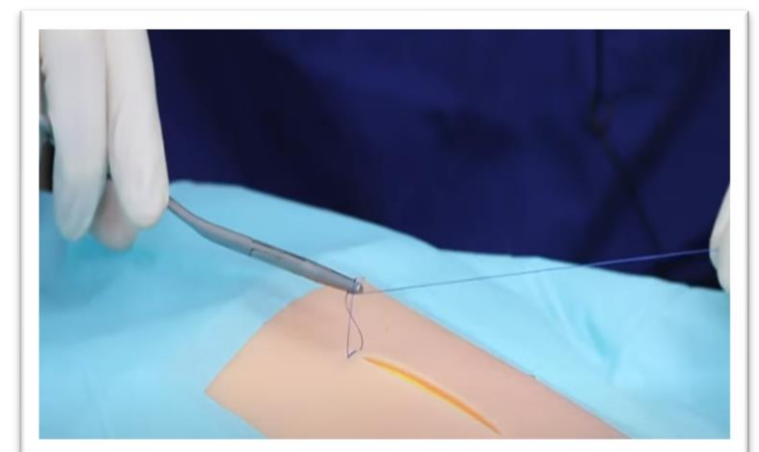
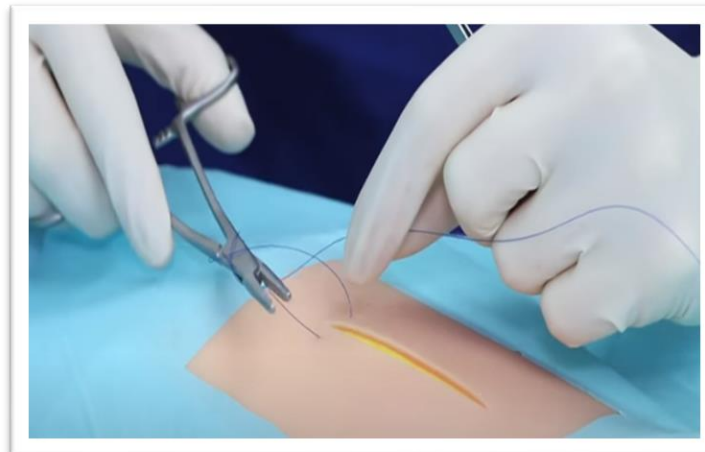
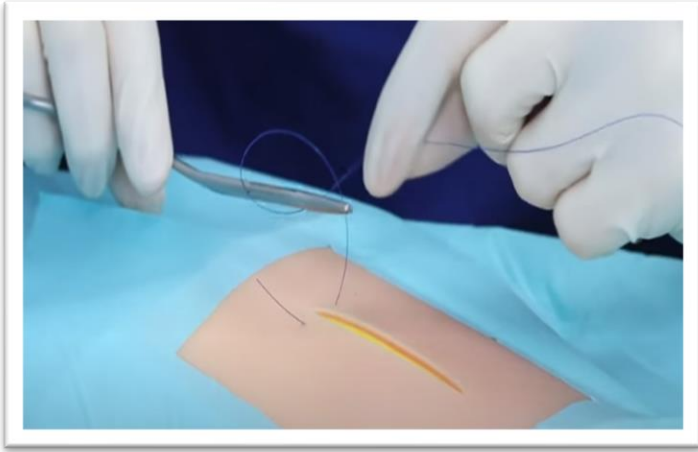


- Open the needle holder and grasp the tip where the needle tip came out of the wound and pull it out.
- Grasp the mid-point of the needle with the needle holder again.



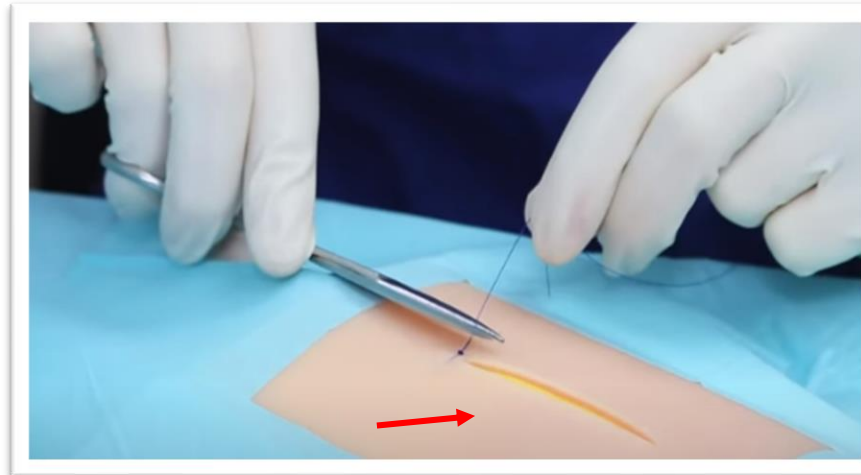
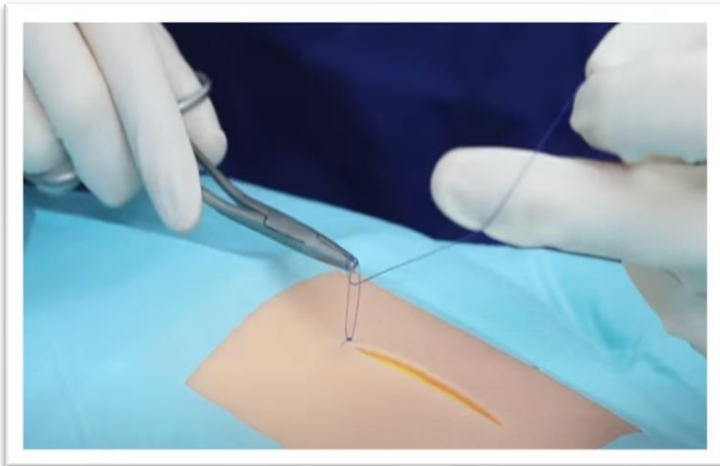
- Grasp the other lip of the wound using the toothed forceps.
- Pull the needle through the wound lip opposite the point where the needle came out and push it up.
- Pull the needle, cut the thread so that it remains 4 cm on each side of the wound lips.

Wound Closure Techniques



- Tie a surgeon's knot (two throws) to bring the cut edges of the skin together.

- Do not tighten the thread too much.



- After knotting, you can cut the ends of the thread leaving about 5-10mm on the surface so that they can be grabbed at these ends while removing.

Wound Closure Techniques

- Throw any pointed tools as soon as you have finished suturing.
- Close the wound with clean gauze after suturing. Change this after 24 hours. The wound can be left uncovered after 48 hours.

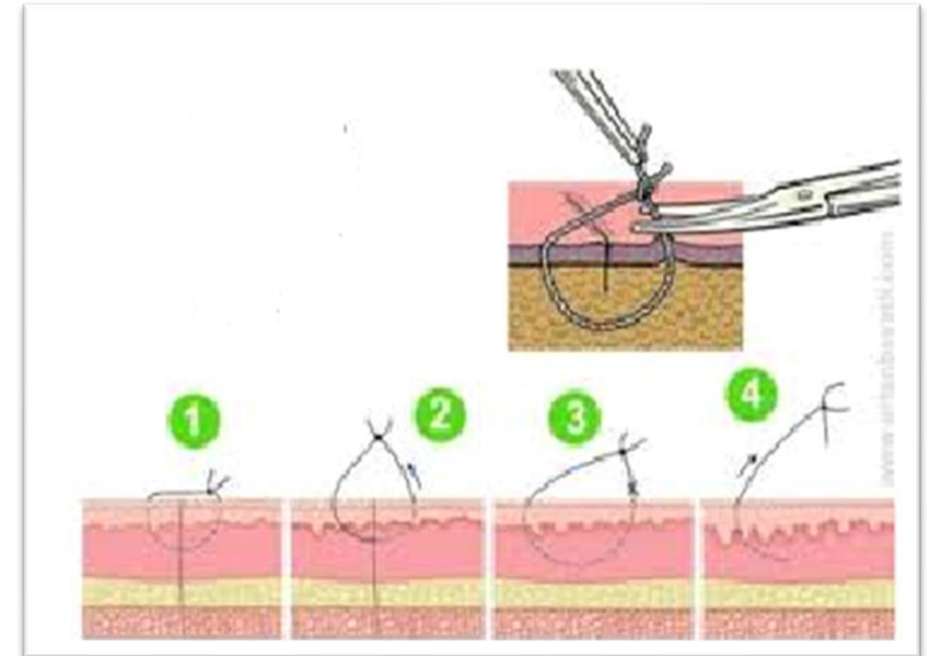
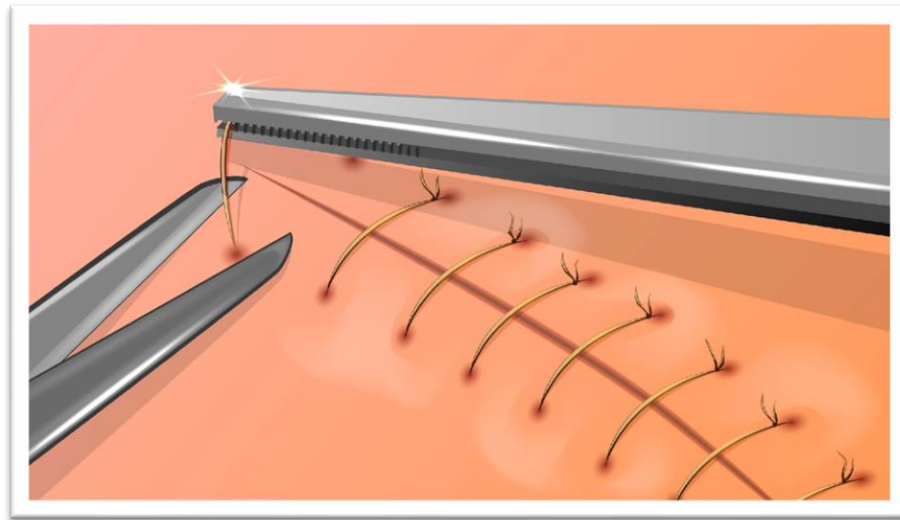
Remove sutures after;

- 5 days, for wounds on the face,
- 7 days, for wounds on the scalp,
- 7- 10 days, for wounds other sites.



To Remove Sutures;

- Use toothed forceps, povidone-iodine, gauze, scalpel blade.
- Clean around the wound with povidone-iodine.
- Grasp one end of the stitch using the forceps and lift it up.
- Place the scalpel blade under the knot and cut the suture away.



Do not;

- use more sutures than necessary to keep the wound ends together.
- suture if you are not sure whether there are important structures under the skin.
- pull the suture material to bring the edges of the wound together.
- suture deep penetrating wounds.
- suture the wounds which have too much damaged, bruised tissue around them.
- suture wounds that are over eight hours old.
- suture wounds on the fingers, as nerves, blood vessels, and tendons can be easily damaged.

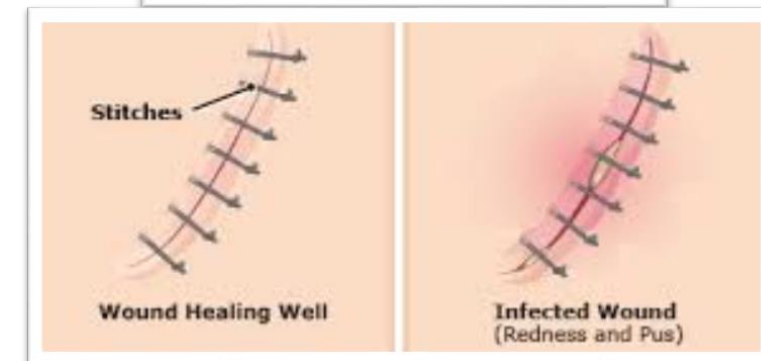
You should not suture if:

1. **the wound lips do not come together easily.**
2. **the wound lips stay together without stitches.**
3. **there is no primary recovery chance.**



Infection Signs:

- Redness,
 - Heat increase,
 - Swelling, pain, worsening of complaints.
-
- If the wound has been sutured, check whether the tension along the suture is causing swelling and inflammation.
 - If the tension is excessive, remove the stitches.
 - If the redness and swelling are severe and do not go away within 24 hours, give the patient amoxicillin/clavulanate (875/125 mg) orally twice a day.



Infection in the Wound

Wet-Dry Closing Is Practiced As Below:

1. Wet the gauze pad with isotonic water.
2. Place in and around the wound.
3. Cover it with 3 to 4 layers of dry gauze.
4. Protect the wound with a bandage or a protective dressing.
Since the gauze sticks to the wound surface when it dries, remove bacteria and purulent matter from the wound while it is being removed.
5. Change these gauze twice a day until the base of the wound is pink and there are no signs of inflammation.
6. Place a non-adhesive dressing on it.

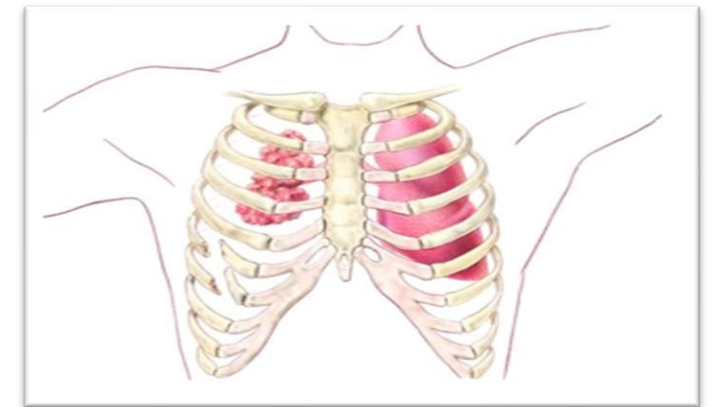
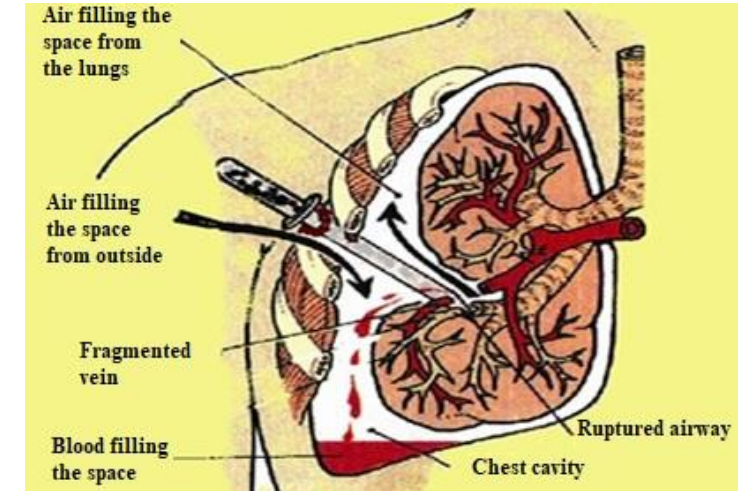


Which Problems May Occur in Penetrating Chest Wounds?

The object that enters the chest injures the pleura and lung.

As a result, the following symptoms may occur:

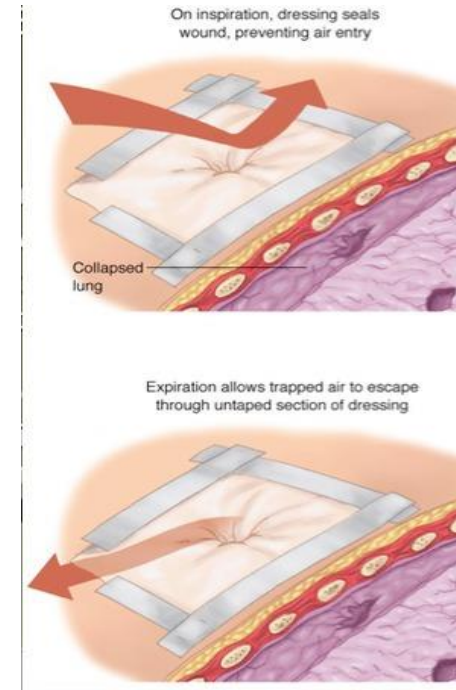
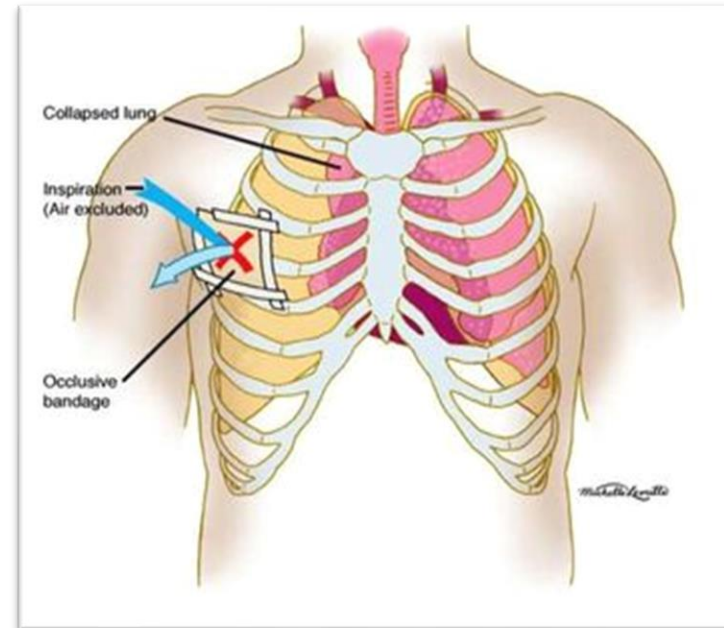
- Intense pain
- Difficulty in breathing
- Bruising
- Rapid breathing
- Hemoptysis
- Open pneumothorax (the wound in the chest appears to be breathing)



Pneumothorax

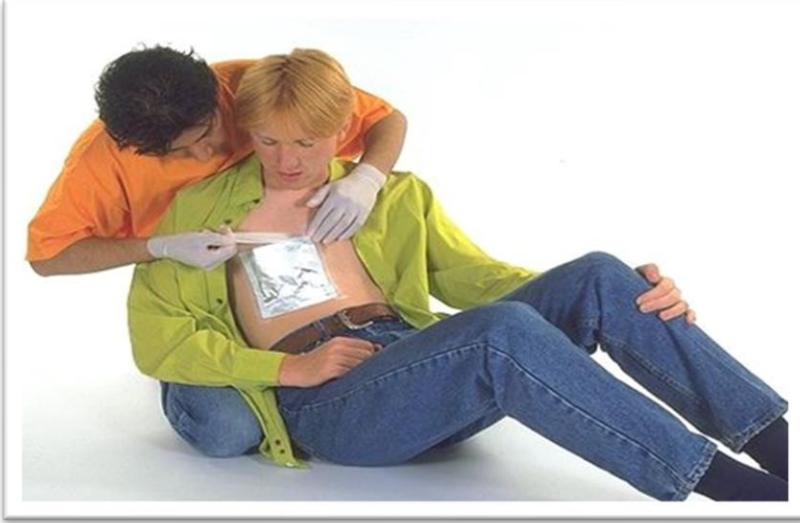
First Aid for Penetrating Chest Wounds

- Check the consciousness of the patient/casualty,
- Evaluate the vital signs (ABC) of the patient/casualty,
- Cover the wound with an airtight cloth such as nylon.
- Leave one end of the dressing on the wound open to prevent air from entering the wound during breathing and to allow air to escape during exhalation....

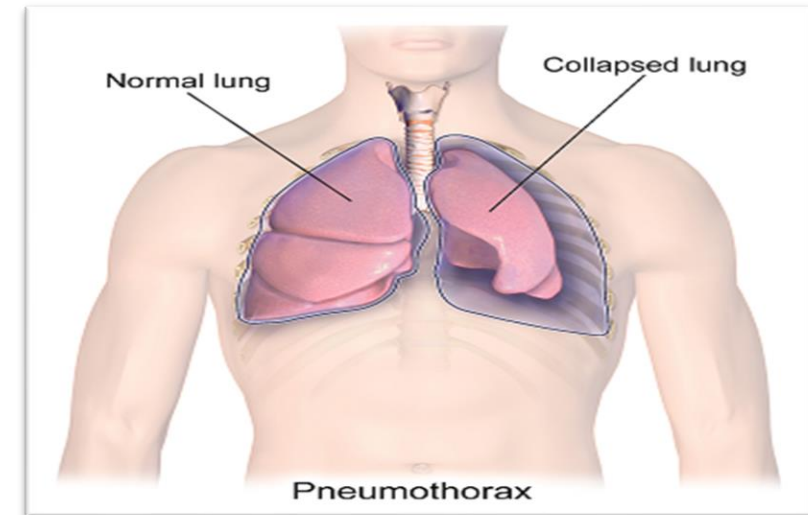


First Aid for Penetrating Chest Wounds

- If the patient/casualty is conscious, let him sit in a semi-sitting position,

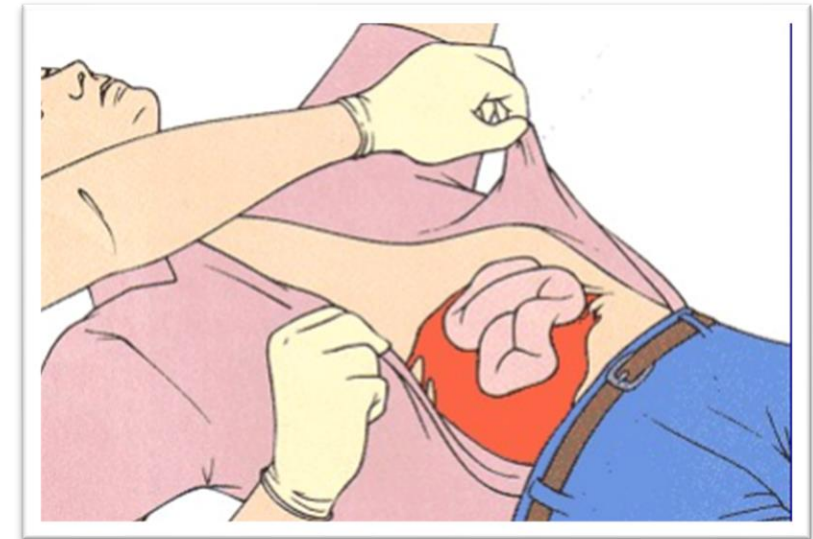


- Do not give anything orally,
- Check vital signs frequently,
- Shock probability is very high in open pneumothorax.
- Call the Tele-Health Center:
- Evacuate the patient from the vessel.



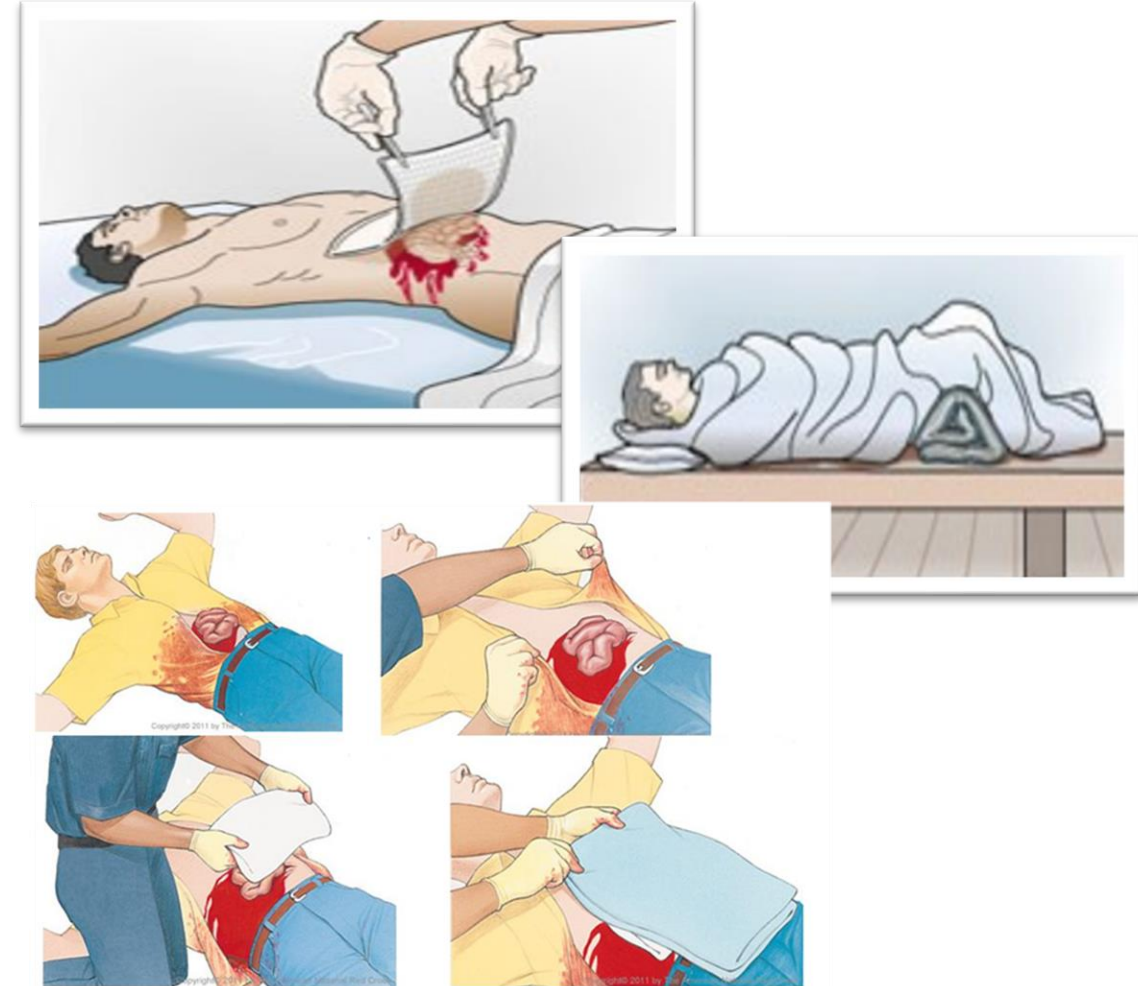
Which Problems May Occur in Penetrating Abdominal Wounds?

- Organs in the abdominal region may be damaged; internal and external bleeding and related shock symptoms (such as hypotension, rapid and weak pulse, rapid and superficial respiration) may occur,
- If the stomach is hard and very painful, the situation is serious.
- Intestines can be exposed.
- Check the patient's consciousness.
- Check the patient's vital signs.



First Aid for Penetrating Abdominal Wounds

- Do not try to let the exposed organs in, cover them with a large, moist and clean cloth,
- If the patient is conscious, lay them their legs bent in the supine position, cover them to prevent heat loss,
- Do not give anything to eat or drink orally.
- Monitor vital signs frequently,
- Call the TeleHealth Center
- Evacuate the patient from the vessel.



Sterilization

Sterilization is the process of destroying all microorganisms on and inside any object.

- Sterilization is performed on ships by using devices such as hot air oven, bain-marie (boiling), etc.
- Before the used medical materials are sterilized, visible dirt, especially organic wastes, must be cleaned using detergents.
- Dirty tools should be carefully hand-washed and rinsed.
- Hand washing requires two washtubs, small brushes, non-abrasive cleaning cloths and detergent.
- General protection measures, such as waterproof clothing and gloves, should be followed during the washing process.
- Tools must be dried.
- For effective sterilization, it is necessary to boil them for 30 minutes after the water starts to boil at 100°C.



100°C - 30 minutes

- Place the tools to be sterilized in the hot air oven.
- Make sure that the trolley air vents are open.
- Make sure that the lids of the tool trays are half-open.

Ideal Sterilization Values:

- 60 minutes at 175°C
 - 90 minutes at 170°C
 - 180 minutes at 140°C
-
- Leave the hot air oven to cool down.
 - While cooling, open the upper air vent. Do not open the sterilizer lid right after the process, even if it is for rapid cooling. Wait for a while.
 - Close the side lids while taking the trolleys outside.
 - Keep the tool trays covered.



Bandaging

- Since the bandages help the vein flow return to the heart, it is always applied from the distal (tip) to the proximal (up).



- While applying the bandages, make sure that the pressure is equal throughout the dressing.
- Uneven pressure can impair tissue nutrition, affecting blood circulation.
- A bandage should be applied to wounds after dressing under aseptic conditions.
- Keeping the extremity ends exposed is important in controlling the proper circulation.
- Appropriate pads are used in these areas to separate the areas close to each other and protect the bony prominences.
- The bandage-applied areas are observed for signs of circulatory disorders.
- In case of discoloration, redness, cyanosis, numbness, oedema, and cold skin, the bandage should be removed.
- Make sure you are careful during the removal of the bandages.
- The bandages are applied after sterile gauze or band-aid is applied on the wound.
- The bandages applied on the dressing are tied and fixed with a safety pin, plaster or metal fasteners.

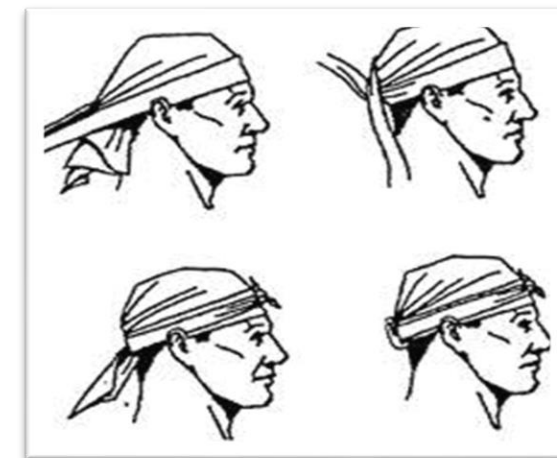
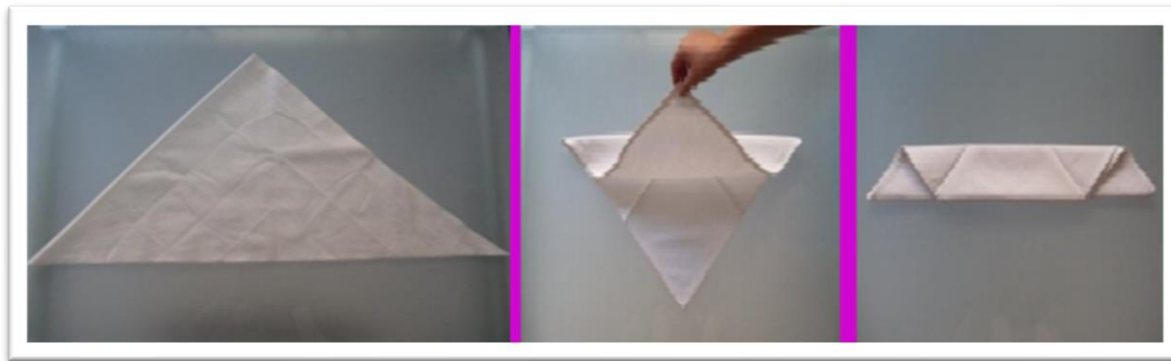
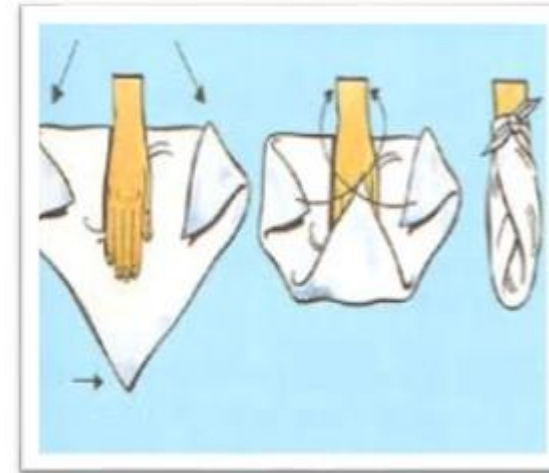
Types of Bandages

Triangular Bandage:

Used for hanging, wrapping, fixing and covering hard materials.

The triangular bandage is used depending on the place of use as:

- open (on the chest, hanging)
- wide bandage (in rib, collarbone, arm fractures)
- narrow and folded (in eyes, ears, feet and wrists, instead of rolled bandages).



Types of Bandaging

Tubular net bandages



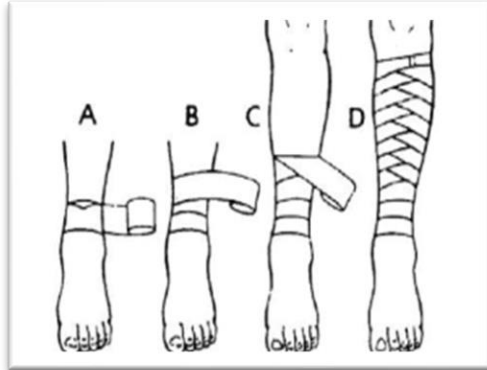
Roll Bandaging Techniques

Spiral Bandage



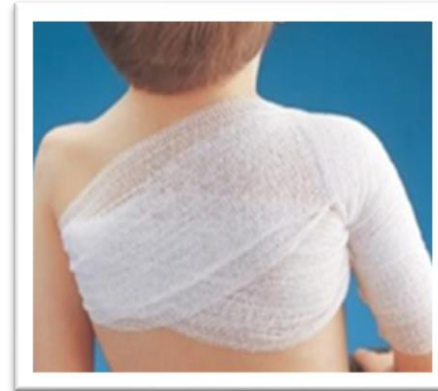
- Applied on parts of the body that have the same thickness.

Spiral Reverse Bandage



- Applied on parts of the body that have different thickness

Spica Bandage



- Applied to wide areas such as shoulder and hip joints.

Figure 8 Bandage



- Applied to the joint areas such as knees and elbows or around these areas

Rolling Bandage



- Applied on the neck, wrist and forehead.