

MINISTRY OF HEALTH OF UKRAINE
POLTAVA STATE MEDICAL UNIVERSITY

Department of general surgery

METHODICAL INSTRUCTIONS
FOR STUDENT SELF-DIRECTED WORK
WHEN PREPARING FOR AND DURING TO THE PRACTICAL CLASS

Study discipline	General surgery
Module №1	INTRODUCTION TO SURGERY. SURGICAL EMERGENCY CONDITIONS. FUNDAMENTALS OF ANESTHESIOLOGY AND INTENSIVE CARE
<i>Content module 2.</i>	<i>Bleeding, blood loss. Bases of blood transfusion</i>
<i>Lesson theme №6</i>	Bleeding and blood loss. Methods of temporary and final stopping of bleeding.
Years of study	<i>III</i>
Faculty	International

Poltava

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<i>Lesson theme №6</i>	Bleeding and blood loss. Methods of temporary and final stopping of bleeding.

1. Relevance of the topic :

Blood loss is a direct threat to the life of the victim and of the immediate actions of the doctor depends on his fate . Risk of bleeding associated with the development of hemorrhagic shock, the severity of which is due to the intensity , duration of bleeding and blood volume lost . Rapid loss of 30% of circulating blood volume leads to severe anemia , hypoxia, the main brain and can result in death of the patient . Medical personnel must own images temporary stop bleeding , to know the clinical signs of secondary bleeding and the risk to the patient's life .

2 . Learning Objectives :

1. Know the classification of bleeding etiology , mechanism of occurrence , date of occurrence, anatomy , pathogenesis bleeding , compensatory and adaptive mechanisms for bleeding .

2 . Know the definition of the concepts that relate to bleeding and disorders of hemostasis .

3 . Learn the local and general clinical signs of bleeding. Know the pathogenesis and clinical course of hemorrhagic shock.

4 . To be able to diagnose the bleeding , to distinguish closed and open bleeding.

5 . To be able to interpret the signs of hemorrhagic shock , to assess the condition of the patient and to provide for the investigation.

6. Be able to provide first aid - to a temporary stop bleeding.

7. To be able to evaluate the results of inspection of patient with bleeding , the diagnosis according to the classifications to determine a treatment plan - final stop bleeding and blood loss compensation .

3. Basic knowledge and skills necessary for studying the topic (inter-disciplinary integration)

The names of the preceding disciplines	These skills.
normal physiology	Know the features of the functioning of the hematopoietic and cardiovascular system
normal anatomy	Know the normal parameters of a general analysis of blood and urine tests. Determine the type of vessel. Know the structure of the main types of vessels.
Propedeutics Internal Medicine	To demonstrate the method of examination of patients, gathering medical history, conduct inspection, palpation, percussion and auscultation, reading radiographs
pathophysiology	Know the pathogenesis of hypovolemic shock, blood disorders, DIC, to be able to diagnose shock.

biochemistry	To treat blood biochemistry..
pathological anatomy	Histopathological signs of ble

The student must have an idea :

- The definition and types of bleeding.
- Determination of blood loss .
- The mechanism of self- control bleeding .
- On how to temporarily stop the bleeding.
- On how the final stop bleeding : mechanical, physical , biological.
- Of vascular suture .
- Transplant and alloplasty .

The student should know :

- Know the classification of bleeding on the etiology , mechanism of occurrence , date of occurrence, anatomy , pathogenesis bleeding , compensatory and adaptive mechanisms for bleeding .
- Know the terms that relate to bleeding and disorders of hemostasis .
- To learn the local and general clinical signs of bleeding. Know the pathogenesis and clinical course of hemorrhagic shock.

The student should be able to:

- Be able to diagnose bleeding , to distinguish closed and open bleeding.
- Be able to correctly interpret the signs of hemorrhagic shock , assess the patient's condition and provide for the investigation.
- Be able to provide first aid - to a temporary stop bleeding.
- Be able to evaluate the results of inspection of patient with bleeding , the diagnosis according to the classifications to determine a treatment plan - final stop bleeding and blood loss compensation .

Mastering the skills of students:

- Learn how to diagnose bleeding and its severity .
- To learn fingerpicking snuggling on the vessels .
- Learn to impose a pressure bandage .
- Learn to impose twists and harness .
- Learn how to determine the extent of blood loss.

4.Tasks for self-study in preparation for the lesson .

4.1. The list of basic terms , parameters, characteristics, which the student must learn in preparation for the class:

term	definition
BVC	Blood volume
hypovolemia	Reducing the bcc
hemostasis	stop the bleeding

coagulation coagulopathy		blood clotting Disruption in the blood coagulation system	
№	List of training activities	Methodical instructions to training activities	Self-study
<i>theoretical</i>			
1	Define the concept of bleeding, hemorrhagic shock, DIC		
2	Give the classification of bleeding	The causes and types of bleeding	
3	Count the principles of first aid, select shows for each type of temporary hemostasis		
<i>Practical:</i>			
1	Collect medical history of a patient with gastric bleeding	Pay attention to the features of bleeding.	Work on the survey of patients
2	Apply the tourniquet to hold finger pressing arteries	Determine the indications for tourniquet, finger pressing	Performed by students one-on-one
3	Diagnosis, the provision of first aid, the purpose of treating patients with bleeding from varicose veins of the lower limbs	ssify bleeding, determine the amount of first-aid treatment policy	Working with patients

2 . Theoretical questions for the class :

1. Opredelenie and types of bleeding.
2. Opredelenie of blood loss .
3. Mehanizm self- control bleeding .
- 4 . Methods temporarily stop the bleeding.
- 5 . Methods for the final stop bleeding : mechanical, physical , biological.
6. Sosudisty seam.
7. Transplantation and alloplastica .

4.3. Practicall tasks that are used in class:

1. Diagnosis of bleeding and its severity .
- 2 . Finger pressing down .
- 3 . Imposing a pressure bandage .
- 4 . Imposition of twists and wiring , conduct tests on individual compatibility .

5 . The content of the topic.

Bleeding (haemorrhagia) - the outpouring of blood from the blood vessel is **Haemorrhage, or bleeding, is the outflow of blood from the blood vessels into tissues, cavities or surrounding environment, as a result of an injury or defected permeability of the vascular walls.**

The hemorrhage is one of the main reasons of death of persons with trauma.

Blood loss is a life-threatening condition, which necessitates urgent treatment, as the life of the injured person invariably depends on how fast the doctor can deal with the

problem.

All doctors, surgeons emphasize to problem of bleeding. One of the basis parameters of qualification of the surgeon skill is to reduce loss of blood during operation and to stop bleeding

Speaking about bleeding, it distinguish three concepts: 1) itself bleeding, 2) hemorrhage, 3) hematoma.

1) **The bleeding** - the outflow of blood from the blood vessels into tissues, cavities or surrounding environment;

2) **The hemorrhage** – when the blood oozes (просачивает) the surrounded tissues during the process of bleeding;

3) **The hematoma** – when the poured out blood divides tissues into layers, separates organs. As a result the artificial dimension (объемная) cavity, which is filled with blood, is formed.

The further development of hematoma may lead to the following results: resorption, suppuration or the organization

Classification. There are some classifications of bleeding.

I. Anatomical classification (according to kind of bleeding vessel)

- Arterial hemorrhage;
- Venous hemorrhage;
- Capillary hemorrhage;
- Parenchymatous hemorrhage (bleeding is a capillary type of bleeding from an organ like the liver.);
- Combined bleeding

II. According to mechanism of bleeding:

- Mechanical trauma, vessel rupture (haemorrhagia per rhexin);
- Arrosive hemorrhage (haemorrhagia per diabrosin). These types of bleeding take place during suppurative melting of vessel wall;
- Diapedetic hemorrhage (haemorrhagia per diapedesin);
- The violation of chemical composition of blood. The hemophilia, scarlet fever, sepsis, scurvy and others are causing bleeding sometimes. Toxins or beriberi to produce defect in the permeability of the vascular walls and caused of hemorrhage;
- Increased of arterial and venous blood pressure. The diseases, such as essential hypertension, atherosclerosis sometimes coursed of an injury of the vascular wall and bleeding (stroke, hemorrhoidal bleeding, etc.);
- Impairment of fibrination (haemophilia, Werlgof's disease, cholemic hemorrhage! in patients with jaundice).

III. According to environment the bleeding is divided into the two main kinds.

There are:

- External bleeding;
- Internal bleeding.

The hemorrhage caused by damaging of skin or visible mucous membrane is named **external**. When blood accumulates in the enclosed space of the body or in the cavity, or in the hollow organ - this is **internal** bleeding. **External bleeding**. External bleeding is the major sign of injury. The color of the escaping blood depends on the type of the vessel

affected: it is bright red in arterial bleeding and dark red in venous haemorrhage. The lethal bleeding within a few minutes after injury may result not only from a damage to the aorta but also from that to the femoral or axillary arteries or even larger veins. Injury to the major cervical or thoracic vessels can lead to a very serious complication — air embolism. This occurs as a result of air entering the neck veins through the laceration, which subsequently (позже) reaches the right cardiac chambers to finally obstruct the branches of the pulmonary artery.

In arterial external bleeding blood of bright red cells effuses by pulsative spurt, such haemorrhage quickly results in acute anemia. The following symptoms characterize an acute anemia: persisting paleness, trembling (дрожание) and small pulse, progressing decrease of blood pressure, dizziness (головокружение), nausea, vomiting and syncope.

External venous bleeding is characterized by slow effusion of dark blood.

Injury of large veins of neck is dangerous due to a possibility of development of air embolism of cerebral vessels and cardiac pressure in these veins during inhalation.

General symptoms are the same for all types of bleeding, including inner bleeding in various cavities. They are observed in heavy loss of blood and consist of appearance of acute anemia (paleness, dizziness, syncope, trembling small pulse, progressing decrease of blood pressure).

The local symptoms are various.

Internal bleeding. This is usually due to traumatic injuries or a pathology of or around the vessel. Making the diagnosis of internal bleeding is more difficult than that of external. The clinical picture incorporates the *general* signs associated with haemorrhage and *local* ones that vary with the location of the bleeding vessel.

Internal hemorrhage divided into the *explicit* and *occult* (without clinical symptoms). Moreover, it can be occult, when diagnosed only by means of specific methods of investigation.

In internal bleeding, blood effused into closed cavity, may compress a vitally important organ (brain, heart, lung, etc.), violate its function and become dangerous of the patient's life.

Bleeding in serous cavities (pleural, abdominal) during internal hemorrhage the especial place is occupied. They stop independently rarely and are noted massiveness of a hemorrhage. It is caused by that the blood in a serous cavity loses ability to coagulation. Walls of these cavities don't obstruct mechanically to the escape of blood through injured vessel. Moreover, owing to negative pressure in a pleural cavity it is formed suction effect. As a result of falling out a fibrin from a blood coagulation is violate. A fibrin settles on a serous cover. Thus process of a thrombogenesis is impairing.

At bleedings in empty space of a gastrointestinal tract the blood in a stomach changes the color. In ample quantity of its accumulation a vomiting, like "ground coffee" (*hematemesis*), is originated. Further or at a bleeding from underlying departments of a gastrointestinal tract it is observed weak tarry stool in large quantity (*melena*). This is example of explicit bleeding.

Occult bleeding - this is hemorrhage without any clinical symptoms. For example, there is bleeding from ulcer of stomach or duodenum. This type of hemorrhage doesn't have clinical symptoms. Such bleeding is possible to reveal only by laboratory method.

This is research of occult blood in feces. Continued long time concealed hemorrhages which are not revealed, may result in development of an anemia.

Some kinds of internal bleeding have specific name:

- Haemobilia - haemorrhage from biliary ducts;
- Haematuria - haemorrhage from kidneys and urinary system;
- Haemoperitoneum - haemorrhage in abdominal cavity;
- Haemothorax - haemorrhage in pleural cavity;
- Haemopericardium - haemorrhage in pericardial cavity;
- Haemarthrosis - haemorrhage in joint cavity;
- Metrorrhagia - uterine bleeding;
- Proctorrhagia - rectal bleeding;
- Hemorrhagic insult - cerebral hemorrhage.

IV. According to time of beginning all bleedings are: *primary* and *secondary*.

A beginning of primary bleeding is concerned with direct damaging of vessel during trauma. Straight off onset symptoms or during first hours after injuring be developed.

The secondary bleedings are *early* (usually from some hours to 4-5 days after damaging) and *late*.

There are two main reasons of early secondary bleeding development:

1. Slide of ligature off damaging vessel, which was imposition during operation;
2. Washing-out the clot from the injured vessel. This complication we have in connection with increased of blood pressure, blood flow acceleration or through reduction of spastic vessel contraction, which to occur during acute blood loss.

Late secondary or *erosive hemorrhage* concerned with vessel wall destruction. This is result of development of wound infected process. This case is one of very complicated, because all vessel wall change in this region and hemorrhage replace in every moment is possible.

V. According to clinical course - all bleedings are divided into *acute* and *chronic*. During acute haemorrhage to bleed occurs at short time period.

During chronic haemorrhage to bleed is gradually, a little at a time. Sometimes during some days narrow or periodic discharge of blood is observable. In cases of stomach ulcer, duodenum ulcer, malignant tumors, uterine fibromyoma, hemorrhoids the chronic haemorrhage is observe.

VI According to degree of severity.

Estimation of blood loss severity is very important, because it determined of character of blood supply disturbance in sick organism and finally, danger of bleeding for patient's life.

According **V.L.Struchkov and E.W.Lutzevich** there four levels of blood loss.

• *I level*- easy degree - blood loss is even to 10 -12% of blood circulating volume (500 1000 ml). Haemorrhage is causing little changes to hemodynamic. The general condition of Patient is satisfactory. Pulse is slightly quickened, arterial pressure is normal (standart). Blood hemoglobin is rised above 100 g/l (10 g %). During capillaroscopy: background is rosy, 3_4 capillary loops with quick homogenous bloodstream are determined.

- *// level* - middle degree - blood loss is even to 15 - 20 % of blood circulated volume (1000 - 1400 ml). Apparent bleeding is distinguished. The general condition medium-scale difficulty. Limpness, dizziness, hyperhidrosis, syncope are observe. Coverlet is pale. Respiration is accelerated. Reflexes are decrease. Single vomiting, melena may be observed. Pulse become noticeably more rapid (90 - 100 per Arterial pressure is decreased to 90 mm Hg. Leucocytosis, deviation of the different count to the left are determined. Hematocrit is 0,38 - 0,32, hemoglobin is 80 — 100 g/l (8 - 10 g %). Quantity of urination is decreased.

- */// level* - heavy degree - blood loss is 20 - 30 % of blood circulating volume (1500 - 2000 ml). The general condition of patient is bad (grave condition). Paleness a skin, cold sweat is observed. Rapid vomiting and melena are determined. The bleeding j] accompanied by syncope. Visible mucous membranes are colourless. The patient yawn feels thirst. Pulse is rapid and thready. Arterial pressure is decreased to 60 mm Hg. Hematocrit is 0,30 - 0,32, hemoglobin is 50 - 80 g/l (5 - 8 g %). Oliguria is observed.

- *IV level*- massive blood loss - loss of blood is more then 30 % of blood circulating volume (more than 2000 ml). Plentiful bleeding with prolonged loss of consciences may be observed. The general condition of patient is very grave, preagony. Pi and arterial pressure are not fixed. Hematocrit is 0,23 and lower, hemoglobin is 5 and lower. Anuria is observed.

Criteria for the estimation of the degree of bleeding

	Degree			
	light	moderate	severe	Massive
Er, x10 ¹² /l	Down to 3,5	3,5-2,5	<2,5	
Hb, g/l	>100	100-83	83-70	<70
Pulse	<80	80-100	100-120	>120
Systolic BP	>100	100-90	90-60	<60
Ht	0,4	0,4-0,3	0,3-0,25	<0,25
Blood loss,%	<10	10-20	20-30	>30

Hemorrhagic shock - one of aspects of a hypovolemic shock. The clinical picture of a shock can appear, beginning from a hemorrhage 20-30 % BVC.

Stages of hemorrhagic shock:

I stage - compensated reversible shock

II stage –decompensated reversible shock

III stage - irreversible shock.

I stage - hemorrhage volume is completely restored by compensatory mechanisms of an organism.

II stage - the spastic stricture of arterioles can influence a central hemodynamics, normal level arterial pressure any more, the decentralization of a blood supply develops.

III stage - is more than 12 h. unguided hypotonia, the transfusion therapy inefficient, development of polyorgan insufficiency takes place.

Laboratory investigations.

1. Amount (Levels) of the erythrocytes (N-4-4,5 g/l)
2. Levels of Hb (hemoglobin) in blood peripheral. This parameter is reduced at a bleeding. (The norm is 125-160 g/l)
3. Hematocrit - correlation of volume of cellular compounds of blood to volume of plasma. Is reduced at bleedings. The norm is 44-47 %.
4. Specific gravity of blood (№1057-1060)
5. Blood circulating volume (BCV)

Checking for levels of the red blood cells, hemoglobin and haematocrit should be done on admission and repeated afterwards. In severe bleeding, the results of the investigations mentioned may not serve as objective indicators of the degree of hemorrhage in the first few hours, since autohaemodilution occurs with time, reaching its maximum within 1,5— 2 days.

It is haematocrit and blood specific gravity which can be relied upon in judging about the interrelationship between the cellular components of blood and plasma.

The blood specific gravity of as much as 1,057— 1,054, hemoglobin 65—62 g/l, haematocrit 44— 40 suggest blood loss as high as 500 ml, while those of 1,049-1,044, 53-38 g/l, and 30-23, respectively, mean that the amount of the blood lost is above 1,000ml.

A progressive fall in venous blood pressure suggests that the heart is not receiving enough blood due to a reduction in blood circulating volume. It is measured either in the superior or inferior vena cava. This is performed with a catheter passing through the median cubital or long saphenous vein. The most factual method is whereby the amount of blood loss is checked by calculating the deficit in blood circulating volume and its components (i.e. circulating plasma volume, volume of cellular blood components, etc). The method consists in the introduction of specific indicators (Evans' blue, radioisotopes, etc.) into the vascular system. The concentration of the diluted indicator in the blood helps determine the plasma volume; using the standard table and the haematocrit value allows for the calculation of blood circulating volume and globular volume.

The normal values of blood circulating volume and its components are found from the standard table based on the patient's body weight and sex. The difference between the normal and the actual values is used to estimate the deficit in blood circulating volume, circulating plasma volume and the globular volume, i.e. the amount of blood lost.

Special diagnostic methods. If internal bleeding is suspected, diagnostic puncture should be performed (thoracocentesis in haemothorax, laparocentesis in haemoperitoneum, arthrocentesis in haemarthrosis, puncture of the posterior vaginal fornix in ruptured ectopic gestation or ovarian cyst). If indicated, X-ray, ultrasound scanning and computerised tomography can also be used. Endoscopic methods include gastroscopy, rectoscopy, cystoscopy and arthroscopy.

It will be noted that clinical symptoms and signs as well as the laboratory findings are used to evaluate the severity of blood loss.

The method of definitions of blood circulating volume in the health man

Method of definition	the man	the woman
For 1 m ² of a body surface	2,8 l	2,4 l
In % mass of a body	7,5%	6,5%
In mg on 1 kg of mass	70 mg/kg	65 mg/kg

METHODS of MESURING of volume of blood loss:

1. Definitions blood volume circulation (BVC) on MOORE (in a ml.).

Initial informations: mass of a human body, sex, build. Idea of indirect definition of a blood belongs to Valentin. In 1838 he defined degree of delution of a blood having infused distilled water in animal. Indirect definition of BVC at the man has realized in 1882 by Grehaut and Qningand. They offered for this purpose an inhalation of CO₂, this method overestimates real BVC by 12-16 %. In 1920. A.Dawson offered to used a dark blue vaso-colour T-1824 called Evans dark blue, that is widely used as of plasma indicator. Error of a method +10 %.

The data obtained by dilution method T-1824:

BVC for the men - 7,6 %

BVC for the women - 7,1 %.

Methods of a quantitative estimates of BVC with radioactive isotopes also is based on a principle of delution and definition of radioactive blood test. Isotopes ³²P, ⁵⁵Fe, chrome as ⁵¹Cr Na₂Cr₄, ⁴²K, thorium are offered for a score of erythrocytes. In clinical practice an isotope of chrome ⁵¹Cr as Na²⁵¹Cr₄ is used widelly. Error BVC - 7,0 + 0,4 %.

Clinical indications of an Acute hemorrhage loss BVC by 20-30% in volume is 1500-2000 ml.

METHODS of definition of the LOST BLOOD VOLUME:

DIRECT METHODS:

1. By amount of a blood, which immediately has flowed out at external bleeding.
2. By weight of dressing material (at a hemorrhage during operation).

These indicated methods are rather inexact and not very information. More informative is definition of a relative parameter - degree of BVC losses in patient. More often in clinic estimate of volume of a hemorrhage by the basic parameters: a specific gravity, Hb, Ht used. Besides definitions of a hemorrhage by an Alcover index of a shock is used (correlation of a pulse rate to levels of systolic pressure, the norm is 0,5).

INDIRECT METHODS

1. For approximate estimation of a blood loss in the patients with gunshot wounds of a skull volume of hemorrhage - 1,2-1,5 (for Klarc, 1967).

Wounds of thorax 1,8-2,0

Wounds of abdomen 1,7-2,0

Pelvis 2,0-2,5

Femurs 1,5-1,8

Crus and food 1,0-1,2

Brachium, arm, forearm, hand 1,0-1,6

2. Approximately it is possible to definite BVC deficit at a CVP modification (central venous pressure). The norm is 50-100 mm.aqwe.columne. It is decreased at hemorrhage more than 15-20 % BVC. Some clinicians use for definition of blood loss Polyglucin test: intravenously stream inject 200 ml of Polyglucinum and measure CVP. If low CVP on this background increases the hemorrhage – is middle degree of blood loss, if it raise does not - severe.

3. There is a method of definition of a hemorrhage suggested by the senior lecturer of faculty of an oncology and radiation medicine UMSA V.D.Sidora (1973). The method is based on definition of venous hematocrit and mass of a human body of patient - with the composed tables of measured BVC deficit. This procedure supposes an error up to 3,6 %.

4. Definite of a circulating blood volume with the help of hematocrit method by E.P. Kurachov (1973).

$$\text{Deficit BVC} = \frac{\text{BVC required} + \text{H1} - \text{H2}}{\text{H1}} \quad [\text{divided by}]$$

BVC required – weight of patient x (multiplied by) 76 (the Pokrovskij number was defined on normograms).

H1 - hematocrit norm (in women 41, in men - 43).

H2 – hematocrit of patient.

The error of a method is no more than 300 ml.

Procedure lasts for about 10 minutes.

BVC of patient - BVC require - BVC deficit.

5. Method G.A. Barachkov. Definition of relative density of a blood.

The idea is you put drop of an examined blood in to solution of a copper vitriol with previouses measured relative density. It is necessary to have a set of test tubes with copper vitriol solution with relative density from 1040 - 1060 up to 1060 - in the women, 1055 -1063 in the men.

Structural and logic threads

definition	- The outpouring of blood from the blood vessel is damaged or abuse permeability of their walls.
classification	Mechanical damage, rupture of blood vessels (haemorrhagia rer rhexin); b) arozivni bleeding (haemorrhagia rer diabrosin); c) diapedetic bleeding (haemorrhagia rer diapedesin); d) violation of the chemical composition of the blood, changes in coagulation and anticoagulation system of blood.
kind of bleeding	a) blood, b) arteriovenous c) venous, z) capillary, d) parenchymal.
diagnostics	I - mild: the loss of 500-700 ml of blood (CBV reduction of 10-12%); II - medium: the loss of 1000-1500 ml of blood (CBV reduction of 15-20%); III - severe degree: 1500-2000 ml of blood loss (reduction of 20-30% BCC); IV degree - massive blood loss: the loss of more than 2000 ml of blood (CBV reduction of more than 30%).
Methods temporary stop	Finger pressing of the artery over

bleeding	Limb flexion in the joint Swabbing the wound and applying a pressure bandage Pressed against the vessel in the wound with your fingers
Methods of definitive hemostasis	Ligation of the vessel in the wound Ligation of the vessel during the
Physical, chemical and biological methods to stop bleeding	Diathermocoagulation, laser, Dicynone, etamzilat

METHODS of BLEEDING STOPPING

In majority of cases of bleeding from the arteries, veins or capillaries, hemostasis occurs spontaneously.

In place of trauma of vascular wall, at a bleeding, is fast form trombocitaris concentration, where the fibrin “sits”. Its go the enough reliable haemostasis. With help this way, bleeding fast stops from small vessels. When the organism some self doesn’t stop bleeding, we use artificial method its stopping.

There are two basic methods to stop bleeding: temporal and final.

Temporary methods of haemostasis.

Temporary methods to control of bleeding of one's nature are mechanical. The temporally method of haemostasis divided on:

1. Applying a arresting bleeding tourniquet;
2. Digital compression of artery;
3. The maximal flexion of extremity.
4. Raised position of extremity;
5. Pressure bandage;
6. Tamponade of a wound;
7. Applying clamp on bleeding vessel;
8. Temporarily shunting (temporary bypass of vessel).



1. Applying arresting bleeding tourniquet. The most reliable way is the application of a tourniquet; however, it can only be used on the extremities.

In carotid arterial bleeding a tourniquet on the neck using a board or across the contra-lateral axilla is rarely applied. Instead, Cramer's splint is usually placed on the intact side of the neck to serve as a supporting frame. The tourniquet is applied to it and around some gauze pack that has been put on the bleeding vessel on the other side of the neck. If there is no splint at hand, the patient's intact hand is put on his/her head and bandaged. Never apply a tourniquet to the abdominal aorta as this can cause damage to the abdominal organs.

How the tourniquets used to arrest bleeding are broad, flat, rubber bandages applied to the proximal parts of limbs which have been emptied of blood by the application of elastic bandages distoproximally (*Esmarch's tourniquet*) or 1,5 m long tapes with metallic chains on one end and hooks on the other. In arterial bleeding or when massive bleeding is suspected the tourniquet will be applied above the injured site.

Rules of tourniquet application

1. First put a wet sheet or towel onto the area where the tourniquet is to be fixed, i.e. make a soft pad.

2. The tourniquet should be applied firmly, for 2-3 rounds; the last one will be slightly loosed and fixed to the hooks.

3. After procedure *It is a must to write down the time when the tourniquet has been applied since* keeping a tourniquet for more than 2 hours on the lower limb and for above 1½ hours on the upper one can result in ischaemic necrosis.

4. The disappearance of pulse on peripheral arteries, arrest of bleeding and a slightly pale discolouration of the skin below the tourniquet level suggest that it has been applied correctly.

5. If the patient's transportation takes more than 1½ hours, the tourniquet should periodically (every 10—15 minutes) be released until the reappearance of the arterial blood flow, before it is reapplied. At this point press on the bleeding vessel with the fingers in the wound or apply some instrument with a plug to the bleeding point. Reapply the tourniquet either somewhat below or above the original place. Subsequently, if necessary, the removal and reapplication of the tourniquet can be repeated (in winter time every 30 minutes, in summer each 50—60 minutes).

Replace the tourniquet by a transportation splint, in cold periods the extremities being covered with warm clothes to prevent freezing. Transport the patient supine with analgesics having been given.

Long and crude compression of tissues by a tourniquet can cause paresis and palsy of the limbs resulting both from traumatic damage to the nerves and ischaemic neuritis because of insufficient oxygen supply. Tissue hypoxia favours the proliferation of anaerobic infections, i.e. the species of bacteria able to survive without free oxygen. To prevent complications, stop bleeding by temporary application of an air-filled cuff to the proximal part of the limb. At this site the pressure applied must be higher than the arterial blood pressure.

If the bleeding artery has been pressed on correctly, the haemorrhage can quickly be arrested; it is, however, difficult to keep pressing on a vessel for more than 15—20 minutes.

2. Digital compression of artery.

Press on the artery at the sites where it lies superficially and around a bone

- the carotid artery — the transverse process of the C6 vertebra;
- the subclavian artery — the first rib;
- the brachial artery — the internal surface of the humerus;
- the femoral artery — the pubis.

Unlike the carotid artery, the brachial and femoral ones can be pressed on easily.

The subclavian artery is more difficult to press on as it is located behind the clavicle. Consequently, when the bleeding originates from the subclavian or axillary artery, fix the hand in a maximum extended backward position. Then press it on in between the clavicle and first rib. This is most important at the moment of tourniquet application or when changing it or during limb amputations.

Digital compression of a vessel in a wound is indicated in emergency, occasionally during operations. For this, the surgeon will quickly put on sterile gloves or clean their hands with alcohol and iodine and press on the vessel or hold it inside the wound.

3. The maximal flexion of extremity. Flexion of the limb in joint. *This* method is effective provided that the limb can be flexed fully at the elbow joint and bandaged in that position to stop bleeding from the vessels of the forearm and the hand and at the knee joint to control haemorrhage from the vessels of the leg and foot. If the bleeding site of the femoral artery is too high for a tourniquet to be applied, the thigh can be fixed to the abdomen, with the knee and hip joints maximally bent.

4. Raised position of extremity. This method used after operation on the extremities.

5. Pressure bandage;

6. Tamponade of a wound (Wound package) combined with application of a pressure bandage, immobilisation and raising the extremity is a suitable method of temporary haemostasis, if the bleeding originates from veins or small arteries, soft tissues, the scalp, the elbow or knee joint. To achieve a tight package, the gauze should be tightly packed in the wound and pressure bandage applied over it. The tight packing of the knee fosse is contraindicated because this often leads to pedal gangrene. Pressure with load (e.g. a sand bag) or in combination with an ice pack (e.g. a bag with ice) is used for intratissue bleeding and prevention of postoperative haematoma.

7. Applying clamp on bleeding vessel. If the bleeding vessel is located deeply inside (e.g. at the base of a limb, in the abdominal cavity, chest) and none of the methods of temporary haemostasis can be applied, the artery forceps or vessel clamps can be used. It is noteworthy that this can cause damage to some vital organs. Hence it is advisable to

- control the bleeding by digital pressure;
- dry the wound of blood;
- apply the clamp on the bleeding vessel.

8. Temporarily shunting (temporary bypass of vessel). Temporary bypass of a vessel is required to restore blood circulation in an injury to a major artery. A firm elastic tube is usually applied to both ends of the injured vessel and then fixed by ligatures. The temporary bypass can function for between several hours and several days, before the effective definitive haemostasis has been undertaken.

FINAL METHOD of HAEMOSTASIS

The methods of final haemostasis divide into the four groups:

- 1) mechanical;
- 2) physical;
- 3) chemical and biological;
- 4) combined.

1. Mechanical methods

- 1) Ligating a vessel

a) ligating bleeding vessel inside of wound. Ligating the bleeding vessel inside the wound. After the temporary arrest of bleeding has been achieved the definitive care will be provided. This involves surgical wound debridement, revision of the wound, and incision of the soft tissue along the vascular bundle. The vessel's central and peripheral ends are first identified; to pick these up and ligate the vessel artery forceps are used

b) ligating bleeding vessel at a distance. Ligation of the vessel along its length is indicated when its ends cannot be identified in the wound. This precludes its ligation in the wound (e.g. injury to the internal and external carotid arteries). This is also the case in secondary bleeding when the eroded vessel is.

This calls for identification, isolation and ligation of the vessel using the topographic landmarks, which, however, does not ensure the arrest of bleeding from the peripheral ends of the artery or its collaterals

When the surgeon fails to find the ends of the bleeder, they ligate the vessel together with the surrounding soft tissues. If it is not possible to ligate the vessel after its picking up with a clamp or forceps, the clamp can be left in the wound for 8 to 12 days (until the vessel has reliably thrombosed).

2) To under-run bleeding vessel. The surgeon applied around bleeding vessel Z-like suture, if he can't clamp this vessel.

3) Twisting of a bleeding vessel To stop bleeding from small vessels, these can be picked up with a clamp and rotated.

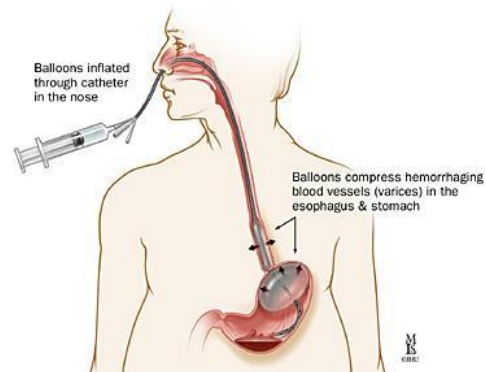
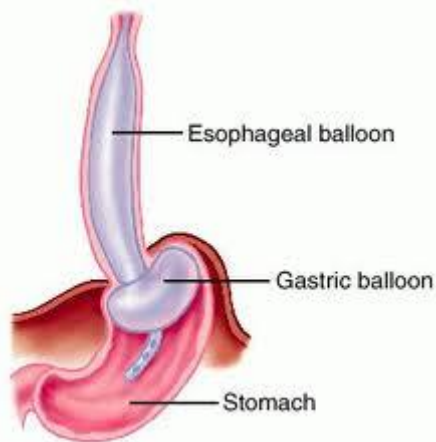
- 4) Wound package (tamponade) and pressure bandage.

- Wound package uses into abdominal surgery, if parenchymatous bleeding is. Tampon situates inside cavity 5-6 day and it is removed. After this procedure bleeding is stop. Dry swabs or those soaked in antiseptic solutions can be used.

- Tamponade of nasal cavity (at nasal bleeding). In this case it is main method. It is anterior and posterior tamponade of nasal cavity

5) Embolisation of vessel. To stop bleeding from the lung, gastrointestinal tract and cerebral vessels a special method of artificial vascular embolism has been recently implemented; this involves the use of lysing (e.g. gelatin, muscle homogenate) or non-lysing (e.g. silicon, polysterol) substances.

6) Special methods (splenectomy at a parenchymatous bleeding from a lien, a resection of a stomach at a bleeding from a ulcer or a tumour, a lobectomy at a pulmonary bleeding, Blaekmor' probe, etc.);



7) Vasculare suture, reconstructive of vessel

There exist both manual and mechanical vascular sutures. Suturing a vessel is recommended whenever restoration of the patency of major vessels is necessary.

Circular vascular sutures are placed manually using atraumatic needles. Ideally, an «end-to-end» connection is

performed. Vascular sutures should be very compact and airtight and meet the following requirements

- 1) a lack of strictures or bumps (not to impede the blood flow);
- 2) minimum threads appearing in the lumen.

Circular vascular sutures can be made using tantalum staples, Donetski's ring. Mechanical sutures are perfect enough not to obstruct the vascular lumen.

Lateral vascular sutures are placed when the vessels are injured adjacently. On suturing, the vessel can be strengthened with the muscle and fascia.

A large tissue defect resulting from the injury or surgery (e.g. following the excision of a tumour) can be covered with a patch from biological materials (e.g. fasciae, aponeuroses, muscles and venous walls). An «**auto-vein**» (the superficial veins of the thigh or forearm) is most commonly used.

In vascular surgery auto- and allotransplants of arteries and veins are used for grafting (e.g. heterografts or xenografts, which are made of synthetic compounds). Performing an «end-to-end» anastomosis or suturing the graft ensures reconstruction.

2. Physical methods.

Thermal means of haemostasis is based on the fact that on exposure to high or cold temperatures proteins coagulate inducing a clot formation cold can cause vascular spasm. This is of great importance for bleeding arrest during operation.

1. Action of low temperature

1) Local hypothermia – in postoperative period on the wound applied an ice-bag (for 10-20' with break 30-40'). In case of gastric bleeding ice bag is applied on the epigastrium area. The application of ice packs in cases of subcutaneous haematoma or swallowing of ice cubes in cases of gastric bleeding is widely used in surgery.

2) Cryosurgery - is the local application of cold, mostly in tumours of the organs

with intense blood supply (e.g. the brain, liver, kidney). Local freezing of tissues is safe to the areas surrounding those exposed to cryonecrosis.

2. Action of high temperature

1) Action of hot solution. In diffuse bleeding from a bone a piece of gauze soaked in hot normal saline is applied.

2) Surgical diathermy involves the passage of high frequency electric current by knife or button electrode to generate heat in the tissues for the coagulation of bleeding vessels. It is mainly used to control bleeding from subcutaneous and muscles' vessels as well as from minor vessels of the brain. The surgical diathermy may be applied provided that the wound is dry, and the voltage of the current is not high enough to cause tissue burn since it can itself cause bleeding.

3) Laser photocoagulation (focused beam of electronic rays) is used in patients with peptic ulcer-associated upper GIT bleeding, haemophiliacs and in oncologic operations.

4) Plasma scalpel

3. Chemical methods.

According way of using, this methods divides on local and general (resorptive) action.

1. Local hemostatics

1) hydrogen peroxide - used for bleeding in wounds. It accelerate trombogenesis

2) vasoconstrictive agents – Adrenaline hydrochloride 1% (injected intramucosum, f.e. –tooth-extracting).;

3) inhibitors of fibrinolysis – ϵ -Acidum aminicaprionicum (from gastric bleeding, it normalizes the permeability of vascular walls

4) preparations of gelatin –Gelapson, spongia gelatinosa (accelerate haemostasis and have tamponade action)

5) wax – for injury the skull bones;

6) Karbosochrom– accelerate permeability vessels, normalize mycrocyrculation.

2. Hemostatics of absorbtion action

1) inhibitors of a fibrinolysis (trasilol, contrical)

2) calcium chloride 1%, 10% intravenously.

3) agent which accelerate formation of a thromboplastin – *Dicynone and Etamsylate* enhance the formation of thromboplastin, normalise vascular permeability and improve microcirculation,

4) substances of specific action (Pituitrinum for uterin bleeding)

5) synthetic analogues of vitamin K – Vicasolum is synthetic water-soluble analogue of vitamin K, is applicable for haemorrhage associated with a deficit of prothrombin (e.g. acute hepatitis and mechanical jaundice, parenchymal and capillary bleeding following injuries and surgical manipulations, gastrointestinal and nasal bleeding, haemorrhoids).

6) Conversion of prothrombin to thrombin requires a slight amount of calcium ions that are available in the blood. Therefore, the use of calcium as a haemostatic substance is justified only in massive transfusion of citrated blood, since on reaction with calcium citrate ions tend to lose their anticoagulative properties.

7) substances which normalize a vessel wall permeability – Acidu ascorbinicy, Rutinum, refortan, carbosochrom.

GELFOAM Sterile Sponge is a medical device intended for application to bleeding surfaces as a hemostatic agent.

4. Biological methods.

Local action

1. Using the patient own tissues (omentum, muscular tissue, subcuraneus fat, fascia)
2. Using the biological substans
 - trombin – only local(a substance obtained from the plasma of donor blood) is effective in capillary and parenchymal bleedings as it influences the conversion of fibrinogen into fibrin. Prior to its use it will be dissolved in normal saline to soak sterile gauzes or the haemostatic sponge and then applied to the bleeding surface. The use of thrombin is contrain-dicated in bleeding from major vessels, since it can induce the fatal generalised thrombosis.
 - haemostas sponge
 - fibrinogen

General ation

Biological substance of general action is blood substance. Its accelerate trombogenesis.

1) Inhibitors of fibrinolysis (have been widely used to decrease the blood fibrinolytic activity. Bleeding associated with an increase in the blood fibrinolytic activity is encountered during operations on the lung, heart, prostate, in liver cirrhosis, sepsis and following transfusion of large amounts of blood. Biologic anti-fibrinolytic substances include contrycal, trasylol (aprotinin), while aminocaproic acid and ambenum are synthesised.

2) Fibrinogen

3) Hemotransfusion of the blood (250 ml is haemostatic dose) Direct blood transfusion is the most effective. In addition, transfusion of small amounts (100—150 ml) of freshly frozen blood.

4) Transfusion plasma

5) Transfusion trombocitaris masse, platelet mass,

6) Antyhemoliticum plasma, antihaemophilic globulin, cryoprecipitate

7) injection of protrombin complex - concentrated coagulation factors II- VII –

IX

8) - Injection of vitamins;

These agents are indicated for congenital or acquired deficiency of blood coagulating factors as is the case in pernicious anaemia, leukaemia, haemorrhagic disorders etc

5. COMBINED METHODS OF BLEEDING CONTROL

Several methods of haemostasis can be combined to increase their efficacy. Of the

most commonly used are muscle or glue to wrap around the sutures on the vessel, different types of sutures and biological packs used simultaneously to stop the parenchymal bleeding, etc.

BASE POINTS of DIGITAL PRESSING of ARTERIAS

Title of an arteria	choronomic ориентиры	a liable bone
A. Temporalis	2 cms upwards and forward from a foramen of choronomic acoustical passage.	a temporal bone
A. facialis	2 cms forward from an angle of a mandible	a mandible
A. carotis communis	middle of intrinsic edge(territory) кивательной of a muscle (top near щитовидного of a cartilage).	a somnolent hillock of a transversal process of 6 cervical spondyles
A. subclavia	behind of a clavicle in a medial third.	the first rib
A. axillaris	forward border(limit) of body height of a hair in an axillary recess.	the head of a humeral bone
A. brahialis	medial near двуголовного of a muscle.	an intrinsic surface of a brachium
A. femoralis	middle пупартовой of a tuck (on osteal ориентирам)	a horizontal branch of a pubic bone
A. poplitea	fastigium of a popliteal space	a back surface of a tibial bone
Aorta abdominalis	range of a belly-button (pressing by a fist)	a lumbar department of a column

The technique - on a wound is superimposed some sterile napkins and a finiteness tightly bandage. Before superposition of a bandage of a finiteness it is necessary to betray a boosted position. A bandage superimpose from a rim to the center.

6. Materials for self-control.

1. Know the classification of bleeding etiology , mechanism of occurrence , date of occurrence, anatomy , pathogenesis bleeding , compensatory and adaptation - IVE mechanisms for bleeding .

2 . Know the terms related to bleeding and disorders of hemostasis .

3 . Learn the local and general clinical signs of bleeding. Know the pathogenesis and clinical course of hemorrhagic shock.

4 . To be able to diagnose the bleeding , to distinguish closed and open bleeding.

5 . To be able to interpret the signs of hemorrhagic shock , to assess the condition of the patient and to provide for the investigation.

6. Be able to provide first aid - to a temporary stop bleeding.

7. To be able to evaluate the results of inspection of patient with bleeding , the diagnosis according to the classifications to determine a treatment plan - final stop bleeding and blood loss compensation .

6.1.Task for self-control .

questions :

1.Definition of bleeding.

- 2 . Determination of hemorrhage.
- 3 . Primary and secondary hemorrhage.
- 4 . Acute and chronic bleeding.
- 5 . Profuse bleeding.
6. External and internal bleeding.
7. Haemorrhagia per tnxin.
8. Haemorrhagia per dia brozin.
9. Haemorrhagia per diapedezin.
10. Harakteristika of arterial bleeding .
11. Venoznye bleeding.
12. Kapillyarnye bleeding.
13. Parenhimatoznye bleeding.
14. Nosovye bleeding.
15. Zheludochnye bleeding.
16. Legochnye bleeding.
17. Krovotecheniya of the urinary tract.
18. Krovotecheniya of the uterus.
19. Krovotecheniya from the rectum.
20. Krovotecheniya in the pleural cavity .
21. Bleeding in the pericardial cavity .
22. Bleeding into the abdominal cavity.
23. Bleeding into the joint cavity .
24. Hidden bleeding.
25. What is a hematoma ?
26. Local signs of bleeding.
27. Common symptoms of bleeding.
28. Laboratory changes in the blood for bleeding .
29. Holemicheskie bleeding.
- 30 . Bleeding in hemophilia .
31. Primary and secondary causes of bleeding.
32. Methods of temporary stop of bleeding .
33. Metody final stop bleeding .
34. Methods for determining the value of krovopote -ri .
35. Mechanical methods of stopping bleeding .
36. Physical methods of stopping bleeding .
37. Chemical methods of stopping bleeding .
38. Biological methods to stop bleeding.
39. Causes of death from blood loss.
40. Terms tourniquet.
41. Shema spontaneous bleeding.
42. The principles of transfusion therapy for bleeding.
43. Hemorrhagic shock, treatment.
44. Treatment of chronic anemia.

assignments:

To fill in a table of characteristic symptoms and principles of first aid for bleeding.

Signs	Arterial	Venous	Capillary	Parenchymatous
The Color of Blood				
the amount of bleeding				
localization				
possible complications				
Common symptoms				
Temporary stop bleeding				
The optimal method of treatment				

6.2 . Situational problems .

Task 1 . In a patient , aged 35, obtained as a result of stab wounds blood loss was 35% of BCC. Specify a contraindication to transfusion such bolnomu. 1) septic endocarditis , and 2) Liver failure , and 3) Renal failure , and 4) Hemophilia A , 5) there is no counter- indications .

Task 2 . Let the most complete correct answer hemorrhage - that outpouring of blood : 1) to the external environment 2) of the body in a vacuum , and 3) in body tissue , 4) in the tissue or body cavity into the external medium , and 5) to the external environment and the body cavity .

Task 3 . Give the most complete correct answer: the cause of bleeding is: 1) damage to the vessel wall as a result of injury , 2) violation of the vascular wall permeability , and 3) sepsis , and 4) vascular injury , neurotrophic processes , and 5) scurvy .

Task 4 . Which classification best reflects the different manifestations of bleeding ? 1) anatomic, because of causes, the clinical manifestations , with the time of occurrence ;

2) the anatomical , physiological , given the time of occurrence , because the causes of , and 3) because of the reasons for the appearance , anatomical , physiological , according to clinical manifestations , with the time of occurrence , and 4) the anatomical , physiological , clinical , taking into account the time of appearance 5) etiologic , anatomical , physiological , clinical .

Task 5 . What distinguishes bleeding for anatomic classification ? 1) primary , secondary ;

2) hidden internal , hidden external and 3) arterial , venous , capillary , parenchymal;

4) early, late , and 5) of exterior and interior .

Task 6 . What bleeding distinguished depending on the reasons that caused them ? 1) mechanical , neurotrophic 2) septic , physiological , and 3) mechanical , arterial , venous .

Task 7 . What distinguishes bleeding in clinical manifestations ? 1) septic , arozivnye ;

2) arterial , venous , capillary , and 3) early, late , and 4) external, internal , hidden , and 5) primary, secondary .

Task 8 . What bleeding distinguished by the time of their appearance ? 1) primary, secondary, early , late secondary and 2) long , short duration , and 3) profuse , intense, not intensive , and 4) acute, chronic , recurrent , 5) such that stopped such that last.

Target 9 . What is a hematoma ? 1) collection of blood , the limited tissue , 2) parenchymal hemorrhage in organs , and 3) the accumulation of blood in the cavity of the joint , and 4) the saturation of the blood of the soft tissues , and 5) accumulation of blood in the pleural or peritoneal cavity.

Task 10 . What groups are divided bleeding symptoms ? 1) local , general , and 2) explicit , secret ;

3) external, internal , and 4) primary, secondary , and 5) single , multiple .

Task 11 . Give the most complete correct answer: the risk of bleeding is to develop : 1) the shock of the collapse , anemia, compression of vital organs , and 2) the shock of the collapse , the truth of the aneurysm , and 3) the shock, anemia , leukopenia , and 4) the collapse, organ dysfunction , asphyxia.

Test problems in implementation of the " Step 1" and " Step 2" .

Test number 1. The patient, from years 7 years suffering from gastric ulcer during the last days observed increasing weakness , dizziness. In the morning , getting out of bed for a few seconds, lost consciousness , and then vomited in the form of " coffee grounds " and " tarry stools " (melena) . Likely diagnosis and treatment strategy .

A. Gastro- intestinal bleeding . Delivery of the patient in the surgical hospital , where he will be picked in the further treatment strategy .

B. Bleeding from esophageal varices . Immediate surgery .

C. Bleeding from colon tumors . The use of hemostatic drug therapy .

D. Gastro- intestinal bleeding . Transfusion of saline and colloid blood substitutes .

E. Gastrointestinal bleeding . The establishment of the probe Blackmore .

Test number 2 . The patient , who was executed in the morning of surgery for postoperative ventral hernias at 17.00 bandage on the wound heavily soaked with blood. Topically applied for an hour with ice bags and sand effect was not given. What are the complications in the early postoperative period in any patient. Your continued tactic.

A patient came to the secondary bleeding. It is necessary to conduct an audit of the operating wound and make the final stop bleeding.

B. In patients capillary bleeding . Continue to apply the bags of ice.

C. In patients venous bleeding. You must apply a hemostatic therapy .

D. In the patient arose secondary bleeding. You must apply a hemostatic therapy .

E. In the patient arose secondary bleeding. You must apply a hemostatic therapy after failure , which make the final stop bleeding.

Test number three . In the patient after the injury occurred pain and swelling 10x6x5 cm in the middle third of the tibia. The skin over the swelling cyanotic . Marked tenderness and fluctuation . Your diagnosis . What kind of assistance you provide to the victim.

A. Subcutaneous hematoma . You must perform a puncture with evacuation of blood.

B. patient bruising . Necessary to impose a plaster Longuet .

C. In patients subcutaneous hematoma . Necessary to impose a pressure bandage on the shin. Recommend locally bags of ice to rest the limb.

D. In the patient's subcutaneous hematoma . Necessary to impose a pressure bandage on the shin. Immediate surgery.

E. patient bruising . Necessary to impose a pressure bandage on the shin. Run a puncture hematoma.

Test number 4 . In a patient , aged 17, on complaints of pain in his left knee after the injury . Limited movement in the joint . Joint has a spherical shape . There is a floating patella . On radiographs of bone lesions were not identified. Your diagnosis and treatment interventions ?

A. In patients available hemarthrosis of the left knee joint, you must puncture the joint. Apply the pressure bandage , immobilize the limb and apply the bags of ice.

B. In patients available hematoma in the left knee joint must perform a puncture hematoma. Apply the pressure bandage , immobilize the limb and apply the bags of ice.

C. In patients hematoma lower leg. The need for urgent surgery.

D. In the patient's existing hematoma in the left knee joint must perform surgery. Apply the pressure bandage , immobilize the limb and apply the bags of ice.

E. In patients available hemarthrosis of the left knee joint must perform emergency surgery. Apply the pressure bandage , immobilize the limb and apply the bags of ice.

Test number 5 . In the clinic enrolled patients with closed abdominal trauma . As a result, emergency operations established rupture of the anterior surface of the right lobe of the liver 6x3x4 cm Gemoperitonium 1.5 liters. How to perform a final stop bleeding, what to do with the blood that is spilled into the abdominal cavity.

A. Sew liver S -stitches . Run reinfusion of blood.

B. Sew liver S -stitches . To evacuate blood from the abdominal cavity.

C. Apply Diathermocoagulation liver. Run reinfusion of blood.

D. Apply the tourniquet on the hepatoduodenal ligament . Run reinfusion of blood.

Ye Sew liver S -stitches . Take blood for biochemical studies .

6.3 Tests for self-control (basic knowledge)

Test number 1. What are the chemicals that are used to stop the bleeding :

a) ϵ - aminocaproic acid;

b) reopoligljuin ;

c) saline ;

d) heparin ;

e) menadione .

Test number 2 . Biological methods to stop bleeding is:

a) tamponade wound gasket ;

b) tamponade muscle injury ;

c) tamponade cartilage injuries ;

g) the introduction of adrenaline ;

e) the intravenous administration of ϵ - aminocaproic acid.

Test number three . Compressive bandage as a method of temporarily stopping bleeding is not indicated for :

- a) bleeding from the veins of the forearm ;
- b) damage to the carotid artery ;
- c) the bleeding of the soft tissues of the head ;
- g) wound area of the popliteal fossa ;
- d) bleeding from the soft tissue of the chest.

Test number 4 . To locate the source of bleeding which is characteristic Hammer?

- a) light ;
- b) the stomach ;
- c) spleen ;
- g) the duodenum ;
- e) the sigmoid colon .

Test number 5 . Whereby the acute blood loss is a natural compensation reduction in circulating blood volume and maintain the vitality of the body ?

- a) vasoconstriction ;
- b) increase in central venous pressure ;
- c) autogemodilyutsii ;
- g) vasodilation ;
- e) drinking water.

Test number 6. What groups are divided bleeding symptoms ?

- a) clear ;
- b) hidden ;
- c) Local ;
- g) temporary ;
- d) General .

Test number 7. What groups are divided into all types of stop bleeding ?

- a) The first-aid ;
- b) Final ;
- c) temporary ;
- d) vascular ;
- d) mechanical .

Test number 8. Continuous maximum length of time for a tourniquet on the lower extremity of the winter :

- a) 3 h ;
- b) 4 h ;
- c) 1.5 h ;
- d) 2 hours;
- d) 0.5 parts

Test number 9. Continuous maximum length of time for a tourniquet on the lower limb of the summer :

- a) 3 h ;
- b) 4 h ;
- c) 1.5 h ;

- d) 2 hours;
- d) 0.5 parts

Tests and testing task source of knowledge .

Test number 1. In the 70 -year-old patient with varicose saphenous veins of both legs suddenly started bleeding from the ruptured node on the inner surface of the lower third of the right tibia. The wound rapidly loose a stream of dark blood flows . What is the amount of first aid should be granted sick ?

- A. Apply a pressure circular or spiral bandage and give limb elevated position
- B. Run finger pressing areas of bleeding
- C. The maximum bend the limb in a joint
- D. enter detsinon
- E. Apply the bandage Dezo

Test number 2 . A young man , 17 years old, during the journey in the bus reached the window right hand. Towards drove a truck , a board which was put forward by an injured hand . There was a traumatic amputation of the right upper extremity at the level of the middle third of the arm (limb hanging on the flap of skin) . Gush from a damaged artery crimson blood. How to stop the bleeding.

- A. Urgent perform finger pressing on the level of the brachial artery of the groin , and then apply a tourniquet
- B. Urgent perform finger pressing on the level of the brachial artery of the groin , and then impose a pressure bandage
- C. Urgent perform finger pressing on the level of the brachial artery of the groin , and then impose an aseptic bandage
- D. Zatamonirovat stump hands , and then apply a tourniquet
- E. Apply aseptic bandage , then apply the tourniquet

Test number 3 in the surgical ward admissions with stab wound in the popliteal fossa. In auditing the wounds installed injury of the popliteal artery , but you do not own the vascular suture technique . What do you do?

- A. Sew vessel in the wound and cause a vascular surgeon
- B. bandaged vessel for
- C. Apply the tourniquet and try the vessel suture
- D. Run a temporary bypass and impose aseptic bandage
- E. Run the temporary bypass and cause vascular surgeon

Test number 4 . At the front desk brought a man 47 years old with complaints of weakness, dizziness, abstinent pain in the left upper quadrant . From history we know that 12 hours before he fell from the ladder and hit the left costal arch. Before entering was dizzy. The patient has to . Pale skin . Pulse was 120 beats / min. BP 90/50 mm Hg Breathing is shallow . On palpation abstentions muscle tension of the abdominal wall , dulling the sound of palpation in the left upper quadrant . Hemoglobin 98 g / l. What is a possible diagnosis and tactics ?

- A. Traumatic rupture of the spleen with intraperitoneal bleeding . Anti-shock measures . Emergency surgery .

W. Traumatic rupture of the spleen with intraperitoneal bleeding . Single-group blood transfusion . Anti-shock measures .

C. fracture of ribs , complicated by hemothorax . Emergency thoracotomy .

D. The gap folds of the small intestine with intra-abdominal bleeding. Anti-shock measures . Emergency surgery

E. Fracture VIII - X ribs on the left with intra-abdominal bleeding. Urgent torakolaparotomiya .

Test number 5 . At the front desk brought a young man with a closed head injury on the left chest . Pale skin . Pulse of 100 beats / min. Blood pressure 110/65 mm Hg , Tenderness and crepitus of bone fragments in the projection of the VII , IX, X ribs on the left mid- inguinal line. Percussion of the left side in the lower notes sound dull , breathing is not listening (with the patient sitting) . Your diagnosis and tactics :

A closed fracture of the I-IV with a left rib complicated intra-abdominal bleeding. Emergency surgery

B. Closed fracture of ribs VIII to X from left , complicated by hemothorax . Therapeutic and diagnostic puncture of pleural cavities , hemostatic therapy with dynamic supervision

C. Closed fracture of ribs VIII to X at the left. Therapeutic and diagnostic puncture of pleural cavity , hemostatic therapy with dynamic supervision

D. Closed fracture of ribs VIII to X from left , complicated by hemothorax . Emergency surgery

E. Closed fracture of ribs VIII to X from left , complicated by hemothorax . Single-group blood transfusion .

Case studies for the source of knowledge

1. In the 70 -year-old patient, who suffers for varicose saphenous veins ending, suddenly began to bleed from the node that peaked at the inner surface of the lower third of the right tibia. With the wounds pretty intense sluggish stream of dark blood pours out . What is the amount of first aid should be given to the patient ?

2 . Boy , 17 years old , while traveling in a bus , put forward in the right hand window . Towards was a truck , which has been stung by a board extended hand . There was a traumatic amputation of the right upper extremity at the level of the middle third of the arm (limb hanging on the flap of skin) . Of the injured arteries gush of bright red blood. How to stop the bleeding ?

3 . In the surgical ward patient delivered a stab wound in the popliteal fossa. In auditing the wounds installed injury of the popliteal artery , but you do not own the vascular suture technique . What do you do?

4 . In the emergency department delivered a man 48 years old with complaints of weakness, dizziness , abstained in the left upper quadrant pain . From history we know that 12 hours before he fell from the stairs , blow fell on the left costal area . On the eve of income was unconscious .

The patient lies in a forced position. Changing the position of the body increases the pain in his stomach. Pale skin . Pulse - 120 beats per minute. Blood pressure - 90 /50 mm Hg. Art. Breathing is shallow . Palpable is abstentions muscle tension of the abdominal

wall, dullness in the left upper quadrant abdominal and sloping ground. Hemoglobin - 98 g/l. Your diagnosis and tactics?

5. In the emergency room delivered a man with a closed chest injury on the left. OBJECTIVE: pale skin. Pulse - 100 beats per minute. Blood pressure 110/65 mm Hg. Art. There is pain and crepitus bone fragments in the projection of VIII, IX and X of edges case on the mid-axillary line. Percussion in the lower right is determined dull sound, breath does not listen (to the patient sitting). On radiographs, other than the specified rib fractures, further revealed an intense shade with the horizontal level VII to the boundary edge. Your diagnosis and tactics?

6. The patient, aged 30, who suffered for 7 years with gastric ulcer during the previous day celebrated increasing weakness, and dizziness. Got up out of bed in the morning, suddenly lost consciousness a few seconds. After that, once vomited in the form of "coffee grounds" and "tarry stools." Pale skin. The abdomen was soft and painless.

What is your diagnosis? What are the urgent need to do more research to confirm your assumptions? Where and how you send the patient to treatment?

7. In the patient who underwent surgery in the morning about an inguinal hernia, in the evening bandage on the wound began to copiously prosekayut blood. Employed locally for an hour with ice and bubbles sandbags effect was not given.

What complication in the early postoperative period occurred in a patient? Your continued tactic?

8. To you asked the boy complained of pain in the right leg and the increasing swelling after falling from her bike. Injury occurred about half an hour ago. When viewed from the front surface of the middle third of the leg swelling has dimensions of $10 \times 6 \times 5$ cm above the bluish skin. On palpation determined by pain and fluctuation. Pulse on the dorsal artery of the right foot saved.

Your diagnosis? What assistance do you provide to the victim?

9. In the hospital emergency department delivered the patient complained of pain in his left knee after the injury. Limited movement in the joint, painful. The joint has a spherical shape. Determined by balloting patella. On radiographs of bone lesions are not set.

Your diagnosis and treatment interventions?

10. In the clinic enrolled patients with closed abdominal trauma. While being presented severe symptoms of intra-abdominal bleeding. As a result, emergency laparoscopy set rupture front surface of the right liver particle size $6 \times 3 \times 4$ cm hemoperitoneum.

How to make the final stop bleeding from a damaged liver? What to do with the blood that is spilled into the abdominal void?

11. During amputation of the lower extremity at the level of the lower third of the femur after ligation of the femoral artery with the last clip was filmed. With the wound under a lot of pressure pulsations was spurting blood is bright red.

What is the cause of the bleeding? How can draw a provisional and final stop bleeding? How to prevent this complication?

12. During the diagnostic puncture of tumor formation in the lower third of the leg into the syringe was recruited blood pressure dark cherry color. Where to hit a syringe needle ? How to stop the bleeding ?

13. While working with a circular saw accident took place on the machine , and saw a fragment of the work was applied incised wound of the lower third shoulder . The patient is to temporarily stop the bleeding was imposed tourniquet . Transporting the patient to the emergency room took 3 hours . What a mistake was made ? Complication that can occur and how to profilaktirovat ?

14. In AD patients , 65 underwent surgery removal of foreign body left lumbar area . On the same day in the evening bandage patient , heavily soaked with blood , the wound is bleeding over the surface. The patient reported that the day before he was held during the month of anticoagulant therapy, which stopped a week ago. In determining the clotting time for the Lee - White figure was 11 minutes. Name the cause of the bleeding and the image of his final stop.

15. In the patient , E., 62 years old , an operation cholecystectomy, choledocholithotomy , external drainage of the common bile duct at the jaundice caused by the violation of the outflow of bile due to falling of a stone in the common bile duct. During the operation, attention is drawn to significant bleeding tissue . What is the cause of this condition? What additional therapeutic measures should be conducted?

Tests III level of complexity

Test number 1. Specify the methods of physical control bleeding :

- a) the application of cold ;
- b) plugging the wound ;
- c) a hemostatic sponge ;
- g) electrocoagulation ;
- e) the vessel suture .

Test number 2 . What are some common clinical features specific to bleeding ?

- a) weakness;
- b) dizziness ;
- c) dizziness;
- g) pain in my heart ;
- d) cyanosis .

Test number three . What a way to temporarily stop the bleeding can be used in large-scale damage of blood vessels ?

- a) the elevated position of the limbs ;
- b) application bundle;
- c) the imposition of hemostat in the wound ;
- g) the use of hemostatic sponge ;
- d) application of a pressure bandage .

Test number 4 . What medications are used for local hemostasis ?

- a) hemostatic sponge ;
- b) foam sponge ;
- c) thrombin ;

- g) hematogen ;
- d) washed erythrocytes .

Test number 5 . The reason for the late secondary hemorrhage is:

- a) an increase in blood pressure ;
- b) purulent fusion of thrombus ;
- c) the elimination of vasospasm ;
- g) Arosa vessel wall ;
- d) sliding ligatures.

Test number 6. The reason for the early secondary bleeding has everything except :

- a) festering wounds ;
- b) Injury to blood vessels ;
- c) pushing the thrombus ;
- d) sliding ligature ;
- d) high blood pressure .

7. References:

General:

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8. The distribution points are awarded to students:

At mastering topic number 6 to substantial module 2 for training activities for students rated a 4-point scale (traditional) scale, which is then converted into points as follows:

rating	Points
5 (excellent)	5
4 (good)	4
3 (satisfactory)	3
2 (poor)	0

Guidelines prepared

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