

MINISTRY OF HEALTH OF UKRAINE  
POLTAVA STATE MEDICAL UNIVERSITY

DEPARTMENT OF THE GENERAL SURGERY WITH PATIENT'S CARE

It is confirmed on meeting of department  
of the general surgery with patient's care  
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«\_\_\_»\_\_\_\_\_2021

**METHODICAL INSTRUCTIONS  
FOR STUDENTS  
DURING PREPARATION TO A PRACTICAL LESSON**

Subject matter	<b>NURSE PRACTICE</b>
<i>The module № 2</i>	BASIC DUTIES AND PROFESSIONAL SKILLS OF NURSE OF SURGICAL DEPARTMENT
<i>The substantial module 1</i>	HEMOSTASIS. BLOOD TRANSFUSION. RESUSCITATION ACTIONS AT SURGICAL PATIENTS
<i>Lesson theme № 1</i>	BLEEDING AND BLOOD LOSS
<i>Course</i>	<b>III</b>
<i>Faculty</i>	<i>Medical, foreign students</i>

Poltava 2021

<i>The substantial module 1</i>	HEMOSTASIS. BLOOD TRANSFUSION. RESUSCITATION ACTIONS AT SURGICAL PATIENTS
<i>Lesson theme № 1</i>	BLEEDING AND BLOOD LOSS

## 1. Results of training:

**General competence** Loss of blood poses immediate threat for life of the victim and its destiny depends on immediate actions of the doctor. Danger of a hemorrhage is bound to development of the hemorrhagic shock which gravity it is caused by intensity, duration of a bleeding and volume of the lost blood. Fast loss of 30 % of volume of a circulating blood leads to an acute anemia, a hypoxia of a brain and can conclude death of the patient. The medical personnel should own means of a time stopping of a bleeding, know clinical signs of the secondary bleeding and its danger to life of the patient.

**Subject competence** - Know the causes of bleeding, diagnostic methods, basic principles of treatment

## II. The employment purpose:

1. To know classification of bleedings by an aetiology, the occurrence mechanism, occurrence terms, anatomic features; a pathogeny of bleedings, compensatory and adaptic mechanisms at a bleeding
2. To know definition of the concepts, concerning a bleeding and hemostasis disturbances
3. To acquire aboriginal and general clinical signs of a bleeding. To know a pathogeny and clinic of hemorrhagic shock.
4. To be able to diagnose a bleeding, to distinguish the occluded and open bleeding.
5. To be able to treat correctly signs of hemorrhagic shock, to estimate a state of the patient and to expect consequences
6. To be able to render first aid - to make a time stopping of a bleeding.
7. To be able to estimate the received results of inspection of the patient with a bleeding, to position the diagnosis according to classification, to define a treatment planning - a definitive stopping of a bleeding and hemorrhage indemnification .

### Interdisciplinary integration.

Discipline	The nobility	To be able
<i>Prevue</i>		
Anatomy	Anatomic features of pots	To define pot phylum.
Histology	Constitution of pots	
Normal physiology	Physiology and hemostasis biological chemistry	To estimate a state of system of a hemostasis at a coagulogram.
<i>The future</i>		
The pathological Anatomy	pathohistology signs of a bleeding, disturbance of a circulation of blood, ДВС - a syndrome.	
Pathological physiology	Pathogeny of shock, disturbances of a circulation of blood, ДВС - a syndrome.	
Surgical illnesses	Classification, pathogeny and clinical signs of bleedings	. To diagnose, render first aid, to prescribe treatment
<i>Inside the subject</i>		
Asepsis and antiseptics	Asepsis and antiseptics rules	To apply an aseptic bandage
Hemotransfusion	Hemotransfusion rules	To make hemotransfusions.
Transport immobilisation	Immobilisation rules	To make an immobilisation.
Trauma	Rendering assistance principles at a trauma	To render first aid to the injured
Wounds	Clinical pattern and first aid at wounds	To inspect a wound to render first aid
Terminal states, resuscitation	Clinical signs of terminal states	To carry out reanimation actions.
The postoperative season	Features of care of patients after operation	To look after the patient послеоперации.

**Rough card for studying and working off of practical skills  
On diagnostics and first aid at bleedings**

	The list educational actions	Methodical indicatings to educational activity	Independent work of students
<b><i>The theoretical</i></b>			
	Define concept a bleeding, hemorrhagic shock, ДВС - a syndrome		
	Result classification of bleedings	The causes and kinds of bleedings	
	List first-aid treatment principles, specify indications for each kind of a time stopping of a bleeding		
<b><i>The practical:</i></b>			
	Collect the anamnesis at the patient with an intestinal bleeding	To pay attention to features of occurrence of a bleeding	Work on inspection of patients
	To impose a haemostatic braid, to make manual pressing of arteries	To define indications for an applying a tourniquet, manual pressing	The friend on the friend is made by students
	Establishment of the diagnosis, first-aid treatment, appointment of treatment to the patient with a bleeding from varicose veins of the inferior extremity	To categorise a bleeding, to define first aid volume, medical tactics	Work with patients

Independently to fill the table of characteristic symptoms and first aid principles at bleedings.

Signs	The arterial	The venous	The capillary	Parenchima - тозных
Colour of a blood				
Intensity of a bleeding				
Localisation				

Possible complications				
The general symptoms				
Time stopping of a bleeding				
Optimum методлечения				

#### IV. The training maintenance

*Bleeding (haemorrhagia)* - outpouring of a blood from veins at damage or disturbance of permeability of their wall.

Classification of bleedings.

**I. Depending on the occurrence cause:** bruises, tearing up of pots (haemorrhagiaperrhexin) арозивные bleedings (haemorrhagiaperdiabrosin) diapedetic bleedings (haemorrhagiaperdiapedesin) disturbance of chemical composition of a blood, change of coagulating and anticoagulative system of a blood.

**II. Taking into account a kind of the bleeding pot:** arterial, arteriovenous, venous, capillary, parenchymatous.

In relation to external environment and clinical exhibitings: choronomic, intrinsic, are hidden.

On occurrence time: primary, secondary.

At outside bleedings blood streams in external environment.

Intrinsic bleedings can descend both in a lumen, and in a tissue. The hemorrhage in a tissue grows out of imbibition of the last by blood with tumescence formation. Massive hemorrhages can be accompanied by flaking of a tissue with formation of an artificial lumen by the filled blood - hematomas. The hematoma, formed can resolve or round it the sheath is formed, and the hematoma turns to a cyst.

The special place is occupied with bleedings in serous lumens - pleural, abdominal. Such bleedings differ massiveness because seldom are intercepted it Is autocratically caused by that the blood which has poured out in serous lumens, loses ability to coagulation, and walls of these lumens do not frame a mechanical hardle for a blood which pours out from pots; in pleural cavities, besides, through negative pressure it is framed присасывающий effect.

Bleedings concern the latent without clinical signs. As an example it is possible to result the bleedings, clinically not displayed: from stomach ulcers and a duodenum. Such bleeding can be found only a laboratory method - feces research on an occult blood.

Primary bleedings arise immediately after pot damage, secondary - through some time term after a stopping of a primary bleeding.

*The factors defining volume of a hemorrhage and an outcome of bleedings*

Cause of death at кровопотере - loss of functional properties of a blood (conduction of oxygen, a carbon dioxide, nutrients, exchange products, function of detoxication, etc.) And disturbances of a circulation of blood (acute vascular insufficiency - hemorrhagic shock). The result of a bleeding defines a series of factors, but crucial importance is got by volume and rate of a hemorrhage: the fast hemorrhage at  $\frac{1}{3}$  BVC is life-threatening, absolutely lethal acute hemorrhage that compounds about half BVC.

Rate and hemorrhage volume depend on character and a kind of the damaged pot. The fast hemorrhage is observed at damage of arteries.

As a result of a hemorrhage the great value has the general state of an organism. Healthy people tolerate a hemorrhage is easier. Unfavorable conditions arise at traumatic shock, previous anemias, an attrition, starvation, traumatic long operations etc.

The result of a hemorrhage depends on fast acclimatisation of an organism to кровопотере. So, with other things being equal a hemorrhage tolerate is easier and faster women adapt for it and donors as loss of blood at a menses or a constant donorship frame the congenial conditions for indemnification of various systems, first of all is warm - vascular, to bloodless.

Frigorism, as well as overheat, negatively affects an organism adaptability to кровопотере.

Hardly children and old men tolerate a hemorrhage. At children it is caused anatomo - physiological features of an organism, loss is dangerous to the newborn even several milliliters of a blood. At older persons owing to age changes in heart, pots (atherosclerosis) acclimatisation to кровопотере much more low, than at young men.

Danger to life is defined by a member role in which there was a hemorrhage. So, the insignificant hemorrhage in material of a brain can be dangerous owing to a lesion of the vital centres.

Danger of a hemorrhage is bound to development of the hemorrhagic shock which gravity it is caused by intensity, duration of a bleeding and volume of the lost blood. Fast loss of 30 % BVC conducts to an acute anaemia, a hypoxia of a brain and can conclude death of the patient. At insignificant, but a long bleeding the hemodynamics changes a little, and the patient can live even at depression of level of haemoglobin to 20 g / l.

The acute hemorrhage in a consequence of depression BVC can lead to the hemorrhagic shock which development is possible at кровопотере, peer 20-30 % BVC. At the heart of shock distresses of the central and peripheric hemodynamics owing to a hypovolemia lie. At serious massive кровопотере as a result of hemodynamics distress, there come a paresis of capillars, blood flow decentralisation, and shock can pass in an irreciprocal stage.

At hemorrhage augmentation the acidosis educes, there are sharp disturbances in microcirculation system, there is an aggregation of erythrocytes in capillars.

It is important to define hemorrhage size that, along with a bleeding stopping, has crucial importance for a choice of medical tactics.

(Hb), a hematocrit (Ht) it is necessary to define the maintenance of erythrocytes, haemoglobin at once at entering of the patient and to retry further. These indexes during the first hours at a serious bleeding do not reflect objective size of a hemorrhage as аутогемодилюция comes later (maximally it is expressed in 1,5-2 days). Valuable indexes are Ht and density of a blood which reflect an interrelation between formulated elements of a blood and plasma. On lambs, at relative density 1,057-1,054, Hb 65-62 g / l, Ht 40-44 hemorrhage compounds to 500 ml, at relative density 1,049-1,044, Hb 53-38 g / l, Ht 30-23 - more than 1000 ml.

Authentic definition of size of a hemorrhage is very important in clinical practice. Anesthesiology, transfusion tactics depends on its size during operation and conducting the postoperative season. In clinical practice the visual method of definition of size of a hemorrhage more often is applied; however even at the most skilled experts the error

compounds to 30 %. Degree of deficiency BVC reflects a shock index of Algovera (the attitude of frequency of warm reductions to size of a systolic BP). In norm the index of Algovera is less 1, at an index more than 1,5 deficiency BVC compounds more than 40 % that compounds direct threat of life of the patient. However, an index of Algovera неинформативен at patients with a hypertensive syndrome.

One of methods of definition of size of a hemorrhage is hematocrit- method Moore, hemorrhage size define under the formula.

In this formula instead of a hematocrit it is possible to use a haemoglobin content. However it is necessary to mean that concentration methods of definition of size of a hemorrhage that are based on an index of a hematocrit and a haemoglobin content, can be recommended for calculations only at slow кровопотере as their true values become real only on reaching full dissolution of a blood which descends in an organism within 2-3 days.

The most informative method of an establishment of size of a hemorrhage is definition of deficiency BVC and its components: BVC, volume of formulated elements - globular volume. The research procedure is based on introduction in a vascular bed of certain quantity of indicators. Exact enough method of definition BVC by means of dark blue Evans (paint T - 1824). On concentration of the indicator thinned in a blood define volume of circulating plasma; considering a hematocrit, by means of tables calculate BVC and globular volume. Appropriate indexes BVC and its components find under tables in which weight of a body and age of the patient is specified. On a difference between conforming and actual indexes define deficiency BVC, globular volume, volume of circulating plasma, i.e. hemorrhage size. However objective now it is necessary to consider радионуклидного a mean of research BVC which error fluctuates within 3-5 %.

Depending on volume streamed and level of depression BVC evolve 4 severity levels of a hemorrhage:

I - easy degree: loss of a blood of 500-700 ml (depression BVC on 10-12 %);

II - centre degree: loss of a blood of 1000-1500 ml (depression BVC on 15-20 %);

III - serious degree: loss of a blood of 1500-2000 ml (reduction BVC by 20-30 %);

IV degree - a massive hemorrhage: loss more than 2000 ml of a blood (depression BVC more than on 30 %).

Clinical signs observed at кровопотере, allow to define its degree.

In due time begun treatment can warn development of hemorrhagic shock, therefore begin it follows as fast as possible. In case of a serious hemorrhage even before blood typing and blood-compatibility tests of the patient and the donor start introduction of the blood-substituting fluids which application is based that loss of plasma and, hence, reduction BVC are tolerated by an organism much more difficultly, than loss of erythrocytes. Albumine, a protein, Polyglucinum are well kept in a blood channel, in case of need it is possible to use кристаллоидные solutions, but it is necessary to remember that they quickly leave a vascular bed. Low molecular weight dextrans (реополиглюкин) fill volume of the intravascular fluid, improving microcirculation and rheological behaviour of a blood. The hemotransfusion is necessary at depression of level of haemoglobin below 80 g / l and an index of a hematocrit less than 30. At serious acute кровопотере treatment begin with jet injection of a blood in 1, 2 or 3 veins and only after lifting the GARDEN above 80 mm hg pass to the drop injection. For anaemia elimination use инфузииэритроцитарной masses; it is more expedient to introduce blood substitutes as it improves a capillary blood stream after infusion and reduces deposition of formulated elements of a blood.

## **INFLUENCE OF THE HEMORRHAGE ON THE ORGANISM. PROTECTIVELY - COMPENSATORY REACTIONS**

Posthemorrhagic hypovolemia, having reduced leads to a circulatory disturbance in an organism. As a result join protectively - the compensatory processes referred on restoration of conformity BVC and container of a vascular bed, thereby an organism with adaptive reactions are provided with maintenance of a circulation of blood. The specified reactions include 3 basic mechanisms:

1. Reduction of volume of a vascular bed at the expense of rising of a tonus of veins (venospasm) and peripheric arterioles (arteriolospasm).

2. Indemnification of lost part BVC for the account autogemodilution owing to moving of intercellular fluid to a circulatory bed and a yield of a blood from depot.

3. Compensatory reaction of members of life support (heart, lungs, nephroses).

Similar compensatory reaction cannot proceed a long time, the reduced state of vascular resistance leads to indemnification failure.

The hypoxia of a liver, nephroses, hypodermic cellulose invokes serious metabolic disturbances.

Advance of disturbances in an organism is caused sladd erythrocytes in capillars owing to their spastic stricture and blood flow retardation, and also an accruing hypoxia of tissues. In a metabolism anaerobic processes prevail over oxybiotic, the tissue acidosis accrues. Such disturbances of a histic metabolism and microcirculation lead to multiorgan insufficiency: in nephroses the glomerular filtration decreases or stopped and the oliguria or анурия educes. In a liver there are necrotic processes, drops сократительная ability of heart owing to a lesion of a myocardium, lungs the interstitial edema with gaseous exchange disturbance through pulmonary - the capillary membrane («a shock lung») educes.

Thus, even at the intercepted bleeding loss of blood leads to serious changes of all systems of vital activity of an organism that demands use of the diversified agents and treatment methods the core among which is restoration of a hemorrhage and the earlier it is executed, the better for the patient.

### **BLEEDING STOPPING**

The bleeding from fine arteries and veins, and also from capillars is in most cases stopped autocratically. Seldom there comes an independent stopping of a bleeding from large pots.

One of important protective systems of an organism is a fibrillation. The spontaneous hemostasis in some cases allows an organism to cope with a bleeding independently

**Hemostasis** - complex biochemical and biophysical process in which the vein and tissues surrounding it, thrombocytes and plasma factors of coagulating and anticoagulative system of a blood take part.

Reduction of smooth muscular cells of the pot leads to a vasoconstriction, in a region of damage of pots the endothelium is broken frames a surface, a place for thrombus formation, hemodynamics change, blood flow retardation do possible thrombogenesis process, and thromboplastin of the damaged pot and surrounding tissues (histic thromboplastin) participates in fibrillation process. Change of electric potential of the damaged pot, a collagen stripping, accumulation of awake biochemical materials (glycoproteins, the factor of Villebranda, calcium ions, trombospondine, etc.) Provide adhesion (adherence) of thrombocytes to bare vascular wall collagen. The adhered thrombocytes frame conditions for aggregation of thrombocytes - complex biochemical

process with adrenaline participation, АДФ, thrombin with formation of arachidonic acid, Prostaglandinums, тромбоксана and other materials. The aggregated thrombocytes together with thrombin and fibrine are formed platelets by a parcel - a surface for the further thrombogenesis with participation of coagulating system of a blood.

In I th phase of coagulation descends to participation of plasma factors (VIII, IX XI, XII factor of Hagemana) and blood thrombocytes - bloody thromboplastin is formed. Last together with histic thromboplastin in the presence of ions of Са translates prothrombin in thrombin (II phase of linkage), and thrombin in the presence of XIII factor translates fibrinogen in fibrinopolimer (III phase) process of formation of a parcel concludes retractions of the last with thrombus formation. Thereby the hemostasis is provided, and the bleeding from fine pots is reliably intercepted. All process of a thrombogenesis descends very quickly - during 3-5 mines, and such processes as adhesion of thrombocytes, prothrombin transferring in thrombin, fibrine formation, is occupied with some seconds.

The bleeding, proceeds, in case the organism has not coped it independently, serves as the indication to a time stopping of a bleeding.

**Methods of a time stopping of a bleeding.** A reliable method is the applying a tourniquet, however it is applied mainly in the field of extremities.

Manual pressing of an artery on an extent make in those fields where arteries settle down superficially and near to a bone.

Extremity flexion in a joint effectively at bracing of the arm bent completely in an ulnar joint at a bleeding from forearm or brush pots, and a foot - in a knee joint at a bleeding from pots of an anticnemion or stack.

The tamponade of a wound and superposition of a compressing bandage with an immobilisation at raised position of an extremity is a good method of a time stopping of a bleeding from veins and small arteries, from the soft tissues covering bones of a skull, ulnar and patellar joints.

Pot pressing in a wound dactyls carry out in emergency situations, sometimes during operation.

Time bridging of the pot is a mean of restoration of a circulation of blood at damage of large arterial pots.

**Methods of a definitive stopping of a bleeding** share on 4 bunches: 1) mechanical, 2) physical, 3) chemical and biological, 4) the combined.

Mechanical methods. The pot dressing in a wound is a reliable mean of a stopping of a bleeding. For its realisation evolve the central and peripheric extremities of the bleeding pot, trap their haemostatic clamps and dress.

*The pot dressing on an extent* is applied, if it is impossible to find the extremities of the bleeding pot in a wound (for example, at wound of choronomic and intrinsic carotid arteries), and also at the secondary bleedings when arrosion pot is in a depth of an inflammatory infiltrate. In such cases, being oriented on topography the data, find, bare and dress the pot outside of a wound. However this method does not guarantee the termination of a bleeding from the peripheric extremity of a damaged artery and collaterals.

At impossibility of isolation of the extremities pots make a pot dressing together with surrounding soft tissues. If the pot it is trapped by a clamp, but it is not possible to dress, it is necessary to abandon a clamp in a wound for long time - till 8-12 days, there will be no yet reliable a thrombosing pots.

Damaged pots of small calibre can be trapped a haemostatic clamp and rotary movements to make curling pots.

Sometimes, in the presence of small wounds and damages of pots of fine calibre it is possible to make a wound tamponade. Wads apply dry or moisten with a normal saline solution. Typical examples of a stopping of a bleeding is the forward and back tamponade of a nose at a nasal bleeding, a uterus tamponade at a uterine bleeding.

At bleedings from pots which it is difficult or it is impossible to dress, use clipings - crossclamping of pots by silver clip-on earrings. After a definitive stopping intracavitary bleedings delete member parts (for example, a resection of a stomach with an ulcer, bleeding) or all member (a splenectomy at lien tearing up). Sometimes impose special junctures, for example, on edge of a damaged liver.

Now for a stopping pulmonary, stomach - intestinal bleedings and bleedings from bronchial arteries, brain pots methods of artificial embolization of pots are developed and implanted. In radiological control in the bleeding pot, make a catheter, and on they be the emboluses occluding a lumen of the pot, than the bleeding stopping is reached. As emboluses use globules from synthetic polymerous stuffs (silicone, polystyrene), gelatine. In an embolization place further there is a thrombus formation.

The basic indication to an angiorrhaphy is necessity of restoration of passableness of the main arteries. The vascular seam should be highly tight and meet following demands: it should not break a blood stream (absence of narrowing and a turbulence) should be in a pot lumen as less as possible a suture material. Distinguish a seam manual and mechanical.

Manually a vascular seam impose with the help атравматических needles. Ideal it is considered bond pots the extremity in the extremity. The circular vascular seam can be imposed by means of tantalic paper clips, rings Donetsk. The mechanical seam made enough also does not narrow a pot lumen.

The regional vascular seam overlaps at a pot gutter wound. After superposition a seam strengthen by means of a fascia or a muscle.

At presence in wall of the big defect formed as a result of wound or operation (for example, after an oncotomy), apply patches from a biological stuff (a fascia, wall of a vein, a muscle). Choose aunvenous (the big saphena of a hip or a superficial vein of a forearm) is more often.

As grafts in surgery of pots use auto allotransplants of arteries or veins, widely apply prostheses from synthetics. Reconstruction is made by superposition of anastomoses the extremity to the extremity or sewing up a graft.

**Physical methods.** Thermal means of a stopping of a bleeding are based on properties of high temperatures to fold protein and on ability of low temperatures to invoke a vasospasm. These methods get great value for struggle against a bleeding during operation. At diffusive bleedings from an osteal wound put the napkins permeated with a hot isoosmotic solution of Sodium chloridum to it. Applying of bladder with ice at hypodermic hematomas, swallowing of scraps of ice at a stomachal bleeding are widely applied in surgery.

*The diathermocoagulation* based on application of an alternating current of high frequency, - the basic thermal mean of a stopping of a bleeding. It widely use at bleedings from damaged pots of a hypodermic fatty tissue, a muscle, fine pots of a brain. The basic condition of application of a diathermocoagulation - dryness of a wound, and at its carrying out it is not necessary to lead up tissues to carbonisation as this in itself can invoke a bleeding.

*The laser* (the electron radiance focused in the form of a fascicle) apply to a stopping of a bleeding at patients with a stomachal bleeding (ulcer), at persons with the raised stasis (hemophilia), at oncologic operations.

*Cryosurgery* - surgical methods of treatment with aboriginal application of a cold: at operations on strongly vascularised members (a brain, a liver, nephroses), especially at excision of tumours. Local freezing of a tissue can be made without damage of the healthy cells surrounding a field crionecrosis.

**Chemical and biological methods.** Haemostatic materials section into agents резорбтивного and local action. Резорбтивное action educes at material entering in blood, aboriginal - at its immediate contact to tissues which bleed.

Haemostatic materials of the general резорбтивного actions are widely used at intrinsic bleedings. The most effective direct hemotransfusion, is expedient also decantation fresh preserved bloods small doses (100-150 ml), plasmas, platelet masses, fibrinogen, a prothrombin complex, antihemophilic globulin, a cryoprecipitate, etc. These drugs effective at the bleedings bound to congenital or secondary insufficiency of separate blood-coagulation factors at a series of diseases (a pernicious anaemia, a leukosis, a hemophilia, etc.).

Now the inhibitors of fibrinolysis possessing ability to reduce fibrinolytic activity of a blood are widely used. The bleedings bound to rising last, are observed at operations on lungs, heart, a prostate gland, at a cirrhosis, septic states, at decantation of the big doses of a blood. Are applied as biological antifibrinolytic drugs (Trasyololum, Kontrikal? Acidi tranexamuci), and synthetic ( $\epsilon$  - Acidum aminocapronicum, Ambenum).

*Dicynonum, Etamsylatum* - the drugs accelerating formation of thromboplastin, they normalise permeability of vascular wall, improve microcirculation. As the agents normalising permeability of vascular wall, apply rutin, vitamin C, karbosochrom.

*Vicasolum* - synthetic water-soluble analogue of phthiocol. As the medical agent is used at bleeding, bound to maintenance depressing in a prothrombin blood. It is shown at an acute hepatitis and obtutation icterus, parenchymatous and capillary bleedings after wounds and surgical interventions, at stomach- intestinal bleedings, a peptic ulcer, hemorrhoidal and long nasal bleedings.

For process of transformation of prothrombin in thrombin very small quantity of ions of calcium which routinely already are in a blood is required. Therefore application of drugs of calcium as haemostatic agents expediently only in case of decantation of massive doses of a citrated blood as at interaction of calcium with citrate last loses the antycoagulant properties.

Haemostatic materials of local action are widely used. At parenchymatous bleedings from a liver wound apply an original biological wad - a muscular tissue or a protecting cap in the form of a free flap or a flap on a leg. The special value in surgery has application фибринным films, a biological antiseptic wad of a haemostatic collagenic sponge. Haemostatic and gelatinous sponges, a biological antiseptic wad use for a stopping of capillary and parenchymatous bleedings from bones, muscles, parenchymatous members, for a tamponade of sine of a firm meninx.

*Thrombin* - a drug received from a blood plasma of donors, promotes fibrinogen transferring in fibrine. The drug is effective at capillary and parenchymatous bleedings of various parentage. Before the use it dissolve in Sodium chloridum isoosmotic solution. With drug solution permeate sterile gauze napkins or haemostatic a sponge which impose on a

bleeding surface. Thrombin application is contraindicative at bleedings from large pots as development of widespread clottages with a lethal outcome is possible.

**The combined methods.** For intensifying of action of a hemostasis sometimes combine various means of a stopping of a bleeding. Are most propagated a wrapping by a muscular tissue or greasings by glue of a vascular juncture, simultaneous application at parenchymatous bleedings of a various kind of junctures, biological wads, etc. For treatment of patients with ДBC - a syndrome important elimination of the cause which have invoked it, restoration BVC, carrying out of actions for liquidation of renal insufficiency, and also hemostasis normalisation - introduction of heparin and (by strim) native or freshfrozen plasmas, platelet masses, if necessary apply the PULMONARY ventilation.

For a stopping of the bleeding invoked by action medicinal drug use native or свежемороженную plasma, at an overdosage of anticoagulants of indirect action - Vicasolum (phthiocol), at a heparin overdosage - protamin sulphate, for inactivation of fibrinolytic drugs - ε - Acidum aminocapronicum, Trasylolum.

To a stopping of a bleeding at sick of a hemophilia apply a cryoprecipitate and antihemophilic plasma, native plasma, native donor plasma, fresh-citrate blood, direct hemotransfusions.

### **THE SECONDARY BLEEDINGS**

The secondary bleedings can be early (in the first 3 days) and serotinal - through a wide interval of time after wound (from 3 about several days, weeks). Division into the early and serotinal is defined by the causes of occurrence of the secondary bleedings (as a rule, they differ and on exhibiting time). The cause of early secondary bleedings is disturbance of rules of a definitive stopping of a bleeding: insufficient control of a hemostasis at operation or a wound surgical treatment, ligatures on pots are weakly fastened. To a bleeding can result rising of a BP after operations (if the patient or the wounded man is operated at diminished pressure), shock, the hemorrhagic anaemia, a controlled hypotension when are possible pushing out of thrombuses from large or fine pots, slide ligatures.

Principal causes of the secondary bleedings is purulent - inflammatory complications in a wound, necrosis development that can lead to fusion of thrombuses. Decubituses of pots at pressure upon them of osteal or metal splinters, drainages can be the cause of serotinal bleedings also. The vascular wall necrosis, formed can lead to its tearing up and bleeding occurrence.

The secondary bleedings, as well as primary, can be arterial, venous, capillary, parenchymatous, and also choronomic and intrinsic.

Gravity of a state of the patient is defined by hemorrhage volume, depends on calibre and character of damage of the pot. The secondary bleedings on action on an organism more serious, than primary as there are against earlier past hemorrhage owing to primary bleedings or operative interventions. Therefore at secondary bleedings gravity of a state of patients does not correspond to hemorrhage volume.

The clinical pattern of the secondary bleedings consists of the general and aboriginal symptoms, as well as at primary bleedings.

Principles of a stopping of the secondary bleeding same, as well as primary.

As preventive maintenance of the secondary bleedings following high lights serve.

Careful definitive stopping primary bleedings at damage of pots and during any operative measure. Before sewing up the operative measure region is necessary for examining

wounds carefully (hemostasis check). Operation conclude sewing up wounds at confidence of bleeding dead stop.

Careful carrying out of a primary surgical treatment of wounds, excision of foreign matters.

The prevention of purulent complications from a wound observance of rules of an asepsis and antiseptics during operation, antibacterial therapy.

The drainage equipment (in need of a drainage of wounds, lumens) taking into account topography of pots to prevent formation of decubitus of a vascular wall, its erosions.

Researches before each planned operation of a state of coagulating and anticoagulative system of a blood of the patient. In case of disturbances in a state of coagulating system of a blood control over a state of a hemocoagulation at patients who have a threat in respect of the secondary bleeding, is carried out regularly in the postoperative season.

Careful observation of the patients who have tolerated operation, for the purpose of timely revealing of the secondary bleeding. The medical personnel should know clinical signs of the secondary bleeding and its danger to life of the patient. The personnel, looking after should own means of a time stopping of a bleeding.

#### **V. The Rough basis of actions**

**Definition of size of a hemorrhage.** At I degree of a hemorrhage the expressed clinical signs are absent. At II degree of a hemorrhage integuments acyanotic, extremities cold to the touch are defined a tachycardia to 100 impacts in minute, depressing of a BP to 90-100 mm hg. At serious кровопотере (III degree) the restless behaviour of the patient, a cyanosis, pallor of integuments and visible mucosas, breath increase, cold sweat are observed. Pulse rate reaches 120 in a minute, a BP the Quantity urine allocation is reduced to 80-90 mm hg reduced - an oliguria. At massive кровопотере (IV degree) the patient is braked, is in a stupor state, sharp pallor of integuments, a Crocq's disease, анурия (the termination мочеотделения) are observed. Pulse on peripheric pots weak, threadlike or is not defined absolutely, a tachycardia to 130-140 and more in a minute, a BP is reduced to 30 mm hg and more low.

**Methods of a time stopping of a bleeding.** A reliable method is the applying a tourniquet, however it is applied mainly in the field of extremities.

The haemostatic braid is elastic in length of 1,5 m that on the one hand concludes a metal chain, with another - a hook. At positioned arterial or a massive bleeding impose a braid more proximally a damage place.

Assumed the applying a tourniquet field should be wrapped a soft stuff (a towel, a bed-sheet, etc.) I.e. frame soft gasket. A braid extend, impose more close to a chain or a hook and do by a braid 2-3 rounds; the further coils impose, extending a braid, then a hook attach to a chain. Necessarily specify applying a tourniquet time so prelums it within more than 2 h in the inferior extremity and 1,5 hours - on top are dangerous an artery development of a necrosis of an extremity. Control of correctness of an applying a tourniquet is the bleeding termination, petering of a pulsing peripheric the located arteries and easy "wax pallor" extremity skins. If transportation of the wounded man occupies more than 1,5-2 hours., it is necessary to take out periodically for 10-15 minutes a braid for restoration of arterial flow of a blood. Thus damaged pot press  $\tau$  tupfer in a wound or make manual pressing of an artery. Then a braid impose again, a little above or below a place where it was.

*Manual pressing of an artery* on an extent make in those fields where arteries settle down superficially and near to a bone: a carotid artery - cross-section process CIV, subclavial

- And a rib, humeral - a field of an intrinsic surface of a humeral bone, a femoral artery - a pubic bone. Manual pressing is especially important by preparation for an applying a tourniquet or its changes, and also as reception at extremity ablation.

*Extremity flexion in a joint* effectively at bracing of the arm bent completely in an ulnar joint at a bleeding from forearm or brush pots, and a foot - in a knee joint at a bleeding from pots of an anticnemion or stack. At high damages of a femoral artery inaccessible to an applying a tourniquet, it is necessary to fix a hip to a gaste at the maximum flexion of an extremity in patellar and a hip joint.

*The tamponade of a wound and superposition of a compressing bandage* with an immobilisation at raised position of an extremity is a good method of a time stopping of a bleeding from veins and small arteries, from the soft tissues covering bones of a skull, ulnar and patellar joints. For a hard tamponade a gauze wad introduce into a wound, tightly filling it, and then fix a compressing bandage. The melancholy a tamponade is contraindicative at wounds in the field of a popliteal space as in these cases the extremity gangrene often educes. Pressure a load or in a combination to refrigerating (bladder with ice) use at interstitial bleedings, and also often apply as a method of preventive maintenance of postoperative hematomas.

*Pot pressing in a wound dactyls* carry out in emergency situations, sometimes during operation. For this purpose the doctor quickly puts on a sterile glove or alcoholizes an arm, iodine and presses or compresss the pot in a wound, intercepting a bleeding.

At a bleeding from the damaged penetrating located pots of proximal departments of an extremity, an abdominal lumen, a thorax when it is impossible to apply the methods of a time stopping of a bleeding listed above, use superposition on the pot of the haemostatic clamp, bleeding in a wound. To avoid a traumatising a series of the located formations (nerves), it is necessary at first to try to intercept a bleeding, having pressed the pot dactyls, and then to impose a clamp immediately on the bleeding pot, preliminarily having drained a wound from a blood.

*Time bridging of the pot* is a mean of restoration of a circulation of blood at damage of large arterial pots. There and back damaged artery introduce densely elastic a tube and the pot extremity fix on tubes ligatures. On such time the shunt the arterial circulation is reduced. The shunt can function from several o'clock about several days, will not be given yet possibility of a definitive stopping of a bleeding.

## **V I. Tasks for check of final level of knowledge**

### **Situational problems for check of final level of knowledge**

In 70-year-old patients, suffering varicose dilating of saphenas of the inferior extremities, the bleeding from knot has subitaneously opened was lacerated, on an intrinsic surface of the inferior third of right anticnemion. From a wound an intensively enough languid jet dark blood pours out. What volume of first aid should be given the patient?

*The answer: for a time stopping of a bleeding on the right anticnemion it is necessary to impose pressing circular or spiral бинмоёую a bandage, having added extremities raised position, and to organise transportation of the patient in a surgical hospital.*

The guy, 17 years, during a trip to the bus, has put forward the right arm in a window. Towards there was a truck by which bort has been affected the arm is put forward. Traumatic

ablation of the right top extremity at level of a centre third of shoulder (the extremity hangs in skin shreds) has taken place. From damaged arteries scarlet blood flows by heads. How to intercept a bleeding?

*The answer: it is necessary to make urgently manual pressing during a humeral or axillary artery then to impose standard (Esmarch) or the improvised haemostatic braid.*

It is necessary to shelter a wound a sterile bandage, an immobilized of extremity, to introduce the anaesthetising.

The patient needs emergency transportation in branch surgical a profile.

In surgical branch the patient with колото - резаной a wound in a popliteal space is delivered. At wound revision popliteal artery damage is positioned, but you do not own technics of a vascular juncture. What your actions?

*The answer: in this case it is necessary to recognise as Optimum tactics time bridging pots and attraction of the vascular surgeon for performance of the regenerative operation.*

In a reception the man of 48 years with complaints to delicacy, giddiness, a moderate pain in left hypochondrium is delivered. From the anamnesis it is known that 12 hours back it has fallen from a ladder, impact has had on a field of the left costal arch. On the eve of entering there was a syncope.

The patient lies in the forced position. Change of position of a body enhances an abdominal pain. Integuments acyanotic. Pulse - 120 impacts in a minute. Arterial pressure - 90/50 mm hg Breath superficial. During palpation strain of muscles of an abdominal wall, a dullness in left hypochondrium and sloping places of a gaste is found moderated. Blood haemoglobin - 98 g / l.

Yours the diagnosis and tactics?

*The answer: Y the patient it is necessary to suspect traumatic tearing up of a lien with intra-abdominal a bleeding. Follow-up expediently in an accident ward to make смотровую рентгенцимок an abdominal lumen in position of the patient sitting for an exception of presence of free gas in an abdominal lumen and X-ray ribs. The trolley should deliver the patient urgently in surgical branch for immediate surgery performance.*

In an accident ward the man with the occluded trauma of a thorax at the left is delivered. Objectively: integuments acyanotic. Pulse - 100 impacts in a minute. Arterial pressure - 110/65 mm Is hg observed morbidity and crepitation of osteal fragments in projections VIII, IX and X ribs on the right on a centre axillary line. Has percussively put in the inferior departments the stupid note is defined, breath is not auscultated (in position of the patient sitting). On the roentgenogram, except fractures of the specified ribs, the intensive shade with horizontal level to a limen of VII rib is follow-up found.

Yours the diagnosis and tactics?

*The answer: the patient has an occluded fracture VIII - X ribs on the right, complicated by a hemothorax. Damage of intercostal pots or lungs can be a bleeding point here. The patient on a trolley should be delivered in surgical branch where to it it will be medical executed - a diagnostic puncture of a pleural cavity and in the general complex of medical actions haemostatic therapy with dynamic overseeing by a state of health is designed*

The patient, 30 years, suffers within 7 years a peptic ulcer of a stomach within past days noted accruing delicacy, giddiness. Has got up in the morning, suddenly for some seconds has fainted. After that single-passly there was a vomiting in a kind of "a coffee ground" and "a tarry chair". Integuments acyanotic. A gaste soft, painless.

What your diagnosis? What urgent additional researches are necessary for executing for acknowledgement of your assumption? Where and how you will send the patient on treatment?

*The answer: the patient has a bleeding in the top departments stomach- intestinal tract, it is probable from a stomach. It should be transported immediately by ambulance car on a stretcher in surgical branch. If it does not detain sending of the patient, it is necessary to measure arterial pressure and whenever possible to take from it blood for definition of quantity of erythrocytes, haemoglobin, a hematocrit. Result of the analysis of a blood it is possible to tell by in a hospital to phone.*

At the patient to whom operation concerning an inguinal hernia in the morning has been made, in the evening a bandage on a beginning wound it is abundant ooze blood. Second-hand местно within an hour with ice and saccules with sand of effect have not yielded bladders.

What complication in the early postoperative season has arisen at the patient? Your further tactics?

*The answer: the patient in the early postoperative season had early secondary a bleeding. It is necessary to take the patient in operational, to make wound revision, to impose a ligature on the bleeding pot or follow-up to impose on a wound 1-2 junctures for the purpose of a hemostasis.*

The guy has reverted to you with complaints to pains in the right anticnemion and its accruing tumescence after falling from a moped. The trauma has descended about a half an hour back. At survey on a forward surface of a centre third of anticnemion the tumescence in the dimensions  $10 \times 6 \times 5$  is the Skin over it cyanotic see. At a palpation morbidity and fluctuation is defined. Pulse on a back artery of the right stack is conserved.

Your diagnosis? You will give what help to the victim?

*The answer: At the victim the hypodermic hematoma of the right anticnemion is. It is necessary to impose a compressing bandage on an anticnemion, to recommend местно bladders with ice, rest for an extremity. Further the patient necessarily should be is examined by the surgeon.*

In a hospital reception the patient with complaints to a pain in the left knee joint after trauma reception is delivered. Locomotions in a joint are circumscribed, painful. The joint has the ball-shaped form. It is defined whirlbone ballotements. On the roentgenogram of damage of bones it is not positioned.

Yours the diagnosis and medical actions?

*The answer: the patient has a hemarthrosis of the left knee joint. It is necessary to make a joint puncture, to impose a compressing bandage, immobilization of extremity, follow-up to recommend a cold for a joint.*

In clinic the patient with the occluded trauma of a gaste has arrived. At entering the expressed symptoms of an intra-abdominal bleeding. As a result of an emergency laparotomy are positioned tearing up of a forward surface of the right hepatic lobe in the dimension  $6 \times 3 \times 4$  sm, a hemoperitoneum.

How to make a definitive stopping of a bleeding from a damaged liver? What to do with the blood which has streamed in an abdominal lumen?

*The answer: For a definitive hemostasis the place of damage of a liver should be taken in II-shaped junctures, it is desirable with filing to them of a gland. Junctures impose a stupid needle with a double strand through all depth of a liver.*

*Blood which has poured out in an abdominal lumen, collect, filtrate through 8 beds of a gauze in vials with the stabilising solution, containing sodium citrate or heparin, and transfuse revertively sick.*

At ablation of the inferior extremity at level of the inferior third of hip after a deligation on a femoral artery the clamp has been taken out from last. From a wound under the big pressure pulsing locomotions became spray blood brightly - red colour.

In what the bleeding cause? How to make a time and final stopping of a bleeding? How to prevent such complication?

*The answer: After a declamping from a femoral artery has descended соскальзывание ligatures and has opened an arterial bleeding. The time stopping of a bleeding can be made by manual pressing of an artery to a horizontal branch of a pubic bone. The definitive stopping of a bleeding can be executed by a ligation of an artery with the previous its insertion that will prevent further соскальзывание ligatures.*

At a diagnostic puncture of tumoral formation in the inferior third of anticnemion in a syringe blood darkly - cherry colour began to be typed under pressure. Where the hypodermic needle has got? How to intercept a bleeding?

*The answer: the Needle has got to a vein. For a bleeding stopping it is necessary to impose a compressing bandage.*

At work to a circular saw there was a failure on the machine tool and to the worker the saw fragment had been put резаная a wound of the inferior third of shoulder. To the patient for the purpose of a time stopping of a bleeding the haemostatic braid has been imposed. Transportation of the patient in fracture clinic has occupied 3 hours. What error has been admitted? Which can arise complications and it prevention?

*The answer: in the Summer a braid it is necessary to impose a maximum at 2 o'clock continuously. At prolongation of term of stay of a braid on an extremity there can be its ischemia and a necrosis. A braid it is necessary for the prevention of a long ischemia in 2 hours per some minutes to dismiss, having intercepted a bleeding manual pressing, and repeatedly to impose above a place of its previous locating.*

At patient Д, 65 years operation of excision of a foreign matter of the left lumbar area has been executed. This very day in the evening the bandage of the patient has abundantly got wet blood, the wound bleeds on all surface. The patient has reported that to it the day before within a month therapy was made antycoagulation, have stopped one week ago. Whether at blood clotting time definition on - to White the index has compounded 11 minutes. Name the cause of a bleeding and a mean of its definitive stopping.

*The answer: At the patient against application of anticoagulants has educed коагулопатична a bleeding. A wound it is necessary tightly tamponade, to sew a wad to wound edges, and to the patient to prescribe haemostatic therapy.*

At sick E, 62 years, are carried out operation a cholecystectomy, a choledocholitomy, an outside drainage choledoch concerning the mechanical icterus invoked by disturbance of outflow of bile owing to hit of a concrement in the general bile duct. During operation attracts attention a significant staxis of tissues. In what the cause of such position? What additional medical actions are necessary for making?

*The answer: At the patient to bedrock of disturbance of outflow of bile has educed cholemic a bleeding bound to insufficient entering in the general blood stream of phthiocol. In a treatment complex it is necessary to add a haemostatic drug Vicasolum (phthiocol solution).*

### **Tests and problems for check of initial level of knowledge**

Specify means of a physical stopping of a bleeding:

Cold application ;

Wound stypage;

Absorbable gelatin sponge;

Electrocoagulation ;

Vascular seam.

What general clinical signs are characteristic for a bleeding?

Delicacy;

Nausea;

Giddiness;

Heartache;

Cyanosis.

What means of a time stopping of a bleeding can be applied at damage of large arterial pots?

Raised position of an extremity;

Applyings a tourniquet;

Superposition of a haemostatic clamp in a wound;

Absorbable gelatin sponge application;

Compressing bandage superpositions.

What drugs are used for an aboriginal stopping of a bleeding?

Absorbable gelatin sponge;

поролоновая a sponge;

Thrombin;

Hematogen;

The washed erythrocytes.

The cause of a serotinal secondary bleeding are:

BP rising;

Purulent fusion of a thrombus;

Vasospasm liquidation;

Vascular wall arrosions ;

sliding of a ligature.

Everything, except is the cause of early secondary bleedings:

Wound pyesis;

Pot wound ;

Thrombus pushing out;

sliding of a ligature;

The raised arterial pressure.

Name chemicals which use for a bleeding stopping.

$\epsilon$  - Acidum aminocapronicum ;

reopoliglukin;

Normal saline solution;

Heparin

Vicasolum.

Biological means of a stopping of a bleeding are:

Tamponade of a wound a gland ;

Tamponade of a wound a muscle;

Tamponade of a wound a cartilage;

Adrenaline introduction;

Introduction  $\epsilon$  - Acidum aminocapronicum.

The compressing bandage as a method of a time stopping a bleeding is shown at:

Bleedings from forearm veins;

Carotid artery damage ;

Bleedings from soft tissues of a head;

Wound of a field of a popliteal space ;

Bleedings from soft tissues of a thorax.

For what localisation of a bleeding point characteristicly ground?

Lung;

Stomach;

Lien;

Duodenum ;  
Sigmoid intestine.

At the expense of what at acute кровопотере there is natural indemnification of reduction of volume of a circulating blood and viability of an organism is sustained?

Vasoconstrictions;  
Rising of the central venous pressure;  
autogemodilution;  
vasodilatation;  
Water drink.

On what bunches bleeding symptoms share?

Are opened;  
The hidden;  
Aboriginal;  
The time;  
The general .

On what bunches all means of a stopping of bleedings share?

The pre-medical;  
Final;  
Time;  
The vascular  
The mechanical

Continuous maximum on duration time of an applying a tourniquet for the inferior extremity compounds in the winter:

3 h;  
4 h;  
1,5 h;  
2 h;  
0,5 hour.

Continuous maximum on duration time of an applying a tourniquet for the inferior extremity compounds in the summer:

3 h;  
4 h;  
1,5 h;  
2 h ;  
0,5 hour.

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2 (poor)	0

Guidelines prepared

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