**ODESA NATIONAL MEDICAL UNIVERSITY**

**Department of Surgery №3** **with the course of oncology**

**METHODOLOGICAL RECOMMENDATIONS 3 THEME STUDY:**

**"A** **SURFACE INFLUENCED.** **FIRST ROOMS** **.** **EXPLOSIVE INJURY.** **CLASSIFICATION, CLINICAL PICTURE.** **RANGE BALLISTICS, PATHOMORPHOLOGY OF RAS PROCESS** **"**

for students of the Faculty of Dentistry

Approved at the methodical meeting of the department

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From av. Department, professor A.Tkachenko

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**The topic of the lesson.** **"MASTER SURGICAL INJURY.** **FIRST ROOMS.** **EXPLOSIVE INJURY.** **CLASSIFICATION, CLINICAL PICTURE.** **RANGE BALLISTICS, PATHOMORPHOLOGY OF THE RAS PROCESS** **"- 4 h**

**Actuality of theme.**

The painful shells were used by people from time immemorial, even in the era of inventing copies, slings, bows and crossbows. In this case, the person himself became the victim of his inventions. The first mention of firearms relates to the XIV century - these were "fire tubes", which served to throw out metal and stone shells with the help of light gunpowder. Slit trunks appeared in the XV century, but their use was prohibited as "obscene" and dangerous improvement. In 1840, weapons appeared, charging from the state-owned part, it's rifles Shaspo and Dreise. After 10 years, the shutter, copper sleeve and smokeless gun allowed, increasing the power of the projectile and its speed, reducing the weight of weapons. Narrowing trunks, ensuring the rotation of the ball and stabilizing it in flight, required the coating of its solid shell. The transition to multi-charging patterns (1861), the creation of more effective pyroxylene gunpowder (1880), the invention of the Maxim machine gun (1883), the use of a ball of sharp form instead of the oval (1900) are the main stages of the evolution of small arms of the previous century. Back in the 18th century, the English surgeon Genther wrote: "The art of striking a person makes great successes than the art of his healing." The progress of firearms is in the direction of increasing the strength of explosives, reducing the caliber and mass of shells, increasing the initial speed of flight, and improving the design of weapons. All this allows you to increase the power of fire, its density, and ensure the survival of the impressive effect of the shells at considerable distances. In military field surgery at the turn of the XX-XXI centuries, the appearance of new types of weapons changed the nature of damage to tissues and organs, as well as the course of the wound process, the treatment of firearms the wound continues to be one of the topical issues. In numerous local military conflicts, firearms and their complications are the leading causes of fatalities in the battlefield and in the stages of medical evacuation, as well as lead to disability of servicemen. Currently, gunshot wounds have more pronounced morphofunctional changes, characterized by severity, coquette, and plurality (Efimenko M O., Khrupkin VI, Marahonich LA, 2003). The introduction of advanced medical technologies in military field surgery can improve the treatment outcome of the wounded.

Objectives: To study the features of modern wounds caused by firearms. Elements of Early Ballistics. The mechanism of action of the wounding projectile. Morphological and functional changes in tissues during firearms.Zone of a gunshot wound: a wound channel, primary and secondary necrosis. Concept about primary and secondary microbial contamination of wounds. Mechanisms of healing of wounds by primary and secondary tension. The concept of early, postponed and late UHO firearms. Contents of surgical treatment of wounds. Options for surgical wound treatment depending on the anatomical and morphological characteristics of the gunshot wounds. Concept of one-stage and exhaustive NWF of firearms. Preparation of students in military and peaceful time on the issues of diagnostics, organization and provision of medical care to the wounded with surgical surgical pathology.

2.3. Specific goals:

As a result of studying the discipline, students must: Have an idea: about the prospects of the development of military field surgery as a department of surgery that studies the organization of providing surgical care to the wounded in wartime based on the latest advances in medical science, taking into account the features of modern combat operations and the participation of troops in the elimination of consequences. disasters (emergencies) of peacetime.

Know:

• the volume and content of the first, pre-medical and first medical aid to the wounded in the course of fighting, suffered from natural disasters and catastrophes;

• the basis of the organization and content of skilled and specialized surgical care for the wounded;

• peculiarities of providing surgical care to the wounded in local wars and armed conflicts;

• features of the course, diagnostics and principles of treatment of modern firearms, closed injuries, combined and multiple injuries, combined radiation and chemical lesions;

• clinical manifestations, diagnosis, prevention and treatment of traumatic shock, prolonged compression syndrome, acute blood loss, infectious complications of gunshot wounds in wartime and in emergency situations of peacetime;

• structure and characterization of surgical pathology in victims of natural disasters and catastrophes;

• provision of medical care stages.

Be able:

• to diagnose gunshot wounds with modern weapons, closed injuries, combined and multiple injuries, combined radiation and chemical injuries,

traumatic shock, prolonged compression syndrome, massive blood loss, infectious complications of gunshot wounds;

• to carry out medical sorting of wounded and injured at the stage of provision of the first medical aid in case of mass arrival of them;

• to provide the first pre-medical and first medical care to the wounded in various types of military trauma;

• to deploy and organize the work of the dressing at the stage of provision of the first medical aid;

• conduct personnel training sessions for providing first aid to the wounded.

Have:

• the method of medical sorting of the wounded at the stage of provision of the first medical aid;

• Organization of work on dressing at the stage of provision of the first medical aid.

Have experience (skill):

• medical sorting of wounded, injured and patients with surgical profile at the mass arrival at the stage of providing the first medical aid;

• the provision of medical care to the wounded on the sorting site and in the dressing room at the stage of provision of the first medical aid.

**3. Contents of the lesson: 3.1.** Structural-logical scheme of the content of classes;

3.2. Contents of the topic "Combat surgical trauma. Fireballs. "

Classification of firearms

• By etiology: spherical, fragmentary, ballistic, arrows, mine explosives.

• By the nature of the wounded canal: blind, cross-cutting, tangent, rebounding.

• By localization: head, neck, chest, stomach, pelvis, limbs.

• In relation to cavities: penetrating (with damage to the internal organs, vessels, nerve trunks, bones) and non-penetrating.

• According to the number of wounded shells: single, multiple. In addition, there are combined and combined injuries.

Combined are injuries caused by one type of weapon, but with damage to two or more different anatomical areas of the body.

Combined lesion is caused by the influence of several impressive factors: firearms, thermal, mechanical, radiation, chemical.

Unusual during wounds inflicted by firearms, frequent development of purulent-septic complications and high lethality, forced doctors to study wound balistics and morphofunctional changes in tissues.

Raneva ballistics and morphofunctional changes in tissues with firearms

Raneva Ballistics - the branch of science that deals with the definition of the impressive effectiveness of firearms wounding shells on the basis of studying their movement in biological tissues and matter targets-simulators.The term "wound balistics" belongs to Callander and Franch (1935). Ip Davydovsky understands under him the physical phenomenon that occurs in the tissues at the moment of passing through the wounding projectile. In "NATO Emergency Military Surgery Instruction" (1975), wound ballistics are defined as the study of movement within the body of the wounded shells and damages their abilities. The purpose of the study of wound ballistics is the development of a unified methodology for determining the spectacular properties of modern firearms, the protective properties of individual armor protection and mechanisms for the formation of gunshot wounds, as well as the creation of a unified medical diagnostic algorithm for combat firearms.

To explain the severe course of firearms, various theories were created.

The theory of poisoning wounds by gunpowder. It was assumed that during fireburns, together with the wounded projectile in the wound, particles of gunpowder that "poison" the tissue in the area of ​​the wound canal are deposited in the wound. Doctrine

about the fire-wound, set forth in the book by V. Braunschweig (1497), permeated with the conviction that all firearms were "poisoned" with gunpowder, and accordingly, the author recommended the original methods of treatment: "If a person is wounded from a rifle and gunpowder poisoned the wound, then take the hair rope and push it through the open hole, and stretch it there and back to all the cracks, and then you will reach the exit of gunpowder from the wound; then the wound will not fester. " Fear of contamination of wounds with gunpowder forced surgeons to deal with this contamination, for which burned wounds with hot iron or poured them in boiling oil.

The falsity of this theory was proved by the French surgeon A. Pari in the XVI century, who formulated the requirement that "the surgeon immediately expanded the wound, if only the area of ​​its distribution allows it." He proved that the characteristics of a gunshot wound depend not on poisoning with gunpowder, but on the crushing of tissues.

The theory of burn, explains the features of the course of a firearms that the ball passes through the tissues as a result of the conversion of mechanical energy into the heat and causes the burn of tissues. Subsequently, many authors in the experiment have shown that the temperature of the bullet when passing through the tissues increases slightly and can not cause burns of tissues that surround the wound channel.

The theory of hydraulic action. Its founder was Bush, but in its final form it was formulated by Coher, Regeer and Bruns. In accordance with this theory, when penetrating a wounded projectile into the tissue, they have conditions like in a hydraulic press, where the moving piston creates pressure in the fluid, and this pressure is passed through the walls of the cylinder by the law of Pascal in all directions with equal force. Hydraulic

the effect of the supporters of this theory was explained by the extremely large destruction of the internal organs in the cavernous wounds. On convincing experiments E.V. Pavlov, VA Tile showed the failure of this theory and proved that the destruction of tissues as the advancement of a wounding projectile is becoming more extensive, while according to the laws of hydraulic theory, it must spread evenly.

At present, the generally accepted theory of direct and lateral shock, based on formulated in the late nineteenth century theory of the impact of Tile and the hydrodynamic theory of Schierning and Kohler

the mechanism of the formation of a firearm. The action of direct impact is carried out on the fabric in the area where the wounded shell directly encounters them. The force of the lateral shock acts on the tissues outside the wound canal. Using modern registration equipment (impulse photography, high-speed filming, strain gauging, etc.), it was possible to decipher the mechanism of direct and side impact. It was found that around the ball formed a stream of air in the form of a wedge. The direction of flow in parallel and radially the flight path of the bullet. The compressed air going in front of the ball - the main shock wave - is one of the factors damaging the fabric. It follows the bullet itself, which predominantly has a mechanical effect and, depending on the energy it possesses, causes various damage. The ball, which has a large kinetic energy, has a breakthrough effect upon skin damage, that is, it forms a hole, devoid of skin. For the first time in the presence of a fire-wound such a skin defect drew attention Pirogov MI in his book "On the Caucasus Travel", published in 1849

With a defeat of a ball with an unstable flight trajectory, its rollover occurs in the tissues. This generates two main features. Firstly, the movement of the ball is not straightforward, and secondly, there is a more massive damage to the tissues. The direct action of the projectile causes discontinuities, splitting, smashing the tissues. The degree of destruction of tissues depends on their structure, as well as the speed, caliber and shape of the projectile.

The flow of air going radially to the balloon flight pathway forms a temporary pulsating cavity that can exceed the diameter of the injuring projectile in 30-50 times. When it reaches the maximum size, it begins to fall, its "collapse" occurs. The time of the existence of a temporary pulsating cavity significantly exceeds the time of passing the bullet in the tissues. The fluctuations of positive and negative pressure in it reach 50 atm. This contributes to extensive damage to tissues, the ingestion of microbes and extraneous bodies at a considerable distance from the wound canal.

At high speeds of the shells, strong shock waves can occur. These waves do not cause severe mechanical damage, but affect the intracellular processes that lead to the destruction of cell structures. Under the influence of shock waves there is a change in blood coagulation, coagulation of the protein.

A bullet that has a large kinetic energy, if it gets into a hollow organ with a liquid content or bloody-filled parenchymatous organ, will cause a hydrodynamic effect, and striking a bone, destroys it, showing a crushing effect. The ball, which has a small energy to contact with the body, can only provide a wedge-shaped action, which is manifested by the spreading of tissues or their slaughter, the consequences of which may be limited hemorrhages, hematomas, or superficial injured wounds.

Shard fragments of a firearm also have a mechanical effect, the consequences of which will be directly related to their kinetic energy.

Properties of the ball affecting the nature of the injury, is its mass, caliber, shape, design features. These characteristics of the ball are interconnected. Therefore, it is accepted to consider the spectacular properties of the ball in relation to its separate constructive types. The greatest stability in flight and when defeating the biological purpose are balls of greater mass, length and caliber. Blubber balls quickly transmit energy to the affected tissues and result in the so-called stopping effect. The sharp-edged elongated sheath balls often give only 1/10 of their kinetic energy to the affected tissues. The most significant damage occurs when forming the supersonic flow in the tissues when transmitting energy. Sharp balls form such a flow at a rate of interaction with the target of about 1300 m / s, balls with a rounded main part - at 800 m / s.

Soft softball balls have high ductility and, when in contact with soft biological tissues, spend part of the energy on their own deformation, thereby increasing the time of impact and the power of impact. This circumstance became one of the reasons that the Hague Declaration (1899) banned the use of human balls that collapse in the body to defeat the body.

The displacement of the center of gravity of the bullet to its tail part significantly reduces its resistance to movement in the air and along the wound channel. In such conditions, the contact of a hot-spherical ball with the surface of the damaged body leads to the appearance of a supersonic shock in the tissues at an angle of 90 ° at a speed of 130 m / s, and at an angle of 45 ° - 600 m / s. In this case, quite abrupt destruction of the ball and its internal rebounds. It should be noted that the balls are medium

The caliber loses stability only at a distance of 1800-2000 m , while low-caliber bullets are unstable at the initial sections of the trajectory. High-speed balls in biological tissue imitators lose significant stability by turning the longitudinal axis by 90 ° or more in relation to the direction of the ballistic trajectory. In this case there are temporary cavities, the size of which is tens of times greater than the caliber of the wounding projectile. The energy of low caliber and high-speed balls tends to be below 7.62 mm bullet energy at all shot distances, but the amount of energy they transmit is higher.

Low-caliber ball has a great impact, as it is able to give the affected object a large portion of kinetic energy compared with a medium-sized bullet bullet. This type of ball allows us to talk about a new, qualitatively different set of constructive and ballistic properties that provide an integrative affecting effect: high initial velocity, low stability in flight and in tissues, small mass displaced to the tail of the center of gravity, soft core.

Soviet balloon for ammunition 5,45h39mm. The bullet is used in an ammunition AK-74, which belongs to the new generation of reduced-caliber weapons. It has a solid metallic shell made of copper coated steel. Inside is a large steel core. A characteristic feature is a free space of about 5 mm in the main part. His purpose is to shift the center of gravity towards the bottom part, which forces the bullet to change the position in the initial stage of the path in human tissues. In addition, the moment of impact within the existing lead balloon moves forward in space. Move lead is not symmetrical, and this is one reason for the sharp change in the trajectory of bullets passing through the tissue. However, this behavior ball not too increase its damaging effects. Although the ball changes position within 7cm after penetration into the body, there is a significant gap only in the final section (Fig. 16).

The main part of the globe is about 60% of the original weight. The back part is divided into many fragments are scattered to the sides and penetrate the tissue to a depth of 7 cm. When injected into soft tissue there is the same effect of the cavity, as in the defeat of the Yugoslav ball production for AK-47.

Fig. 16. The damaging effect of bullets of AK-74 (Murahovskiy VI, Fedoseev SL, 1992)

In addition, there is a significant gap fabrics. This is because first, they punched fragments and then exposed to temporary cavity. Because the diameter of the hole in hollow organs such as the intestine, can reach 7 cm.

American bullet to the weapon 5,56x45 mm M193 (Fig. 17). This ball of solid metal shell is in the tissues distance of about 12 cm warhead forward. Then it takes 90 °, flattened and broken up in the area of the ring grooves designed to connect with the ball sleeve.

Balls NATO Ammunition 5,56x45 mm M855 and SS109. American M855 bullet has a slightly higher weight and length than the M193 bullet. In Europe, the same is known ammunition SS109. Although the balls are not identical, their behavior in tissues is virtually identical. The firm BM developer SS109 ammunition, says that the high speed rotation reduces the severity of the injury bullet. However, this is not true. Practice shows that the nature of the injury is essentially the same as the M193 bullet (Fig. 18).

The leading point determining hurt the ability of the projectile body is the number of transmitted energy. It depends on the mass of the projectile and its speed and according to Newton's law, expressed by the formula:

***Fig.*** **17.**Porazhayuschee action US-M193 ammunition (Murahovskyy VI, Fedoseev SL, 1992)

Fig. 18. The damaging effect of M855 ammunition (SS109) (Murahovskiy VI,

Fedoseyev SL 1992

where Ek - kinetic energy projectile passed the body; m - mass of the projectile; Uj - velocity at the moment of getting into the body; υ2 - velocity when coming out of the body; g - gravitational acceleration.

Thus, the mechanism gunshot wound playing a central role following items.

• The main shock wave (ballistic), highly compacted air wave formed in front of the ball.

• Sam ranyaschyy shell.

• Temporary throbbing cavity (side impact energy).

• Secondary painful shells (bone chips, flying at speeds up to 70 m / s).

• Impact vortex trail.

Power is defined direct shot ranyascheho characteristics and secondary projectile shells speed, weight, size and area of ​​the shock of touch, in flight stability. The strength of the side impact is affected by the main shock and temporary pulsating cavity.

Interaction firing a projectile from the affected part of the body creates a qualitatively new dynamic feature: the absorbed energy shock waves, contact time, the shape and length of the wound trajectory temporary pulsating cavity, the stability or instability of motion projectile formation of secondary projectiles biological nature, the position of the projectile at impact, power shock impact and others.

To determine the relation between the above dynamic characteristics in the research laboratory of pathology military State Institute for Advanced Medical Defense Ministry has developed physical and mathematical model of the mechanism of formation of a gunshot wound, based on the fundamental mechanics positions (Fig. 19).

Fig. 19. Physical and mathematical model of fire rany-

tion

Designed in the process of physical and mathematical modeling of the basic equation of wound ballistics proved that occur at the time of the collision ranyascheho shell fabrics of shock waves are forced damped mechanical vibrations:

where b - wave damping elastic deformation; Ao - initial wave amplitude elastic deformation, m; ω - frequency waves of elastic deformation Hz; υ - velocity of propagation of elastic deformation, m / s; t - the existence of a wave elastic deformation, p.

Waves elastic deformation (Wood), registered with ballistic studies are inherently audyokolebanyyamy, natural frequency and speed of propagation of which in the target imitators determined by the properties of sound in the material (or composition), which made the target, and the nature of the spread depends on ranyascheho braking severity of the projectile in the matter. WOOD not be confused with elastic waves

tension (or compression) which are directly related to the pressure arising during temporary pulsating cavity. However magnitude and dynamics change WOOD by calculation can judge the amount of kinetic energy transferred per unit area of ​​the wound channel. Therefore Description of the damaging effect ranyascheho shell using absolute values ​​and physical characteristics Wood, registered ballistic settings. Their amplitude decreases over time, the faster the more the attenuation factor of the environment in which they apply.

To describe the harmful effect of projectile fire ranyascheho now the notion of "sphere of defeat"

(Fig. 20).

Fig. 20. The structure of the lesion areas created by firing a projectile at a facility. R1 - radius sphere defeat; R2 - radius temporary pulsating cavity; R3 - radius primary necrosis; R4 - radius of molecular concussion

Scope defeat - a temporary abnormal movements, created high fire-projectile wounds in the facility, which includes a temporary pulsating cavity zone primary zone of necrosis and molecular concussion. The outer limit of the scope defeat - an imaginary line separating healthy tissue from tissues damaged by wounds firearm projectile.

In biological tissues at the time of the shot volume temporary pulsating cavity (R2) equal to 2/3 of the volume of lesion areas (R1), and after firing the value of primary necrosis radius (R3) approximately equal to the radius of molecular concussion (R4), and in amount they will defeat sphere radius (R1).

The dimensions of the primary areas of necrosis braking ranyascheho determined by the nature of the projectile in the tissues, depending on the moment of inertia, which leads to changes in the magnitude and nature of its pretsessyonnonutatsyonnыh fluctuations, which manifests itself in a sudden change in the trajectory of the projectile.

The size of lesion areas depends on the size of the temporary pulsating cavity. In a plastic substance-target simulator (ballistic clay, petrolatum) after firing residual cavity dimensions are the dimensions of internal pulsing band. Therefore, comprehensive assessment of the severity of the mechanical damage caused by a bullet or projectile wounds, it is important to know the volume of the sphere injury or temporary pulsating cavity volume, which not only determine the condition of the victim at this time, but also to predict the course and outcome of injury.

The kinetic energy of the projectile spent on tissue damage is determined by the equation:

where M - the weight of the projectile, khhm / s2; υι - velocity at the time of contact with the object, m / s; υ2 - speed off-site, m / s; g - acceleration of gravity, m / s2.

The amount of scope damage (temporary pulsating cavity area + area + molecular concussion primary necrosis) is calculated by the equation:

Table. 2 shows the critical size range and volume of lesions areas (V).

Table 2. Critical values ​​range and volume of lesions areas

The radius of the sphere defeat cm

V <, m3

The severity of lesions

2

0.0001

Easy

4

0,0005

The average

8

0.0022

Weight

> 8

> 0.0022

It is hard

We can conclude that the harmful effect of firearms determined by the following factors:

• direct harmful effect ranyascheho projectile (bullet);

• WOOD combination harmful action that occurs when braking ranyascheho projectile in the tissues.

However, there are three stages of a gunshot wound, which correspond to phases of movement ranyascheho projectile (bullet) in the tissues (Table. 3).

Table 3. Stages of formation gunshot wound

Stage

Content

Phase

Name

Harmful factors

I

The rectilinear motion projectile ranyascheho

first

breakdown

Bullet WOOD + I

II

Changing the trajectory of the projectile ranyascheho

Second

Braking

Bullet II + WOOD

III

Education sphere defeat

third

Pulsation

WOOD III

The first phase begins in force at the time of collision balls with the surface of the body. Because there is a sharp slowdown abrupt increase in pressure, reaching up to 1x10 6 Pa.

Traumatic effect punching phase depends mainly on the rate of rise and peak overpressure created by the bullet, in which the tissues at a speed of 1450 m / s are beginning to spread waves of elastic deformation of the first order (Wood I).

At the II stage of a gunshot wound acting braking phase. It occurs after the passage of a bullet in the object distance of about 10-13 cm. The speed of movement is reduced. As a result, the critical value increases the value pretsessyonno-nutatsyonnыh fluctuations, resulting in changes in the trajectory of the projectile ranyascheho, hard braking and the emergence of waves of elastic deformation of the second order (WOOD II).

After the departure of the object ball comes III stage of formation of a gunshot wound, the appropriate phase of pulsation. It is what I and WOOD WOOD II come into active engagement with each other (interference, refraction and reflection) and cause resonance effects in tissues, leading to formation of waves of elastic deformation of the third order (Wood III). WOOD III typically have very high amplitude (up 3h106 Pa) and are forced, harmonious, mechanical, damped oscillations with the duration being 1.3 ms (Fig. 21, 22).

Structure gunshot wound

According to the morphological and functional changes, and most importantly, in the interests of medical tactics within the wound channel is divided into three zones.

The primary wound channel (primary or permanent, cavity) resulting from splitting, crushing, separation and fragmentation of tissue along the axis of the flight of the projectile. The diameter and contour of the same channel throughout different due to the behavior of the shell and anatomical characteristic of damaged tissue. Actually channel with gunshot wounds may not be formed as a defect tissue fills wound detritus that poured blood. The course wound channel greatly complicated by the extent projectile passing through diverse tissues that differ in structure, density, elasticity. At the time of injury there is a primary wound channel deviation (deviation from a straight line, which is a continuation of the trajectory of the projectile) that is characteristic of ohnestrel-

Closed wounds. Secondary deviation to the mechanism of action ranyascheho shell to do, it occurs after an injury, sometimes after a long period of time due to displacement of soft tissue and bone fragments compression of tissue hematoma, developing post-traumatic edema.

Wound channel filled with blood, foreign bodies, excluded scraps, broken, dead tissue - wound detritus. Number of broken tissues increases towards the outlet.

Fig. 21. Waves elastic deformation, registered in the ballistic research in the block with petrolatumu and stages of a gunshot wound (7N22 ammo, caliber 5.45)

Contusion zone (zone of direct trauma, primary necrosis) occurs in the area of ​​contact with the shell fabrics. In this area includes tissue located in the vicinity of the wound channel and are necrosis at the time of injury or coming hours after the resulting physical effects on tissue ranyascheho projectile. The depth of tissue necrosis in

Fig. 22. Waves elastic deformation, registered in the ballistic research in biological object (pig), and the stages of a gunshot wound (7N22 ammo, caliber 5.45)

the walls of the primary wound channel is different in its different parts in different organs and tissues. The dimensions of the primary areas of necrosis depends on the ballistic characteristics of the projectile ranyascheho, structural and functional characteristics of broken tissues, including their ability to endure traumatic injuries and hypoxic conditions. Best of all in area contusion kept connective tissue stroma that sometimes is the complete destruction of other surrounding tissue, which is particularly visible in the walls of the wound channel in the tissue and muscles. The more energy imparted tissue wounds shell, the more area zone contusion and primary necrotic tissue.

Visually zone concussion is a relatively thin layer of tissue deep red color, soft texture without capillary bleeding (if muscle tissue is no contraction of muscle fibers in the section or pinch). It is important to bear in mind that the configuration of the primary areas of necrosis may be different, which complicates the implementation of comprehensive primary surgical treatment of wounds.

Zone shock - zone side impact, directly adjacent to the tissue viability completely lost at the time of injury or in the next few hours afterwards. In the mechanism

this zone forming a major role played by the formation of a temporary pulsating cavity wound channel and propagation of shock waves, particularly waves of pressure. In the area of ​​tissue exposed to shock the indirect impact of the projectile. Fabrics, located near the area of ​​contusion, concussion inner layer zone, exposed to a massive shake-up in which they undergo a dramatic shift as a result of the formation of temporary pulsating cavity. In tissues located at a greater distance from the axis of the fire channel, that is the outer layer of shock zone (zone of molecular concussion by Pirogov), concussion less pronounced.

The amount of tissue damage in the area of ​​concussion (zone kommotsyy) varies widely and depends on the tissue structure. Thus, in bodies that are characterized by low compression ratio (brain, liver, spleen, bone) is usually dominated by the effects of tear or split apart. In tissues that contain large amounts of collagen and elastic fibers, less significant damage. It should be noted that the inner layer kommotsyy zone is characterized by very low cell viability due to profound metabolic disorders primarily on the molecular level. First, changes in the outer layer zone kommotsyy are predominantly functional nature (circulation disorders and nutrition of tissues of varying degree). Violation microcirculation and accompanying phenomena pronounced swelling, hemo - and lymphostasis contribute to the development of acidosis and hypoxia,giving adverse effects on tissues in this area. There is a vicious circle: the swelling of the muscles that are fascial cases, leads to compression, further deterioration of blood flow and increase swelling. Thus, in the area kommotsyy against the background of strengthening microcirculation disorders can progress and necrobiotic degenerative processes that contribute to the development of secondary necrosis occurring in the area kommotsyy far from the primary wound channel. With a favorable course of wound healing caused by inadequate local relevant impact on wound treatment and general wounded, it may reverse the development of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.located in fascial cases, leads to compression, further deterioration of blood flow and increase swelling. Thus, in the area kommotsyy against the background of strengthening microcirculation disorders can progress and necrobiotic degenerative processes that contribute to the development of secondary necrosis occurring in the area kommotsyy far from the primary wound channel. With a favorable course of wound healing caused by inadequate local relevant impact on wound treatment and general wounded, it may reverse the development of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.located in fascial cases, leads to compression, further deterioration of blood flow and increase swelling. Thus, in the area kommotsyy against the background of strengthening microcirculation disorders can progress and necrobiotic degenerative processes that contribute to the development of secondary necrosis occurring in the area kommotsyy far from the primary wound channel. With a favorable course of wound healing caused by inadequate local relevant impact on wound treatment and general wounded, it may reverse the development of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.kommotsyy zone against the background of strengthening microcirculation disorders can progress and necrobiotic degenerative processes that contribute to the development of secondary necrosis occurring in the area kommotsyy far from the primary wound channel. With a favorable course of wound healing caused by inadequate local relevant impact on wound treatment and general wounded, it may reverse the development of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.kommotsyy zone against the background of strengthening microcirculation disorders can progress and necrobiotic degenerative processes that contribute to the development of secondary necrosis occurring in the area kommotsyy far from the primary wound channel. With a favorable course of wound healing caused by inadequate local relevant impact on wound treatment and general wounded, it may reverse the development of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.can happen regression of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.can happen regression of structural and functional changes in the outer layer kommotsyy zone, resulting in significantly reduced value of secondary tissue necrosis.

Zone concussion is a concern to surgeons. It may be called the zone of unstable equilibrium. Under adverse conditions (increase swelling, lack of or delay in appropriate local and general measures in the treatment of wounded), this area can significantly expand or entirely undergo necrotic changes. Local and general treatment helps to reduce this area and therefore helps to save the viability of damaged tissues, especially muscles.

The fate of the tissue zones molecular concussion is defined as the degree of damage and the therapeutic management features. Under unfavorable course of wound healing, particularly in inadequate treatment, deep functional disorders can give rise to mykroochahov necrosis, which merge to form makroochahy, and they in turn form a continuous zone of necrosis.

The state of the tissue zones molecular shock is greatly influenced by an imbalance in the system of lipid peroxidation (LPO) and antioxidant system (AOS), microcirculation, hypoxia, trophic disorders, etc.

In wound distinguish between input and output openings. Military doctors important to know what kind of input and output openings do not give a complete picture of the size of tissue destruction. "The visible wounds - just the smoke from the fire" - wrote French surgeon Dэpla.

**Pathogenesis gunshot wound**

The body in response to injury mobilizes general and local defenses aimed at healing the wound that is the essence of wound healing. The starting point of the pathogenesis of gunshot wounds is a process of membrane disease, which is characterized at the molecular level reactions involving reactive free radicals, which are the initiators of physical and chemical process of transformation of kinetic energy projectile ranyascheho. LPO activation causes additional tissue damage around the gunshot wound.

The basis of morphological changes of the soft tissues gunshot wound underlying dysfunction of cell membranes, metabolic disorders major damaged tissue caused by activation of lipid peroxidation, separation of oxidation and phosphorylation in the mitochondria.

The first stage included the major pathogenetic factors characterized by the destruction of cell membranes under enormous kinetic energy projectile ranyascheho, activation of lipid peroxidation, increased consumption of local tissue ischemia and the occurrence of respiratory chain off .

The second stage is characterized by major metabolic pathways inhibition, lack of adenosine triphosphate (ATP) and the gradual development of balance disorders cationic cells. An important aspect of the pathogenesis of secondary necrosis with gunshot wounds are falling energy potential of cells due to violations of redox processes.

The third stage is the implementation of the lipid triad damage biomembranes and thus accompanied by an increase of excess Ca2 +, Na +, K + deficiency in cells and swelling of the latter. It was at this stage due to violations of the membrane system cells apparently a transition reversible ischemic injury in fixed.

The fourth stage is the total destruction of cellular structures completed formation of necrosis.

Currently convincingly shown that mechanical trauma and ischemic tissue hypoxia zones molecular shaking gunshot wound causing activation of lipid peroxidation, which in turn reduces the potential AOC. The intensity of LPO is determined from the date of injury and remoteness tissue from the wound channel. According to the literature, there are 6 basic mechanisms of raising Gender: shock wave shell ranyascheho harmful effect associated with the phenomenon of temporary pulsating cavity; posttraumatic ischemia; stress reaction; activation of phagocytes; ksantynoksydazы activation; the appearance of increased amounts of catalytically reactive metals.

Activation of free radical oxidation leads to lipid peroxidation syndrome, including damage to membrane lipids of cells and subcellular structures, violation of ATP synthesis, denaturation peroxide accumulation of lipids and proteins. Excess lipid peroxides gives physical and chemical structure of cell membranes, inhibiting their enzymatic systems inactivate cytoplasmic enzymes depolyaryzuet DNA splits ATP and amino acids, reduces the activity of enzymes tymolovыh. Established that accumulation

POL products plays an important role in the development of endogenous intoxication syndrome. All of the above pathological changes caused by the increase of intensity of lipid peroxidation, resulting in the first hours after the injury.

Wound healing - active protective adaptive biologically expedient reaction of the organism, aimed to compensate the damage caused injury, and wound defect elimination, ie wound healing.

Instead of the word "healing" is often used the term "regeneration", which means rebirth, rebuild tissue. However, a person considerable size and depth of wound healing defects filled with largely the tissue that has been destroyed and newly formed connective (scar) tissue. Few are able to truly recover tissue in the wound: the epithelium (not skin) bone. Thus, the healing, it is not so much about regeneration (recovery) or restitution (restoration), but on substitution - replacing a tissue other (scar tissue), which is a versatile material in the body that can fill the defect, but not always fully take the function of tissues damaged during injury. SS Hyrholav (1956) considers proper application in relation to processes,occurring in liquidation wound defect, the term "reparation", which means a refund.

Unfortunately, the process is traumatic in all cases leads to wound healing. In some circumstances, the progress of wound healing can take an unfavorable nature, causing serious complications can occur, leading to death of wounded. Such progress may depend on a number of reasons, or a combination thereof:

• the severity and prevalence of local damage;

• irreversible damage to vital organs;

• the general condition of the wounded due to blood loss, eating disorders, hypo - and vitamin deficiency related diseases, lesions penetrating radiation, bacterial toxic substances;

• from serious errors in medical practice.

Healing any wounds is due to inflammation. Feature inflammation as a biological process is its protective and adaptive function that is

mezenhymalnoy vascular response to injury, aimed at eliminating the damaging agent and restore damaged tissue.

In any wound, and the more complicated purulent infection, characterized by successive stages in the healing process. However, the precise boundaries go one stage to another missing that is causing the differences researchers question faznosti wound healing.

E. Kuzin (1977) proposed a classification that identifies the following main phases of wound healing progress.

1. Phase inflammation, divided into two periods:

- the period of vascular changes;

- the period of cleaning the wound of necrotic tissue.

2. Phase regeneration and the formation and maturation of granulation tissue.

3. Phase reorganization of the scar and epithelialization.

The first two phases are mainly related to the formation of granulation tissue, the latter - with the maturation of scar tissue.

Separation of wound healing for periods rather arbitrary and schematic, as in fact clear distinctions between interim periods do not exist, and as if they mutually penetrate each other. The process of progressive tissue necrosis can occur during the period of cleaning the wound necrosis. In the one area of ​​the wound necrosis and demarkyruetsya absorbed or rejected in another progresses (subsequent necrosis is often associated with infectious complications). Over a period of time the wound may occur simultaneously cleaning of necrosis and defect filling newly created living tissue (previous repair). However, the classification of wound healing schematically shows the correct sequence of biological events that occur during healing.

Period biological treatment of wounds from a dead substrate in various wounds proceeds differently, determining the basic qualitative features of the course of wound healing. The further course of the wound depends on the outcome of interaction between microorganisms and body wounds.

It will grow in the wound microflora determines the way in the second period wound healing wound

released from dead and a foreign substrate. Depending on for wound healing can develop in three ways.

First, if the wound is sterile, the necrotic substrate can completely dissolve (rezorbuvatysya), assimilate into the wound. Second, if the bacteria in the wound are provided for reproduction in the wound channel or areas of necrosis, the latter may gradually melt, yielding sterile collapse and ottorhnutsya from the wound. Thirdly, if the interaction (wrestling) defenses and germs in the wound temporarily ends as a "draw", necrotic tissue and foreign bodies, including microbial contaminated can ynkapsulyrovatsya (stay in the body) after filling traumatic defect live cloth.

In the first case of necrosis resorbed, the wound heals without suppuration - primary intention.

In the second case, healing by secondary intention will take place after the compulsory fester in the process which will be the release of the wound necrosis.

In wound healing through fester, wound microorganisms, selecting enzymes such as protease, lipase, sucrose, contribute to the breakdown of necrotic substrate, eliminating it from the wound and therefore it clean. Thus, if the wound heals with suppuration, microflora it plays a positive role and its presence in the wound does not mean some complication in the course of wound healing, that can not be identified with wound infection.

There is a third kind of healing, necrosis of the third lot - its encapsulation. In this case wound healing can occur without festering or partial suppuration, but that healing is fragile, incomplete, since depth outside zazhyvshey wound is dead, usually infected substrate, which under certain conditions can cause fester, rejection of dead tissue and foreign bodies in followed later date has finally healing.

For wound healing by primary intention (or under the crust), the following conditions:

• lack of any significant defect zyyanyya skin and wound edges (in the gaping wound where the face tissue environment, primary healing impossible); • relatively little damage to the tissues deep wounds and lack there of large, especially non-metallic, foreign bodies;

• sterile wound or relatively few of microbial contamination;

• satisfactory overall condition of the wounded (no large blood loss, exhaustion, radiation sickness, intoxication, severe concomitant diseases).

With a favorable combination of all of these conditions (absence of the first condition excludes no wound fester, and the absence of any of these three significantly reduces the likelihood of it) wound heals without suppuration and necrosis of the bulk resorbed and absorbed in the tissues. In this most favorable form of healing, it takes 1 to 3 weeks and runs smoothly.

It should be emphasized that no festering wound healing is not necessarily its complete sterility, absence of microbial contamination. Microbial contamination is typical for all the wounds inflicted even when performing aseptic operations.

Conditions for healing by secondary intention (through fester) directly opposite to those conditions that contribute to the primary tension:

• considerable size defect or tissue necrosis;

• significant tissue damage in the circumference of the wound duct;

• Significant microbial contamination and unfavorable composition of primary or secondary wound microflora;

• presence of a large wound foreign bodies that are more severe microbial polluted;

• unfavorable condition of the body injured.

Combination of these terms, and sometimes in the presence of one of them there festering wounds and purulent necrotic melt the substrate during the cleaning of the wound is healing by secondary intention.

Features of wound healing is associated with factors such as the location of the wound, bacterial contamination, the nature of surgical treatment, antibiotics and other drugs. This approach has led to some success, but the frequency of festering wounds when injuries do not open

falls below 7.12%, as well as aseptic operation this figure is less than 1.2%.

Pathogenetic bases of modern treatment gunshot wound

Gunshot wounds are different from other types of wounds combination of the following characteristics:

• tissue defect formation along the wound channel is always individual location, length, width and direction;

• the presence of zones of necrotic tissue around the wound duct;

• development disorders of blood circulation and supply the tissues bordering the zone of injury;

• wound contamination by microorganisms.

The main component of therapeutic effects bullet wound is its surgical treatment. Depending on the indications distinguish primary and secondary surgical treatment of wounds.

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Primary surgical treatment performed primary indication, ie on the direct and immediate effects of fire-injury. It aims to create a wound environment for biological protection against infection. The task of the surgeon during Pho is the removal of the substrate, which is a breeding ground for pathogens of wound infection and suppresses immune activity and reheneratornuyu tissue around the wound. NO. Pirogov (1846) defined the essence of pho as the need to "transform slaughtered in chopped wounds." The experience of previous wars and a large number of purulent complications during World War II allowed the SS Yudin formulate the main goals surgical treatment of gunshot wounds, "Aims and objectives of this operation lies in the fact that with the foreign bodies removed from wounds all over completely and without residues not only defeated and dead tissuebut also the items that are in danger of necrosis and infection being wounded or strained, pressed or anemyzyrovanы and may have been infected through their shell fragment. Excision should be thorough and pervasive. After it should remain everywhere smooth, flat, fresh, perfectly viable wound surface. "

As a result, Pho, believed AM Golden Eagles (1981), the walls of the wound should be fresh, well-vascularized tissue. Pho surgeons desire to perform in the early stages may radically and simultaneously justified, but in most cases impossible. According to some authors, the wound after treatment, becoming a cut will be different from the last zone only by the presence of molecular concussion.

Experience in medical support of military operations revealed that Pho gunshot wounds in soft tissues requires 70-75% of cases and 20-25% of injuries it is not needed. Do not be Pho small superficial wound through-ball injury to soft tissue with point input and output holes with no signs of damage to the neurovascular bundle or major vessels and bones, multiple small blind superficial wounds.

Pho depending on the terms that have passed since the injury to its implementation, is divided into several types, although the division is conditional: early (performed within 24 hours after the injury), deferred (between 24 to 48 hours) and late (after 48 h).

Indications Pho wounds:

• General:

- large scale destruction of tissue;

- gunshot fractures of the extremities;

- continued bleeding wound;

- wounds, heavily polluted land, etc.

- wounds contaminated with toxic and radioactive substances;

• Special:

- wounds abdomen;

- wounds of the skull;

- sore breasts, genitals, etc. Contraindications to primary surgical treatment

is traumatic shock (temporary and relative contraindications) and ahonalnoe state.

A decision on the need for surgical treatment of wounds taken after examination of the wounded and removing the bandage further diagnosis damage.

To perform a full Pho gunshot wound to be achieved full anesthesia. Good conditions for surgery are created when a multicomponent anesthesia,

However, local anesthesia and retain their value, especially in the mass flow of the wounded. Local anesthesia ensures the autonomy of the surgeon, but high costs limit the use of time, it is of little use in operations on the organs of the chest, abdomen, pelvis.

Before the operation must shave off the hair around the wound clean skin (petrol ether) and process antiseptic solutions (alcohol, iodine, pervomur, chlorhexidine and others). Surgical technique does not tolerate standard techniques as used here, depending on the type of injury, location of the wound, its size, length and projection wound channel.

Pho gunshot wound consists of 6 phases.

The first phase - cut wounds scalpel is performed through the input (output) hole wound channel as a linear incision of sufficient length. Layer rozsikayutsya skin, subcutaneous tissue and fascia. A very important step dissection fascia - fastsyotomyya. At the extremities fascia is cut outside the wound throughout the limb segment, complemented by a cross-section - Z-shaped fastsyotomyya for decompression muscle casings. Then cut through (defoliate) muscle fibers in the course, focusing on the direction of the wound channel.

The second phase - the removal of foreign bodies, ranyaschyh shells or elements of secondary debris, blood clots, lumps of dead tissue, scraps of clothes are free of small bone fragments. The wound is cleaned with antiseptic solutions. Deep foreign bodies are requiring their removal to significant tissue damage, leaving the stage to specialized care. At the stage of surgical intervention are not subject to removal of foreign body located deep in the vital organs to remove that require complex additional access.

The third stage - the excision of nonviable tissue excision is the primary area of ​​necrosis and secondary necrosis zones (zones molecular concussion), where the questionable tissue viability. Excision of fabric layers made taking into account different resistance to tissue damage. The skin is quite resistant to injury, so cut efficiently. Subcutaneous fat maloustoychyva damage, easy to infection, so it is excised to distinct signs of vitality.

Fascia is resistant to damage, so it is excised sparingly, those areas that have lost connection with the underlying muscles. Muscle tissue is the one where the destructive effect projectile pronounced maximum. Scissors must be removed viable muscle: brown, dirty-gray color, does not shrink and does not bleed.

The fourth stage - operation on damaged organs and tissues, skull and brain, spine and spinal cord, organs of the chest and abdomen, bones, organs of the pelvis, the main blood vessels, nerves, tendons, etc.

The fifth stage - obkalyvanie soft tissue adjacent to the wound with a solution of antibiotics and drainage of the wound - the creation of conditions for the outflow of wound discharge. There are passive and active drainage. The easiest way - passive drainage through one or more thick PVC or silicone tubing. When wound drainage tubes carry two-channel flow-aspiration (flow-ottochnoe) washing the wound.

Sixth stage - closing wounds. Pho Primary suture after the wound is not imposed. The exceptions are the wounds of the head, scrotum, genitals. Suturing the wound to be open pneumothorax chest, abdomen wounds, those large joints. Primary suture applied to the surgical wounds, used to access outside the wound.

The elements of reconstructive surgery that can be performed in the course of Pho should include restoring patency large main vessels, damage which can lead to limb necrosis (seam autovenoznaya plastic, the use of vascular prostheses). This operation should be done early after injury (3-6 hours). Contraindications to restore the integrity of the vessel is pronounced contraction of muscles below the injury artery. In some cases, may restore nerve trunks tendons.

The concept of radical Pho seems largely arbitrary. Even after the most careful surgical treatment performed in optimal timing after an injury, the wound will inevitably remain fabrics with low viability. Carve these fabrics impossible and hardly needed. It could do more harm than good, because of the inevitable removal

of functionally active structures: large vessels, nerve trunks. This radical intervention is not achieved, and the amount of dead tissue increases.

The concept of "early" and "one-stage" are a contradiction, because the process nekrodystrofycheskyh changes occurring over time - from several hours to several days after the injury. Looking for simple and reliable criteria for assessing the viability of the tissues around the gunshot wound. This is especially important in the early stages after injury. The basic method of determining the viability of a fire-tissue wounds now is subjective - evaluate color, texture, contractility, bleeding muscle tissue. Long experience may allow the surgeon to distinguish damaged tissue irreparable damage. It is difficult to be sure that during Pho managed to carve a fully viable tissue will no longer form new areas of necrosis in tissue bruise.

The desire to adhere strictly to the provisions voennopolevoy radical surgery that should be fore-stage as possible and exhaustive led to the creation of the concept-step surgical treatment. Its essence is to perform in the most early stages Pho, then (a few days) - repeated surgical treatment with excision of all nonviable tissue regardless of their size and location. This concept led to serious complications, which in most cases adversely affect the functional state of organs and tissues, and therefore the concept was not accepted practical surgeons.

Secondary surgical treatment is always performed for the secondary indicators, ie about complications (in most infectious) require for their development of additional factors supposedly active vegetative pathogenic in the wound and therefore is not a direct and indirect consequence of the fire-injury. Even if surgical treatment, performed with secondary indications, was the first in a row surgery, it is, in fact, is secondary surgical treatment. After this initial surgery sutures impose resort to the imposition of late or early secondary sutures.

Contraindications to the imposition of secondary sutures:

• Absolute:

- signs of acute inflammation in a wound;

- severe general condition of the wounded;

• Relative:

- foreign bodies;

- osteomyelitis;

- eczema around the wound;

- inability convergence wound edges of the large tension;

- the impossibility of scar excision due to proximity to major blood vessels and nerves;

- the location of the bone wound performances;

- dystrophy expressed form of beriberi.

Both primary and secondary surgical treatment can be repeated. On re Pho can say when the first intervention for whatever reasons was deliberately neradykalnыm. Then you might need re-intervention to the appearance of clinical signs of infectious complications, for the same initial indications. Indications to perform secondary treatment for severe forms of local wound infection may occur repeatedly.

Immobilization of the affected limb reduces tissue trauma and antibiotics appointment completes the initial set of measures.

As the wound itself is a process aimed at healing wounds and healing the wounded, all therapeutic tactics must be built in accordance with its phases. It is necessary to create conditions for their normal course and in any case not to interfere with the natural repair.

The main problem in the treatment of gunshot wounds can be formulated as follows.

• Fighting arise acutely life-threatening disorders (blood loss, shock, respiratory failure).

• Prevention and treatment of infectious complications.

• Provision of wound healing defect in the possible shortest time.

Primary and secondary suture

At the VII extended plenum of the Academic Council HVSU Red Army in April 1943 adopted a single classification sutures proposed by MM Burdenko.

• Primary seam that runs immediately after the primary surgical treatment of wounds.

• Primary-deferred or delayed primary suture (5-6 days after surgery, the development of granulation in the wound) and in the absence of inflammation.

• Secondary Early seam - 10-12 th day, the development of scar tissue.

• Late secondary suture - 3 weeks; scar tissue excised before the overlapping seam.

As stitches overlap bullet wound to shorten treatment time and improve functional results wounds, we must recognize that these problems are solved best use of delayed primary suture. In essence delayed primary suture preserves most of the benefits of primary seam and at the same time deprived of its shortcomings. This method is virtually safe. If its application condition prevent wounds and injuries or operational tactical situation, should be resorted to early secondary seam.

The method of choice at the conclusion of surgical treatment of gunshot wound in current conditions and a peaceful and wartime remains delayed primary suture.

The amount of aid during medical evacuation

Providing medical assistance to the wounded in wartime system based on phased evacuation for treatment purposes. Under this system, only the healing process, that is the whole complex of therapeutic measures requiring wounded, divided into separate types of assistance. Each type of care is characterized by specific objectives and a list of typical preventive measures, qualified medical personnel, equipment and conditions necessary to implement these measures.

First aid instructor turns sanitation company, archers, nurses, and just fine - and mutual assistance. For this purpose, IPP and kit indyvidualn- Nye. Cleaning instructor has military medical bag, which is designed to help 25-30 wounded. Widely used available means at hand, mainly for transport purposes immobilization.

First, the provision of first aid every wound should be covered with a bandage, called defensive. The main value of this dressing is to protect the wound from contamination. "Primary dressing decides the fate of the wounded", - said the head of the Military-sanitary management of Red Army, Colonel General AI Smirnov. He thus urged all the timely and efficient imposition of bandages on the battlefield, which requires good train every soldier first aid techniques.

An important element in the treatment of wounds, and often by saving the lives of wounded is stop the bleeding, which can be done in different ways (finger pressing vessels in the projection it forced bending limbs imposing davlyuchoyi dressing, tourniquet). It is necessary to be aware of the danger of imposing vymushenosti and tow time limitations of his stay, the need for continuous monitoring of the correctness of its imposition.

Another element of first aid is to provide the damaged area as possible peace. This is particularly important in wound limbs, accompanied by damage to bones, as well as the mobility of fragments broken bone causes intense pain and tissue damage in the heart gunshot wounds. Calm injured limb achieved ymmobylyzuyuschyh imposing different kinds of dressings. For this purpose, widely used improvised tools prybyntovыvanye upper limb to torso and lower limbs damaged - to the sound. In gunshot injuries of the pelvis and spine injured is placed on a board, a board shop, doors, etc.

Of great importance in the provision of first aid should be given the removal or reduction of pain.

For this purpose, use a solution of promedola shprytsatyubyka that individual is in the medicine cabinet. During World War II is widely used morphine-alcohol mixture (5 mL of 1% solution of morphine in 500 ml of vodka) in 50 ml one-

th wounded. Cottage analgesic agent must precede the transport of immobilization.

In terms of prevention of infectious complications gunshot wound play an important role all measures of first aid (primary protective bandage, stop bleeding, transport immobilization, relieve pain, taking antibiotic tablets with individual kits).

Provided first aid medical assistant battalion. It features a set of PF (field, medical assistant), designed to provide first aid to the wounded and burnt 80-100; B-1 kit (sterile dressing) for up to 100 wounded and burned; a set of B-2 (tires), scheduled for 50 ymmobylyzatsyy; oxygen inhaler CI-4, AC-10, MD-1, etc.

Medical assistant monitors the correct imposition of bandages, harnesses and corrects them imposes standard tires and improves immobilization of earlier transport, carries oxygen inhalation, if necessary, repeat introduction protybolovi funds as well as cardiovascular and respiratory analeptics (25% kordiamin 2 ml of caffeine benzoate sodium 20% 1 mL, 1% ephedrine 5 mL).

The first medical aid aimed at addressing the phenomena directly threaten the lives of the wounded at the moment, prevention of serious complications, evacuation of wounded to the next stage of medical evacuation. In providing first medical aid WFP primarily draws attention to the wounded in a state of traumatic shock with ongoing bleeding and respiratory failure. They conducted a series of measures for the prevention and treatment of respiratory and cardiovascular failure, stop external bleeding. Controlled and corrected bandages, tourniquets and put pressure imposed bandages, means of transport immobilization administered analgesics, tetanus toxoid, antibiotics. Assistance in filling WFP completed primary care card.

Skilled surgical aims to perform surgeries and procedures designed to preserve the life of the wounded, prevention of complications of injuries and fighting developed complications at creating conditions for restoration of disturbed and lost functions of organs and systems,

successful treatment and speedy recovery. OmedB and separate medical unit designed to provide expert surgical care, in terms of fighting they often can not provide all the wounded performance Pho wounds. With minimal assistance to perform:

• stop bleeding any location;

• operations with anaerobic infection;

• surgery for injuries of the abdomen, open and valvular pneumothorax;

• Suppression of asphyxia;

• complex therapy of shock, severe anemia, crush syndrome.

With the reduced amount of aid to these activities add:

• nekrovotochaschyh surgery for wounds to major blood vessels, accompanied by limb ischemia; primary amputation with limb necrosis;

• Pho wounds combined with chemical and radiation injuries;

• Pho wounds with significant tissue destruction, with intensive land pollution.

Specialized surgical care provided vrachamyspetsyalystamy using special equipment in specialized hospitals or departments. There are the following types of specialized surgical care: neyrohyrurhycheskuyu, dental, ophthalmic, otorynolarynholohycheskuyu, urological, ortopedotravmatolohycheskuyu, wounded, gynecological, torakoabdomynalnuyu and fired.

Specialized surgical care provided in military field surgical hospitals and advanced rear base hospital front. X-ray necessary. Specialized hospitals (departments) carry out in full all show therapeutic and diagnostic measures. Performing primary surgical treatment of wounds, if it was not done earlier, treatment complications, wound closure by secondary sutures etc. At long treatment time and no prospects of restoring the combat capability of the wounded were evacuated to the rear of the country.

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***Guidelines was ace. A. clerks***