

APPROVED

The first vice-rector for scientific and pedagogical work
Danylo Halytsky Lviv national medical university

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APPROVED

at a joint meeting of the Academic Councils of medical faculties No. 1, No. 2 and
Faculty of Foreign Students of Danylo Halytsky LNMU,
protocol No. 1/03-2024 of "13" March 2024

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at the meeting of the specialized methodical committee of the surgical disciplines
of the Danylo Halytsky Lviv National Medical University,
protocol No 24. dated February 22, 2024.

Head of the committee _____ Professor Victor ANDRYSHCHENKO

**ALGORITHMS OF PERFORMANCE
OF THE PRACTICAL MANIPULATIONS
ON THE PRACTICAL EXAMINING STATION
of the Objective Structured Practical (Clinical) Examination
Performance of the practical manipulation on the mannequin
Discipline «SURGERY»**

Algorithms of practical skills for urinary bladder catheterization

Urinary bladder catheterization in men

Indications

Medicinal:

- ✓ retention of urine
- ✓ monitoring of urination
- ✓ removal of blood clots
- ✓ intravesical chemotherapy
- ✓ postoperative restoration of the urethral lumen (buoyancy)

Diagnostic:

- ✓ urine collection for research
- ✓ retrograde injection of contrast agents

Contraindications:

- ✓ acute prostatitis
- ✓ suspicion of a rupture of the urethra due to blunt or penetrating trauma (blood in the urethra, hemoscrotum, swollen perineum, prostate gland inaccessible to palpation, inability to urinate)
- ✓ pronounced stricture of the urethra

Anesthesia is not required

Equipment:

Urethral catheterization kit (includes Foley catheter, povidone-iodine solution, jelly lubricant, 10 ml syringe, gloves, sterile wipes, urine collection container), 18-gauge Foley catheter recommended for men

Position of the patient - men, lying on the back

Technique of catheterization in men:

- ✓ treat the penis with sterile napkins
- ✓ retract the foreskin (if present), grasp the penis with the left hand on the sides and extend it to its maximum length perpendicular to the surface of the body to straighten the front part of the urethra
- ✓ treat the head of the penis with povidone-iodide, using the main hand. Observe asepsis during the entire procedure (!)
- ✓ lubricate the catheter with silicone grease for the dummy and take it with the main hand. It is useful for the patient to inject 10 ml of water-soluble jelly (or 2% lidocaine jelly) into the urethra
- ✓ with slight force, advance the catheter into the urethra until the tip of the catheter reaches the bladder and urine appears. Fill the balloon of the catheter with 10 ml of sodium chloride solution

- ✓ if urine does not appear, try to inject fluid through the catheter to ensure proper catheter placement before filling and inflating the balloon
- ✓ connect the catheter to the urine collection container

Complication:

- ✓ suspicion of urethral perforation
- ✓ arterial hypotension
- ✓ hematuria
- ✓ paraphimosis

Urinary bladder catheterization in women

Position: lying on your back in the "frog" position (on your back with half-bent legs apart)

Technique:

- ✓ Place the patient in the supine position with the knees flexed and separated and feet flat on the bed, about 60 cm apart. If this position is uncomfortable, instruct the patient either to flex only one knee and keep the other leg flat on the bed, or to spread her legs as far apart as possible. A lateral position may also be used for elderly or disabled patients.
- ✓ With the thumb, middle and index fingers of the non-dominant hand, separate the labia majora and labia minora. Pull slightly upward to locate the urinary meatus. Maintain this position to avoid contamination during the procedure.
- ✓ With your dominant hand, cleanse the urinary meatus, using forceps and chlorhexidine soaked cotton balls. Use each cotton ball for a single downward stroke only.
- ✓ Place the drainage basin containing the catheter between the patient's thighs.
- ✓ Pick up the catheter with your dominant hand.
- ✓ Insert the lubricated tip of the catheter into the urinary meatus.
- ✓ Advance the catheter about 5-5.75 cm, until urine begins to flow then advance the catheter a further 1-2 cm.
- ✓ Note: If the catheter slips into the vagina, leave it there to assist as a landmark. With another lubricated sterile catheter, insert into the urinary meatus until you get urine back. Remove the catheter left in the vagina at this time.
- ✓ Attach the syringe with the sterile water and inflate the balloon. It is recommended to inflate the 5cc balloon with 7-10cc of sterile water, and to inflate the 30cc balloon with 30-35cc of sterile water.
- ✓ Improperly inflated balloons can cause drainage and leakage difficulties.
- ✓ Gently pull back on the catheter until the balloon engages the bladder neck.

Algorithm of the insertion of the naso-gastric tube

Material support: a pair of non-sterile disposable gloves, a disposable diaper, a nasogastric probe, petroleum jelly or mannequin grease, a 100 ml syringe, hypoallergenic plaster.

Indication:

- ✓ Acute expansion of the stomach
- ✓ Obstruction of the goalkeeper
- ✓ Intestinal obstruction
- ✓ Bleeding from the upper parts of the gastrointestinal tract
- ✓ Enteral nutrition

Contraindications (conditional):

- ✓ The early period after operations on the esophagus or stomach
- ✓ Absence of vomiting reflex.

Position of the patient: Sitting or lying on the left side.

Algorithm:

- ✓ Measure the length of the probe from the lip to the earlobe and down the front abdominal wall so that the last hole on the probe is below the xiphoid process.
- ✓ Apply an oily solution (vaseline, glycerin or silicone grease for the mannequin) to the tip of the probe.
- ✓ Tilt the patient's head to the sternum and insert the probe into the nasal passage.
- ✓ Pushing the probe down the pharynx, ask the patient to make swallowing movements.
- ✓ After inserting the probe into the stomach, make sure of this by injecting 20 ml of air into it with a syringe, while listening for a murmur over the epigastric area.
- ✓ Attach the probe to the nose with a patch.
- ✓ Wash the probe with physiological solution and make sure that it is passable.

Complication:

- ✓ Pharyngeal discomfort.
- ✓ Nostril damage.
- ✓ Sinusitis.
- ✓ Getting the probe into the trachea.
- ✓ Gastritis.
- ✓ Epistaxis.

Kramer's splint application algorithm for shoulder's fractures

Topicality. In clinical practice, standard universal metal splints are used, which are made of iron, steel or aluminum in the form of lattice structures and are called Kramer splints. They are light, have great strength and flexibility, which allows you to give them any shape.

Kramer's tires come in two sizes (110x10 cm and 60x10 cm).

Indication.

- ✓ Temporary transport immobilization.
- ✓ Medical immobilization.

Algorithm.

- ✓ We take a tire 110x10 cm.
- ✓ Cover the tire with cotton wool on one side and fix it with a bandage around the aluminum frame with spiral turns.
- ✓ We tie gauze ribbons 75 cm long to the upper end of the tire.
- ✓ We model the tire: at a distance equal to the length of the victim's forearm, bend it at a right angle, then take the other end of the tire with the other hand, bend it to the back and, leaning on the table, give the tire the required shape.
- ✓ Note. The tire is preliminarily modeled on oneself or on the victim's healthy limb, if his condition allows.
- ✓ After that, the splint is applied to the injured limb in such a way that the hand is bent at the elbow joint at a right angle, the shoulder joint is forward approximately 30° from the frontal plane, the hand is in a state of dorsiflexion in the radiocarpal joint.
- ✓ Note. In case of open fractures of the limbs with injury to soft tissues, it is first necessary to apply an aseptic bandage to the wound, and then a splint.
- ✓ We insert a cotton-gauze roller with a diameter of 5-10 cm into the inguinal cavity, which we fasten with a bandage through the healthy upper arm.
- ✓ Insert a cotton ball up to 5 cm into the palm of the injured hand to give the fingers a half-bent position.
- ✓ Tie the ends of the gauze tape tied to the upper end of the splint to the opposite end of the splint on the forearm.
- ✓ We finish the splinting with additional strokes of the bandage around the body and limbs or by placing a hand on a handkerchief.
- ✓ Note. In case of fractures of the lower third of the shoulder or bones that form the elbow joint, the splint should cover the shoulder, forearm and hand to the carpo-phalangeal joints. The hand is hung on a handkerchief.

Kramer's splinting algorithm for fractures of the bones of the forearm

Actuality. In clinical practice, standard universal metal splints are used, which are made of iron, steel or aluminum in the form of lattice structures and are called Kramer splints. They are light, have great strength and flexibility, which allows you to give them any shape.

Kramer tires come in two sizes (110x10 cm and 60x10 cm).

Indication.

- ✓ Temporary transport immobilization.
- ✓ Medical immobilization.

Algorithm.

- ✓ We take Kramer's tire 60×10.
- ✓ Cover the tire with cotton wool on one side and fix it with a bandage around the aluminum frame with spiral turns.
- ✓ We model the tire: at a distance equal to the length of the forearm + the distance to the wrist-phalangeal joints of the victim, we bend it at a right angle.
 - Note. The tire is preliminarily modeled on oneself or on the victim's healthy limb, if his condition allows.
- ✓ When the damage is localized in the area of the upper or middle third of the forearm, apply a Kramer splint on the outer (extensor) surface from the middle of the shoulder to the carpo-phalangeal joints.
- ✓ The upper limb should be bent at the elbow joint at a right angle, and the forearm should be in a state intermediate between pronation and supination; the hand should be turned with the palm to the stomach in a position of slight extension.
- ✓ Bandage the splint to the limb, and hang the hand on a handkerchief.

Kramer's splint application algorithm for hip fractures

Actuality. In clinical practice, standard universal metal splints are used, which are made of iron, steel or aluminum in the form of lattice structures and are called Kramer splints. They are light, have great strength and flexibility, which allows you to give them any shape.

Kramer tires come in two sizes (110x10 cm and 60x10 cm). For transport immobilization in case of damage to the lower extremities, in the absence of a Dieterichs splint, well-modeled Kramer splints can be used.

Indication.

- ✓ Temporary transport immobilization.
- ✓ Medical immobilization.

Algorithm.

- ✓ For hip fractures, we take 3 ladder splints, size 110x10 cm,
- ✓ We cover the tires with cotton wool, which we fix with a bandage around the aluminum frame.
- ✓ Two Kramer's splints are tied so that one splint is formed, which is equal in length to the distance from the armpit to the inner edge of the foot of the injured limb (long splint).
- ✓ We apply the second tire (short) from the buttock fold to the fingertips on the back surface of the damaged limb to the heel, where we bend it under the sole at a right angle and catch it with the bend of the long tire, like a staple.
- ✓ Note. For greater strength, you can apply a third Kramer bandage on the inner surface of the limb from the crotch to the inner edge of the foot.
- ✓ Before applying the splint, the joints and bony protrusions must be covered with a thick layer of cotton wool, which is secured with a bandage.
- ✓ In this state, the splints are fixed with bandages or handkerchiefs to the torso and thigh, and the foot is bandaged at a right angle to the axis of the limb with 8-shaped bandage moves.

Kramer's splint application algorithm for shin fractures

Actuality. In clinical practice, standard universal metal splints are used, which are made of iron, steel or aluminum in the form of lattice structures and are called Kramer splints. They are light, have great strength and flexibility, which allows you to give them any shape.

Kramer tires come in two sizes (110x10 cm and 60x10 cm).

Indication.

- ✓ Temporary transport immobilization.
- ✓ Medical immobilization.

Algorithm.

- ✓ We take a Kramer tire 110×10 cm.
- ✓ Cover the tire with cotton wool on one side and fix it with a bandage around the aluminum frame with spiral turns.
- ✓ For fractures of the lower leg, a Kramer bandage with a soft cotton pad, well modeled along the bends of the limb, is placed on the back surface of the thigh and lower leg from the gluteal crease to the heel.
Note. We pre-model the tire on ourselves or on the victim's healthy limb, if his condition allows.
- ✓ We bend the tire at a right angle to the sole (it reaches the fingertips).
Note. Two plywood tires can be added on the sides. It is better to put mesh splints on the outer and inner surface of the limb in the form of stirrups, and so

that the foot does not hang down, a board is attached to the sole, which the splint covers in the form of a brace.

- ✓ We fix the tires with a spiral gauze bandage along the entire length.

Note. In the case of a fracture of one of the bones of the lower leg, immobilization is also necessary to reduce pain, but here you can get by with one ladder splint, which is placed on the back surface of the limb.

Note. For fractures of the bones of the foot, a Kramer splint is applied to the lower leg and foot.

Algorithm of determination of the blood group and Rh factor

Determination of the blood group with used of Tsoliclones

Actuality. *Choliclones* are monoclonal antibodies obtained by genetic engineering from the blood of sterile mice to determine the blood type of the ABO system. Unlike standard serums, Tsoliclones are characterized by very high activity and avidity, i.e. the onset time and expressiveness of the agglutination reaction. The main Tsoliclones are: anti-A, anti-B, anti-AB, anti-0 and others. It determines blood groups and the Rhesus factor.

Purpose. Determination of blood groups before blood transfusion between donor and recipient

Material support. Metal tablet with two wells, vials with anti-A zoliclones (pink), anti-B zoliclones (blue), 2 pipettes, 2 syringes, 10 ml blood sample, specimen slides.

Algorithm.

- ✓ Determination of blood group by this method is carried out in the laboratory.
- ✓ The air temperature in the room should be from +15 to + 25 degrees 0C.
- ✓ The study should take place in good lighting.
- ✓ All reagents must be kept tightly closed, since the activity of antibodies decreases significantly when drying.

Note. Do not use reagents that are cloudy or contain flakes.

- ✓ We make inscriptions on the tablet: anti-A and anti-B.
- ✓ Drip Tsoliklons in the amount of approximately 0.1 ml under the corresponding inscriptions. Anti-A reagent is yellowish-pink, anti-B is blue.
- ✓ Next to the monoclonal antibodies, drip a drop of blood and mix it with the reagents with a glass rod or a corner of a glass slide.
- ✓ For 2-3 minutes, observe agglutination, while slightly shaking the tablet. Then we evaluate the result.

Note. Agglutinates are clearly visible to the naked eye, they quickly stick together and form large flakes. If gluing does not occur, the drop of the reagent is evenly colored in red.

We evaluate the result of agglutination according to the following data:

- ✓ If there is no agglutination (both with anti-A and anti-B Tsoliclones), there is neither antigen A nor B in erythrocytes. This is group I.
- ✓ If agglutination is only with anti-A Tsoliclones, the erythrocytes contain only antigen A. This is group II blood.
- ✓ If agglutination is observed only with Tsoliclona anti-B, there is only antigen B in red cells. This is group III.
- ✓ If agglutination has occurred c Tsoliclones and anti-A and anti-B, both antigens are present in erythrocytes.

Note. To rule out autoagglutination, a control procedure is carried out: an isotonic solution of sodium chloride (0.1 ml) and the tested blood (0.01 ml) are mixed. If there is no agglutination, then this is group IV.

Algorithm for determining the Rh factor of blood using Tsoliclones

Actuality. *Tsoliclones* are monoclonal antibodies obtained by genetic engineering from the blood of sterile mice to determine the blood group of the ABO system and the Rh factor. It determines blood groups and the Rhesus factor.

Rhesus factor (denoted Rh, RhD) is a glycoprotein that lies on the surface of erythrocytes, red blood cells. After the discovery of blood groups according to the ABO system (1905-1907), the effectiveness of blood transfusions in humans increased, but the mortality of recipients remained quite high. As a result of an intensive search, a protein was found that reacted and caused erythrocyte agglutination during transfusion of blood of the same type. For the first time, this protein was discovered in a rhesus macaque — as a result, this protein was named "rhesus". About 85% of people have this Rh factor and, accordingly, are Rh-positive. The other 15% who do not have it are Rh-negative.

Purpose. Determination of the Rh factor of blood before blood transfusion between the donor and the recipient

Material support. Metal tablet, vial with anti-D tsoliclons, pipette 1 pc., syringe 2 pc., blood sample 5 ml., slides.

Algorithm.

- ✓ Determination of the Rh factor of blood by this method is carried out in the laboratory.
- ✓ The air temperature in the room should be from +15 to + 25 degrees 0C.
- ✓ The study should take place in good lighting.
- ✓ All reagents must be kept tightly closed, since the activity of antibodies decreases significantly when drying.

Note. Do not use reagents that are cloudy or contain flakes.

- ✓ Apply a large drop of anti-D reagent to the tablet.
- ✓ Next to it is a 10 times smaller drop of the tested blood, which is mixed with the reagent and the result is evaluated.

- ✓ If agglutination has begun, the blood is Rh positive, with a negative Rh factor, agglutination does not occur.
Note. Agglutinates are clearly visible to the naked eye, they quickly stick together and form large flakes.

Algorithm of the temporary stoppage of arterial bleeding with the finger pressure technique

Actuality. Using the technique of finger pressure on "pressure points" is another method of stopping bleeding. This method uses pressure applied with the fingers, thumbs, base of the hand, or the knee to apply pressure to a specific spot or point where the main artery that supplies blood to the wound site lies closer to the surface of the skin or passes over a bone (see figure) . This pressure can help cut off or reduce blood flow from the heart to the wound. Any person can find himself in an abnormal situation in which a large artery is affected. If you do not provide timely first aid for bleeding from an artery, a fatal outcome is possible. Loss of more than 50% of blood is considered incompatible with life. In most cases, materials to stop the blood are not found at hand. In such a situation, finger compression of arteries during bleeding can save life. This is the only solution that allows you to wait for the arrival of an ambulance.

Indication. Arterial bleeding is life-threatening from the main artery.

Contraindication. Missing.

Algorithm:

Note. To effectively press the artery with your fingers, you need to squeeze the artery from both sides.

- ✓ *Temporal artery.* Press with one finger to the temporal bone in front of the auricle by 1-1.5 cm. from it in case of bleeding head wounds.
- ✓ *The mandibular artery* is pressed with one finger to the corner of the lower jaw in case of bleeding wounds on the face.
- ✓ *Carotid artery.* This artery is pressed lower (closer to the heart) by its injury to the cervical vertebrae, to the C6 carotid tubercle. Then a compression bandage is applied, under which a dense roll of bandage, sterile napkins or cotton wool is placed on the damaged artery.
- ✓ *Subclavian artery.* It is pressed against the first rib in the fossa above the collarbone when the bleeding wound is located high on the shoulder, in the area of the shoulder joint or in the inguinal fossa.
- ✓ *Inguinal artery.* It is pressed against the head of the humerus, in the case of a wound in the middle or lower third of the shoulder, for this, one finger rests on the upper surface of the shoulder joint, and the other fingers squeeze the artery.

- ✓ *The brachial artery* is pressed against the humerus from the inside of the shoulder on the side of the biceps muscle, if the wound is located in the lower third of the shoulder or on the forearm.
- ✓ *The radial artery* is pressed against the underlying bone in the area of the wrist of the thumb when the artery of the hand is damaged.
- ✓ *The femoral artery* is pressed in the inguinal area to the pubic bone of the pelvis by pressing with the fist.
- ✓ *The popliteal artery* is pressed in the region of the popliteal fossa in case of a leg or foot wound, for this the thumbs are placed on the front surface of the knee joint. and others press the artery to the bone.
- ✓ *The arteries of the back of the foot* can be pressed against the underlying bones of the foot, and then a compression bandage is applied. In case of heavy bleeding, put a tourniquet on the area of the lower leg.

Note. Pressing the arteries with a finger requires considerable effort. Even a physically strong and well-prepared person can do it for no more than 15-20 minutes. Therefore, after making finger compression of the vessel, immediately apply a tourniquet, a twist or a sterile bandage. An improvised harness can be a twisted handkerchief or a belt, a hose, a scarf...

Note. It is not recommended to use fishing line, kapron thread, thin wire as a twist. They can cut soft tissues.

Note. To prevent the formation of an infected wound at the site of injury after a few days, it is necessary to properly treat it at the time of injury. The wound can be washed only with a 3% solution of hydrogen peroxide. The skin around the wound can be wiped with alcohol, iodine, preventing the liquid from getting into the wound, because, once inside the wound, the action of iodine or alcohol will cause the death of living cells and make healing difficult. Before applying the bandage, do not put cotton wool on the wound, because the cotton fibers will dry to the surface of the wound and then it will be very difficult to remove them.

Algorithm of the temporary stoppage of venous bleeding from the extremity wound

Actuality. When considering the types of bleeding and first aid for them, in addition to arterial bleeding, which is the most dangerous of the possible options, venous bleeding should not be overlooked. The danger of these bleedings, in addition to significant blood loss, lies in the possibility of absorption through damaged areas into air vessels. Air trapped in a blood vessel can later travel to the heart and lungs, leading to a fatal condition known as air embolism.

Indication. Venous bleeding from the extremities

Contraindication. Missing.

Material support: sterile gloves, bandage bag, bandage, gauze, antiseptic

Algorithm:

- ✓ Visual assessment of the bleeding site, detection of signs of venous bleeding
Note. Venous bleeding is characterized by: uniform and rapid outflow of blood of a dark red hue, lack of gushing, possible formation of clots.
- ✓ Place the victim in a lying position.
- ✓ We give the affected limb an elevated position in relation to the trunk, to reduce the inflow of venous blood.
- ✓ We apply an individual dressing package or a gauze pad to the wound, which completely covers the wound surface with an overlap of 3-5 cm on the intact skin in both directions.
- ✓ We fix the bandage on the wound with spiral turns with moderate tension.
- ✓ We refer the patient to a medical institution accompanied by a medical worker or a person who provided first aid.
- ✓

Algorithm of the first medical aid and cardiopulmonary resuscitation

Actuality. First medical aid is the implementation of the simplest medical measures to save life, reduce the suffering of the victim of an emergency situation and prevent the development of possible complications.

Professionally, of course, doctors provide such help, but not always an ambulance can arrive on time at the scene. Therefore, the ability of each of us to provide the necessary first aid to victims before the arrival of rescue services can play a decisive role in saving a person's life.

Basic principles of first aid:

- ✓ correctness and expediency (if you are not sure of your actions, it is better to refrain; the main rule of first aid is to do no harm);
- ✓ speed and consistency;
- ✓ thoughtfulness, determination, calmness.

Material support: Airway, gauze napkin, gloves, resuscitation kit, Ambu bag, defibrillator

Algorithm:

- ✓ Inspect the scene and make sure that the provision of assistance will be safe: ensure your own safety, as well as the safety of the victim and people around.
- ✓ Assess the victim's condition (consciousness, breathing, pulse).
- ✓ If necessary, call an emergency (ambulance) medical team, as well as other emergency services (police, emergency rescue service, gas service, etc.).
- ✓ Assess the presence of critical bleeding and stop it.
- ✓ Ensure patency of the respiratory tract.

- ✓ If the victim has no signs of life and there is no critical bleeding (or you have already eliminated it), start cardiopulmonary resuscitation.
- ✓ Transfer the victim to a stable position (on the side, facing you, hand under the head, leg bent at the knee), if there is no suspicion of injuries to the spine and pelvic bones and cardiopulmonary resuscitation was successful.
- ✓ Do not leave the victim and monitor the state of his vital functions until the arrival of emergency services.

Cardiopulmonary resuscitation (CPR) is an urgent medical complex procedure aimed at restoring the vital activity of the body and bringing it out of the state of clinical death. Includes artificial lung ventilation (artificial respiration) and chest compressions (indirect heart massage).

Cardiopulmonary resuscitation algorithm:

Remember the abbreviation *CAB* (*Circulation, Airways and Breath*). This abbreviation helps to remember the stages of providing Cardiopulmonary Resuscitation.

1. *Circulation* — restoration of blood supply by compression of the chest.

- ✓ Place the injured person on their back on a hard surface.
- ✓ Kneel near the victim's neck and shoulders.
- ✓ Free the front chest wall from clothing.
- ✓ Place the back of one hand on the middle of the patient's chest, exactly between the nipples. Put your other hand on top of the first. Keep your elbows straight and your shoulders directly above your palms.
- ✓ Use the weight of the upper half of your body, not only the strength of your hands, when pressing down exactly, the depth of chest compression should be about 5-7 cm. Make intensive compression movements with a frequency of about 100-120 times per minute.

Note!!! If you have not been trained in CPR, continue chest compressions until the victim shows signs of movement or until qualified medical assistance arrives.

If you have been trained in CPR, check the airways and perform artificial respiration.

2. *Respiratory tracts* — releasing and ensuring an unhindered supply of air.

- ✓ If you are trained and have performed 30 chest compressions, open the victim's airway by tilting his head back and sticking his chin out. To do this, put one of your palms on the victim's forehead and gently throw his head back. Then gently push the patient's chin forward with the other hand to clear the airway.
- ✓ -Check for normal breathing for 5 to 10 seconds. Check for chest movements, listen for normal breath sounds, and feel the patient's breath against your ear and cheek. Convulsive, convulsive breathing is not normal.

- ✓ If the victim is not breathing normally and you have been trained in CPR, start mouth-to-mouth breathing. At the same time, the patient's nose should be closed.

3. *Breathing* – breathe for the victim.

- ✓ Rescue or artificial respiration can be carried out using the "mouth-to-mouth" or "mouth-to-nose" method if the patient's mouth is seriously damaged or cannot be opened.
- ✓ Open the airway by tilting the victim's head back and pushing the chin forward.
- ✓ Fully pinch the victim's nostrils to perform mouth-to-mouth breathing and tightly cover his mouth with yours. Prepare to take 2 breaths. Take the first deep breath, for 1 second, and see if the chest rises. If it rises, take a second breath. If the chest does not rise, repeat throwing the victim's head back and chin forward, then take a second breath.
- ✓ One cycle is considered to be 30 chest compressions and 2 breaths.
- ✓ Continue chest compressions to restore blood supply.

Note!!!

1. If the victim has not started moving after 5 cycles (about 2 minutes) and you have an automatic external defibrillator (AED), place its plates on the patient's body, connect and follow the recommendations. Give 1 shock, then return to CPR, starting with chest compressions for another 2 minutes, then give 2 shocks.
2. If you do not know how to use ADS, an ambulance worker by phone 103 (112) can instruct you on its application. Use child plates, if available, for children between 1 and 8 years of age. Do not use ADS for children under 1 year of age.
3. Continue CPR until signs of movement appear or qualified medical assistance arrives.

Algorithm for applying a CAT tourniquet

for the temporary stoppage of arterial bleeding from a limb

A tourniquet is applied only in case of extreme necessity in such cases when there is a real threat to the victim's life from significant blood loss from wounds of the limbs.

- ✓ The tourniquet is placed 2-3 inches or 5-8 (up to 10) cm above the wound site on the shoulder, forearm, thigh, or lower leg. The presence of two bones on the forearm and lower leg is not an obstacle to stop bleeding with a tourniquet.
- ✓ In the conditions of shelling, if the location of the wound is not precisely known, it is allowed to apply the tourniquet as high as possible on the limbs - the upper third of the thigh or shoulder (four points). At the same time, at the first opportunity, the location of the hemostatic tourniquet, the need for its use must be checked - if possible, other methods of stopping bleeding should be

used. If necessary, apply a tourniquet 5-10 cm above the wound, after which remove the tourniquet applied in the area of fire.

- ✓ Make sure that the tourniquet is not placed on the joint, on the site of the bone fracture. Try not to apply a tourniquet in the middle third of the shoulder and in the area of the popliteal fossa, where nerve damage is more likely.
- ✓ When the tourniquet is correctly applied, the bleeding stops and the distal pulse (at the wrist on the hand or below and behind the inner ankle on the leg) is not detected. The limb should not swell and acquire a bluish tint.
- ✓ If the bleeding has stopped, but you can still feel a pulse, do not tighten the tourniquet more tightly, but place a second tourniquet over the first tourniquet to reduce muscle and nerve damage. Also use an additional tourniquet if bleeding resumes over time.
- ✓ Do not cover the harness with bandages or clothes!
- ✓ Write down the time of applying the tourniquet on it or on a visible part of the injured person's body. Before the time, write the capital letter "T" (tourniquet, time), which is a signal to the staff that a tourniquet has been applied to the injured person.
- ✓ Watch the wounded - often they try to loosen the harnesses, which cause very strong pain. Administer a pain reliever.
- ✓ In most cases, it is relatively safe to apply a tourniquet for two hours. It is necessary to strive for the fact that during this time the bleeding was stopped by other methods, or that the wounded person was evacuated to the surgical department. If this is not possible, try loosening the tourniquet for 30 seconds and assess the patient's condition. If there are no changes in consciousness, breathing, pulse, skin appearance, repeat this maneuver three times.
- ✓ If the tourniquet has been in place for more than 6 hours, do not try to remove it! Removal of the tourniquet after six hours from the moment of its application must be performed by medical professionals.
- ✓ Practice a lot in applying the tourniquet with one, both hands, on different limbs, in different positions, including lying down, to yourself, to a friend. Train for speed, try to fit in 15-20 seconds.

Algorithm. Applying «with one hand» – self-help or mutual help

- ✓ Pull out the tourniquet from the transport package (it is recommended to keep the tourniquet in the combat position under the conditions of war)
- ✓ Place the tourniquet loop on the injured limb above (proximal) the bleeding wound or as high as possible on the soft tissues of the limb if the wound cannot be clearly visualized.
- ✓ Pull the edge of the tape, pulling the harness as tight as possible. Traction must be carried out at an angle of 90° to the axis of the harness loop.
- ✓ Use the harness's adhesive tape for fixation, and fasten the rest of the tape to the C-bracket.
- ✓ Twist the fixing rod until the bleeding stops and the pulsation of the damaged vessels distal to the tourniquet disappears.

- ✓ Fix the rod in the fixing “C”-bracket.
- ✓ Wrap the remainder of the tape around the limb above the rod and through the “C”-bracket.
- ✓ Fasten the rest of the tape with white "TIME" velcro and indicate the time of application of the harness on the same velcro.

Algorithm of applying a cervical collar

Materials: Perfit Ambu* ACE® collar, two pairs of non-sterile examination gloves.

Description of the collar: The Mini-Perfit Ambu* ACE® Collar is a monoblock rigid cervical spine immobilization device designed to assist the rescuer in maintaining a neutral position and preventing lateral (side-to-side), anteroposterior (flexion and extension) displacements of the cervical spine under time of transportation and monitoring of the patient during movement.

Principles of immobilization: *Prevention and/or prevention of further progression of damage to the cervical spine and spinal cord* is achieved by maintaining the head and neck in a "neutral alignment" position. The head and neck should not be bent forward, bent back, or shifted to one side or the other. The "neutral alignment" position prevents damaged vertebrae or foreign bodies from rubbing and/or cutting the spinal cord. In addition, the neutral position prevents the spinal cord from being twisted or compressed, causing physical and/or ischemic damage to the spinal cord.

Algorithm:

- ✓ One rescuer, manually stabilize the head and neck by gently holding the head and neck in a "neutral alignment position."
- ✓ Note: If stiffness is felt, or patient discomfort increases, follow your established protocols for immobilizing the cervical spine for known or suspected cervical dislocation.
- ✓ Once the head and neck are manually stabilized, the second rescuer should apply the TUZA Perfit Ambu Mini Collar to the patient. Determine the size of the collar as indicated below. The applied collar should not excessively extend the patient's neck.
- ✓ Measure the distance between an imaginary plane placed horizontally and just below the patient's chin and a second horizontal plane placed just above the patient's shoulder.
- ✓ Compare this distance with the distance on the collar calibration line to the lower aspect of the collar's plastic body.
- ✓ Calibration. The Perfit Ambu Mini Collar adjusts to a child's size 1. If a larger collar size is required, unclip the safety fasteners by pulling up the buttons.
- ✓ Adjust the collar to an adequate size: Perfit Ambu provides 12 ratchet adjustment positions between a normal infant and a small adult.

- ✓ Simply stretch the collar to the distance beyond the calibration line and the plastic body of the collar equals your finger measurement.
- ✓ Engage the safety locks by lowering the safety buttons.
- ✓ The Perfit Ambu must be changed, the safety locks released and the "arrows" released on the ratchet. Perfit Ambu can now be adapted to smaller sizes.
- ✓ Reset the ratchet locks by pressing "IN" on the "arrows".
- ✓ Now close the safety locks by pressing the safety buttons.

Application

Proper application of any collar requires two people. The first rescuer must support stabilization and "neutral" alignment of the head and neck, holding the head with spread fingers according to the technique.

The second rescuer should move the front of the collar along the patient's chest and place the chin section. The body of the collar should rest against the top of the patient's shoulder and sternum without gaps. The patient's chin should lock securely in the chin section in a neutral alignment position.

While holding the front in place, wrap the back of the collar around the back of the patient's head and neck and secure to the front of the collar with Velcro.

Adjust the collar as needed by holding the front contour of the collar and tightening with the Velcro fastener.

Collar size adjustments can be made on the patient according to your local protocol.

Warning!!!

Maintain "neutral head and neck alignment" throughout the procedure. Once the collar is properly applied and the patient is immobilized, the head should not be released. Next, immobilize the head and neck with head blocks or a head immobilizer and secure the patient to the back with adequate restraint straps.

Applying a simple nodal suture to close a skin wound

Actuality. Uncomplicated closure of skin defects is most often performed with the help of simple nodal sutures. Each seam consists of one individually tied, circular (simple) loop of suture material. This technique allows you to tighten each seam separately, and if even one seam separates, the others will remain unchanged.

The goal of any suturing is to connect the edges of the wound (especially the dermis) without tearing or tension.

Indication

- ✓ Deep wounds that, in the absence of suturing, will heal with significant scarring
- ✓ Wounds with edges that can be satisfactorily closed with such sutures
- ✓ Relatively fresh wounds with minor contamination

Contraindications

Absolute contraindications

There is none

Relative contraindications

- ✓ Simple knotted sutures should not be the only method of wound closure with high tissue tension; these wounds may require other measures, such as submerged deep skin sutures, before epidermal closure.
- ✓ Suture of any type may be contraindicated for wounds that are contaminated, relatively old, or those that may be at greater risk of infection if the wound is closed with sutures. This applies to small bites on the arms or legs, puncture wounds, or gunshot wounds.

Wounds that involve deep structures (eg, nerves, blood vessels, ducts, joints, tendons, bones) and cover large areas or involve areas of the hands or face require special repair techniques that may require referral to a surgeon.

Complication

- ✓ Infection
- ✓ The formation of cuts or scarring due to the pressure of the sutures on the skin
- ✓ Ischemia and necrosis due to excessive tightening of sutures

Equipment

Wound hygiene and application of wound closure techniques do not necessarily need to be performed in sterile conditions. Although instruments that come into contact with the wound (eg, forceps, needles, suture material) must be sterile, clean nonsterile gloves and clean nonsterile water can be used for immunocompetent patients. Some doctors prefer sterile gloves, which fit well and have better barrier protection.

Wound cleaning procedure and barrier protection

- ✓ Face mask and goggles (or face shield), medical caps, suits/gowns, gloves
- ✓ Sterile sheets, towels (for wound treatment and suturing)
- ✓ Antiseptic solution (for example, chlorhexidine, povidone-iodine)
- ✓ Sterile gauze pads (eg, 10 cm × 10 cm [4 in × 4 in])
- ✓ Needle holder, toothed forceps or surgical hook, scissors and suture material (usually non-absorbable monofilament suture material).
- ✓ Sometimes splints or other materials (for further rehabilitation) to limit movement or skin tension, which may be the cause of suture tension

Position of the patient during the procedure

- ✓ The patient should take a comfortable position, reclining on a couch or lying on his back.

- ✓ Adjust the height of the headboard so that it is comfortable to sit or stand next to it.
- ✓ In the case of elongated lacerated wounds, it is necessary to position yourself so that the wound is approximately parallel to the front part of your body.
- ✓ The lacerated wound should be well lit, so it is desirable to provide illumination using a headlamp.

“Step-by-step” description of the procedure

- ✓ If necessary, cleaning, anesthesia, washing and sanitation of the wound are carried out.
- ✓ The wound is covered with a surgical sheet with a designated operating field. If necessary, additional sheets are placed near a sufficiently large sterile work surface.

Working with a surgical instrument

- ✓ Hold the needle holder in the dominant hand so that the index finger is extended along the side of the instrument. This maneuver allows for maximum control. Some experts do not recommend placing your fingers in the finger holes of the needle holder when suturing; this can make it difficult to insert the needle perpendicular to the skin. However, you can place your fingers in the finger holes when releasing the needle with the needle holder and when tying a knot with a tool (tool stitch).
- ✓ Hold the tissue forceps in your non-dominant hand as you would hold a pencil. Do not close the tips of the forceps tightly on the skin, as this can damage the tissue. When handling tissue, use only serrated forceps or a surgical hook to prevent tissue crushing.
- ✓ Hold the suture scissors with the index finger extended and pointing toward the tip of the tool for maximum control.

Stitching

- ✓ In general, the first stitch of the suture is placed in the middle of the wound.
- ✓ Next, the needle holder is prepared: the needle is grasped at an angle of 90 degrees with the very tip of the needle holder. The needle is held at the junction of the proximal and middle thirds of the needle.
- ✓ The tip of the forceps is used as a hook (or with the help of a surgical hook), with its help, the tissue is carefully lifted and, if necessary, the edges of the wound are turned outward during suturing. Proper outward eversion of the wound edges at this stage is critical for optimal dermal closure, ultimately helping to maximize healing power and minimize wound scarring.
- ✓ Suture by gently bending the wrist so that the needle passes through the skin along the path of its curvature.
- ✓ The needle should enter and exit the skin at a 90 degree angle. Compare the depth and width of the stitch on both sides of the laceration. The depth of the stitch should be greater than its width.

- ✓ Push the needle through both edges of the wound if it can be done with little tissue resistance. If there is significant tissue resistance—or if you are suturing a relatively wide space (as may happen with the first few stitches of a knotted suture)—bring the needle through the center of the tear after it has passed through the 1st edge of the wound, then recapture her needle holder. Continue suturing, making a second puncture that goes to the opposite side of the wound.
- ✓ Carefully pull the thread through the needle path and leave some of the free end of the suture material (eg 2-3 cm).
- ✓ Release the needle from the needle holder and leave the needle in the sterile field.
- ✓ Tie the seam with the tool as described below.
- ✓ Repeat these steps, placing all subsequent stitches in the middle of each open section until there is no gap left in the wound. The gap between the stitches is usually equal to the distance from the needle entry to the edge of the wound.
- ✓ Simple skin suture
- ✓ The suture begins and ends equidistant from the edges of the wound. Points A and B have the same depth. If the wound is deep, the suture should be away from the edge of the wound. The edges of the skin should be turned so that the width of the stitch in the deepest part of the wound is greater than on the surface.
- ✓ Simple skin suture
The distance between the stitches of the seam
The gap between the stitches is usually equal to the distance from the point of entry of the needle to the edge of the wound. Sutures should enter and exit at an equal distance from the edges of the wound.
- ✓ Applying a seam using a tool
- ✓ Hold the tip of the needle holder over and between the entry and exit points of the suture thread. Using your non-dominant hand, hold the long end of the sewing thread (the one on the needle side). Remember where the needle is and be careful not to let the needle come into contact with your hand.
- ✓ To make the first turn of the knot, wrap the needle end of the sewing thread (long end) OVER the end of the needle holder twice. These two turns form the basis of the surgical knot, which prevents the loosening of the first suture. Then turn the needle holder 90 degrees and grab the free (short) end of the sewing thread with it. Pull the ends with your hands in opposite directions to secure the first stitch, but don't pull too tight; tight sutures may dig into the skin and cause ischemia, as wound swelling may occur over the next few hours.
- ✓ When retying and retying knots, wrap the needle end of the suture OVER the needle holder only once. Grasp the free end of the suture with a needle holder and pull in opposite directions to tighten the knot. All subsequent stitches can be pulled tight.
Note that the suture is always placed OVER the needle holder and that your hands move across the wound in opposite directions with each stitch. Following this technique ensures that all nodes are square.

- ✓ Apply a total of about 4 stitches. After the last stitch, the thread is cut with scissors, leaving the ends approximately 1 cm long.
- ✓ Instruct the patient about when to return for suture removal, which usually depends on the location of the wound: 3 to 5 days for the face, 6 to 10 days for the head and trunk, 10 to 14 days for the arms, and legs and after 14 days for wounds located in the joint area. Early removal of sutures can lead to separation of the edges of the wound; however, to reduce scarring and cross-stitching on the face, half of the stitches (ie, every other stitch) can be removed on day 3 and the rest removed on day 5. An alternative option is to remove all sutures on the 3rd day and close the wound by applying a special tape.

The practical skill of the wound tamponade for temporary stoppage of bleeding from the limb's wound and in «nodal» bleeding

Actuality.

Wound tamponade. In the presence of massive bleeding on the neck, axillary and inguinal areas, the main method of stopping it is wound tamponade. It involves dense filling of the cavity with a bandage, ordinary gauze or a clean cloth. Thanks to the widespread introduction of tourniquets to stop bleeding from wounds of the extremities, it was possible to significantly reduce the number of deaths both among military personnel and among civilians. However, both during hostilities and during terrorist acts, explosive devices, including home-made ones, which have significant impressive power, are increasingly used.

“Junctional” bleeding. In these conditions, the victims have wounds and bleeding, which have a special definition - "nodal bleeding", that is, bleeding from the places where the limbs join the trunk (axillary and inguinal areas) and the base of the neck.

The peculiarity of these bleedings is that in these areas it is anatomically impossible to use a standard tourniquet suitable for stopping bleeding from wounds of the extremities. The main methods of stopping nodular bleeding are direct pressure on the wound and dense tamponade (filling) of the wound, including hemostatic bandages. The hemostatic action of the bandage with the simultaneous compression of blood vessels creates conditions for the temporary stoppage of massive bleeding. Therefore, wound tamponade is an effective method of stopping massive external bleeding in the neck, axillary and inguinal areas.

Material. Mannequin for simulating a bleeding wound, artificial blood, sterile gloves, sterile or hemostatic bandage, folded in a Z-shape or "accordion" type Combat Gauze for ease of use, pressure bandage.

Algorithm.

- ✓ carefully examine the wound and identify the place of bleeding;

- ✓ with your right hand, press the vessel in this place against the bone in the depth of the wound to reduce bleeding; if the bleeding is from the inguinal area, press the femoral artery at a distance (this can be done by pressing the vascular bundle with your own knee (Fig. 7) and at the same time prepare a hemostatic or sterile bandage for use;
- ✓ take a few loops of the bandage in your left hand and bring it under the fingers of your right hand, with which continue the pressure on the blood vessel using the brought loops;
- ✓ repeat this technique until the wound is filled, without relaxing the pressure with the right hand (the shulga presses with the left, and applies the bandage with the right);
- ✓ after complete tamponade of the wound, apply direct pressure on the wound with two hands for at least 10 minutes in the case of using a conventional bandage and 3 minutes for a hemostatic bandage;
- ✓ after performing the manipulation, carefully reduce the pressure and examine the wound; if the wetting of the bandage with blood does not increase and the bleeding has stopped, apply a compression bandage over the wound;
- ✓ if the bleeding has not stopped, you should continue direct pressure on the wound with maximum effort until the arrival of the ambulance team.

Algorithm of the technique of cricothyroidotomy

Actuality. *Cricothyrotomy* is typically performed as an emergency when endotracheal intubation is contraindicated or not possible with other methods of intubation, and non-radical methods of airway patency and ventilation (eg, supralaryngeal devices such as a laryngeal mask) fail to provide adequate ventilation and oxygenation of the patient.

Note.

- ✓ Guidewire cricothyrotomy is similar to Seldinger (catheter over guidewire) method used for central venous catheterization and may be more suitable for operators with insufficient surgical experience.
- ✓ Needle cricothyrotomy is a temporary technique that uses a 12- to 14-gauge vascular catheter attached to an Ambu bag (or jet ventilator if available). This method of cricothyrotomy is preferred in children < 10 years of age. This apparatus can be easily assembled by attaching the angiocatheter to a 3 ml syringe with the piston removed. An adapter consisting of a 6.5 mm endotracheal tube (ET) is then attached to the syringe and the patient is ventilated with an Ambu bag attached to the ET tube adapter.

Indication

- ✓ Apnea, severe respiratory failure or threatened respiratory arrest requiring endotracheal intubation, and any of the following

- ✓ Unsuccessful attempts at orotracheal or nasotracheal intubation with the inability to provide oxygenation or artificial ventilation of the lungs using alternative methods (eg, Ambu bag, supralaryngeal airway)
- ✓ Contraindications to orotracheal or nasotracheal intubation, such as massive bleeding in the oral cavity, severe facial trauma, or a bulky mass in this area due to the presence of a tumor

Contraindications to percutaneous cricothyrotomy

Absolute contraindications

- ✓ Age < 8 years

Relative contraindications

- ✓ Inability to identify landmarks due to significant damage to the larynx, thyroid, or parietal cartilage
- ✓ Partial or complete dissection of the distal part of the trachea
- ✓ Age from 8 to 12 years (change of age limits without final approval by an expert)

Complication

Early complications:

- ✓ Bleeding, sometimes uncontrollable
- ✓ Insertion of the tube into the tissues of the neck rather than the trachea is usually immediately recognized by the absence of breath sounds on lung auscultation and is eliminated by inserting the tube into the trachea
- ✓ Trauma or perforation of the back of the trachea
- ✓ Injuries of the larynx, vocal cords or thyroid gland

Late complications include:

- ✓ Progressive airway obstruction due to ligamentous stenosis and growth of granulation tissue around the stoma
- ✓ Voice changes that are chronic but may disappear over time
- ✓ Wound infection

Equipment

- ✓ Antiseptic solution (eg, chlorhexidine, povidone-iodine), sterile gauze pad, sterile drape, sterile gloves and gown along with eye and face protection (universal precautions), local anesthetic (eg, 1% or 2% lidocaine with adrenaline, 25 gauge needle, 3 ml syringe).
- ✓ A "catheter on a needle" device capable of accommodating a wire guide attached to a 3-6 mL syringe half-filled with saline
- ✓ Flexible conductor in a plastic case
- ✓ Airway (tracheal tube) having a plastic inflatable cuff and a removable intraluminal curved blunt dilator (facilitating insertion)

- ✓ Scalpel #15
- ✓ Suction source and aspiration catheter
- ✓ Ambu bag mask and oxygen source
- ✓ Patient monitoring equipment including cardiac monitor, pulse oximeter, blood pressure monitor (non-invasive)
- ✓ Capnometer (monitor of partial pressure of carbon dioxide in exhaled air at the end of exhalation), if available

Corresponding anatomy

- ✓ The annular thyroid membrane is located between the thyroid cartilage and the cricoid cartilage. The dimensions of the membrane are approximately 1 cm in the longitudinal direction and 2–3 cm in the transverse direction. Cartilaginous tracheas extend caudally from the cricoid cartilage to the jugular fossa of the sternum.
- ✓ The area around the elastic cone of the larynx is rich in blood vessels (superior thyroid arteries and a relatively rare variant of unpaired thyroid arteries).

Position of the patient

Place the patient in a supine position and, if there is no suspicion of an injury to the cervical spine, perform neck extension. During cricothyrotomy, the position of the person for intubation ("sniffing" position) is not mandatory.

Algorithm.

- ✓ Adequate oxygenation and ventilation of the lungs should be provided as much as possible throughout this procedure, using an Ambu bag or laryngeal mask and supplemental oxygen (if equipment is available, at a high flow rate).
- ✓ Check the cuff of the tracheal tube balloon for tightness by using a syringe to fill it with air. Then release it from the balloon.
- ✓ Use a gloved finger to apply a small amount of water-soluble lubricant to the expander/duct system, including the balloon cuff.
- ✓ Attach a syringe half-filled with saline to the needle.
- ✓ Define the elastic cone of the larynx. The finger should be moved in a caudal direction from the laryngeal prominence (the most protruding part of the anterior thyroid cartilage) to the palpation of the thyroid membrane, which is palpable as the transition between the caudal end of the thyroid cartilage and the cricoid cartilage.
- ✓ Prepare the front of the neck with a cleanser such as chlorhexidine or povidone-iodine and wrap the neck with a sterile drape.
- ✓ If the patient can feel pain, then inject a local anesthetic along the intended skin incision site (see next point).
- ✓ Stabilize the position of the larynx with the non-dominant hand, holding the sides of the thyroid cartilage with the thumb and middle fingers. Maintain stabilization until the airway catheter is in place.

Note. Some surgeons use a scalpel to make a median longitudinal incision of the skin and subcutaneous tissue above the cricothyroid membrane (2–3 cm long).

- ✓ A syringe containing liquid is attached to the needle (which is usually part of the catheter) and the needle is inserted through the thyroid membrane, directing at an angle of about 45 degrees. Keep back pressure on the syringe piston as you advance.
- ✓ Confirm that the needle is in the airway by feeling the click as the needle enters the trachea and by seeing the air entering the syringe as bubbles in the saline solution. If air returns, immediately stop advancing the needle.
- ✓ Remove the syringe from the needle. If the catheter is attached to the needle, advance the catheter and withdraw the needle.
- ✓ Push the flexible tip of the guide wire through the needle or catheter into the trachea.
- ✓ While holding the guidewire firmly, carefully withdraw the needle or catheter, leaving the guidewire in place.
- ✓ Make a skin incision immediately below the guidewire insertion site (if not already done) to facilitate the passage of the blunt-ended dilator and breathing tube, which are advanced as a unit into the trachea. Carefully slide the extender over the conductor. Make sure that the conductor passes through the expander and that the end of the conductor is under control before starting to advance the conductor (so that the conductor does not get lost in the duct).
- ✓ Further dissection of the site is necessary to facilitate passage of the device through the tissues and trachea. If there is significant resistance to passage, try to use a gentle but steady force, rotating the module as it advances, also using further tissue dissection as needed. The fully inserted cannula and flange of the airway aspiration catheter should be flush with the skin.
- ✓ Pull out the conductor and expander.
- ✓ Inflate the balloon cuff to the minimum volume required for effective ventilation.
- ✓ Restore ventilation using the newly created duct.
- ✓ Secure the device in place using a bandage or patch pulled over the catheter flanges.
- ✓ When the catheter is installed, the correct location in the respiratory tract is confirmed by auscultation and determination of carbon dioxide at the end of exhalation.
- ✓ Follow-up care after percutaneous cricothyrotomy
- ✓ To confirm the correct position of the catheter, a chest X-ray may be performed.

Note. *Cricothyrotomy* is usually considered as a transitional step to a longer tracheostomy, which is usually performed within 72 hours of the initial emergency cricothyrotomy. Tracheostomy conversion is believed to reduce the risk of ligamentous stenosis; however, there is no convincing literature data that would confirm the necessity of such a transition.

