LECTURE:

"TRAUMATIC DISEASE. POLYTRAUMA"

(for students of V course in medical faculties)

«APPROVED»

at the methodical session of the department

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Protocol № 1

Head of the Department
Prof. Dr. _______________ Sukhin Y.
Lecture: "TRAUMATIC DISEASE. POLYTRAUMA" - 2 hours

1. Background.
   Persistent regional conflicts occurring in the world, natural disasters, repeated saturation of our lives a lot of cars and mechanisms, improving weapons leads to the steady growth of complex and serious injuries in the general structure of the injury. Therefore, the doctor is very important to have knowledge about the basic principles of diagnosis and treatment of poly trauma. In addition, the urgency of the problem is determined by the fact that mortality in poly trauma is - 25,0-59,2%, and disability - 15,3-30,0%

2. The objectives of the lecture:
   2.1. Overall objective: to acquaint students with modern ideas about the concept of "poly trauma" and for traumatic disease. To give an idea of the methods of treatment used in orthopedics, traumatology and basic principles of their use.

   2.2. Educational objective: to acquaint students with modern ideas about the organization of the treatment of poly trauma in foreign countries and development department staff over the years. Learn to navigate in the possibilities offered by modern science and practice.

3. Plan and organizational structure of the lecture.

<table>
<thead>
<tr>
<th>№</th>
<th>The main stages of lectures and their contents</th>
<th>Objectives for the levels of abstraction</th>
<th>Type lecture, lecture equipment.</th>
<th>Distribution of time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Preparatory stage</td>
<td>I</td>
<td>According to the publication, &quot;Guidelines for the planning, preparation and analysis of the lecture.&quot;</td>
<td>6%</td>
</tr>
<tr>
<td>2.</td>
<td>Key learning objectives.</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Providing positive motivation.</td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plan of the lecture material:</td>
<td>I</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>2.Politravma.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>3. The classification of fractures.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. The classification of existing methods of treatment of injuries of the musculoskeletal system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.Harakteristika modern methods of treatment and the basic principles and</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the publication, "Guidelines for the planning, preparation and analysis of the lecture."
4. The content of the lecture.

Analysis of the unsatisfactory results of fracture treatment has shown that the main causes of failure are:

- The steady increase in the number of severe injuries.
- Excessive clinicians technical side of fracture treatment.
- Entrenched tendency to treat pathological processes caused by trauma, isolated as specific problems in isolation from the general laws of development of the body's reaction to severe trauma.

Practice has also shown that the removal of the victim from the shock is not the end of treatment. injury caused by a breach of important functions and homeostasis parameters are prolonged in nature, they have a specific pathogenesis, clinical forms, and some do not fit into the framework of the doctrine of traumatic shock and injuries. Thus there was a need to formulate a doctrine of traumatic disease.

**Traumatic illness** is a collection of pathological and adaptive changes coming in the body after an injury. These changes occur in a certain sequence and determine the nature of threatening complications for each of the series of successive periods.

*First period* - the period of acute response to injury, corresponds to a period of traumatic shock and, early period (first two days), is characterized by severe blood loss, reaching 30-40% of predicted bcc, and perfusion deficit.

*The second* period (multiple organ failure) (14 days) - the period of the earliest manifestations of traumatic disease. It is characterized by impaired or instability of the functions of individual organs and systems and stable. In this period of traumatic disease multiple organ failure is the result of a generalized systemic response to injury.
The third period (recovery) - the period of the late manifestations of traumatic disease (over 14 days). With a favorable course of traumatic disease this period is characterized by the development of regenerative processes in damaged organs.

The fourth period - the period of rehabilitation. The period is characterized by complete or incomplete recovery.

Polytrauma.

Mechanical trauma systems and organs is divided into isolated and poly trauma. The term "poly trauma" is a collective term that includes the following types of mechanical damage: multiple, mix and match.

For multiple mechanical injuries include damage to two or more bodies in one cavity, as well as two or more anatomical and functional entities (segments) of the musculoskeletal system, such as the liver and intestine, fracture of the femur and the forearm.

Associated injuries considered simultaneous damage to internal organs in two or more planes or damage to internal organs and the musculoskeletal system, for example, damage to the spleen and bladder, damage to organs of the chest cavity and fractured limbs, traumatic brain injury and damage to the pelvic bones.

Combined injuries called defeat, obtained as a result of action of various damaging factors. Mechanical, thermal, radiation, etc. For example, hip fracture and burns any area of the body is called a combined lesion. Perhaps a greater number of options for the combined effects of damaging factors.

Poly trauma is characterized by the following features:

1. There is a so-called syndrome of mutual burdening. For example, blood loss, because the poly trauma it is more or less important, contributes to the development of shock, and in more severe that worsens the injury and the prognosis.

2. Often, the combination therapy of damage creates a situation of incompatibility. For example, the trauma of the musculoskeletal system for the care and treatment shown narcotic analgesics, but with a combination of limb damage to the brain injury their introduction contraindicated. Or, for example, a combination of
damage to the chest and shoulder fracture does not allow to impose abductor bus or a plaster cast.

3. quickens the development of serious complications, resulting in a critical state as massive blood loss, shock, toxemia, acute renal insufficiency, fat embolism, thromboembolism.

4. There effacement of clinical symptoms of abdominal injury, damage to the spine and abdomen, and other associated trauma. This leads to a view diagnostic errors and damages internal organs of the abdomen.

It is impossible to shift on a stretcher and left alone without supervision Prior examination of the patient doctor hospital with multiple injuries. Since the severity of associated trauma damaged areas of the body is different, the treatment in the hospital reveal the dominant injury, defining the currently severity of the condition. It is important for medical tactics and consistent execution of surgical interventions. In severe concomitant injury treatment can be divided into three periods:


*The first (resuscitation) period.* During this period, immediately begin to struggle with the shock. The intensive care unit is necessary to conduct a comprehensive therapy: the stabilization of circulation, complete anesthesia, secure immobilization, oxygen therapy, early surgical intervention, correction of the disturbed functions of the organism. The victim prior to inspection should be completely stripped. Pay attention to the general appearance of the patient, coloring and mucous membranes, heart condition, localization of wounds, abrasions, hematomas, position (forced, passive, active), allowing to identify the estimated damage. Explore percussion and auscultation chest, palpate the abdomen. Clarify diagnosis by X-rays in the intensive care unit without shifting the patient.

If difficulty breathing need to examine your mouth and remove mucus, blood, vomit, dentures, fix the sink down into the cavity of the larynx language. On examination of the chest determines its tour in breathing, retraction and protrusion of the chest, the air suction to the wound, swelling of the neck veins. Increasing deafness heart sounds on auscultation can induce the physician to think about heart damage and
tamponade, especially in cases where there is a wound in the chest at the heart projection. If diagnosed, remove fluid and suck air from the pleural cavity of the syringe, put the rubber drain. This will eliminate respiratory failure and complete examination of the patient. If a patient with concomitant injury found wounded heart or major blood vessels, lung damage and tension pneumothorax, open pneumothorax with progressive deterioration of general condition, it is necessary as it is possible to start the operation soon, in spite of the associated injuries to other body regions. When closed abdominal trauma should be performed paracentesis and laparoscopy.

The second (therapeutic) time. The main problem in poly trauma is a selection of the optimal timing and extent of surgery. According to the degree of urgency of the operation and its volume is divided into four groups of victims.

The first group consists of patients with lesions that rapidly lead to death if not rendered first aid. This massive bleeding at rupture of organs (liver, spleen), cardiac tamponade, extensive lung injury, dual "fenestrated" or "valve" rib fractures and others. Typically, these victims come in serious, sometimes terminal condition with blood pressure below critical level. For external arterial bleeding is performed only temporary hemostasis: clipping, harness. If found broken limbs, performed a transport immobilization.

The second group includes patients with poly trauma without breakthrough bleeding and deep breathing disorders with damage to the hollow organs of the abdomen, pneumothorax, intracranial hematomas, severe injuries of extremities closed. Operations typically carried out in the first hours after admission. In the presence of fractures of the limbs or ribs perform anesthesia fractures places blockade and impose plaster bandages or skeletal traction.

The third group consists of patients with severe, dominant injuries of the musculoskeletal system without massive bleeding. Surgery is carried out only after the removal of the victims of traumatic shock. Due to the risk of operations are shown only in open fractures of limbs in the form of a thorough primary surgical treatment of wounds, amputation with extensive crush limbs and signs of frailty.
The fourth group consists of patients with multiple injuries of limb segments, without the traumatic shock. In the presence of open lesions conducted primary surgical treatment of wounds, healing limb immobilization. As a rule, osteon synthesis is carried out under the threat of compression of the neurovascular structures, the fragments of skin perforation. Where indicated osteon synthesis produce the most gentle manner using distraction device.

When choosing tactics of treatment of multiple fractures should strive not only to restore the anatomical and functional relationships, but also to facilitate the care of victims, provide perhaps an earlier its activation. More than 40% of patients with closed multiple fractures conducted conservative treatment: skeletal traction, application of casts.

Osteon synthesis using - distraction devices facilitates care operated, it allows for the early activation of the limb and the load. In case of damage of two adjacent segments generally use a combination of several methods for stable osteon synthesis. For example, at the turn of the femur and the tibia is carried stable intramedullary osteon synthesis of femoral pin massive and imposing compression apparatus shin.

The third (rehabilitation) period. During this period, after the cessation of therapy immobilization is necessary to persevere in the restoration of joint function through exercise therapy, physiotherapy and spa treatment, swimming. In addition, carry out treatment of complications associated with poly trauma.

**Traumatic shock**

Delorez wrote: "shock - it is easier to recognize and describe than to define it" Systematizing the diversity of these groups can be distinguished shock types.

- Allergic shock
- Anaphylaxis
- Hemorrhagic Shock
- Cardiogenic shock
- Septic shock
- Traumatic shock
We dwell on the etiology and pathogenesis of traumatic shock. There are many theories to explain the phenomenology of shock. Almost all these theories have left at least one pathophysiological link, which over time have been proven and are included in the general scheme of the modern understanding of shock. If you refuse to detail and explore how the concept has changed a shock in terms of the major theories can distinguish several stages.

The present stage is marked tendency to introduce the study of shock along with the existing notions of cybernetics elements, in particular the government of the endocrine system and the intracellular exchange system, development of so-called "shock cell". Thus, it had the modern "neuro-endocrine and vascular-metabolic 'understanding of the pathophysiology of shock.

According to this view can result in the following definition of shock. Shock - a syndrome disorders critical functions of the organism, resulting tissue blood flow inconsistencies low metabolic needs of the tissues.

It should be assumed that the end point in the determination of shock following the violation of central hemodynamics and tissue will perfusion violation of tissue metabolism.

Intensive care patients in the prehospital (problems):
1. Stop the bleeding.
2. Catheterization of the veins: the linear brigade produces 1-3 catheterization, of peripheral veins, and a special team of central venous catheterization.
3. Anesthesia and sedation.
4. Transport immobilization.
5. Reimbursement bcc deficiency and correction of metabolic disorders.
6. Hormone.
7. Cardiac therapy.
8. Hemostatic therapy.
Surgical interventions in traumatic shock.

First performed emergency (CPR) operation, which should begin no later than 20-30 minutes from the time of admission. They are aimed directly at the elimination of the threat to life: tracheostomy asphyxia, with tension pneumothorax, thoracotomy or laparotomy with profuse bleeding, surgical treatment of wounds.

Secondarily conduct emergency operations, which are also aimed at saving lives. For the diagnosis and preoperative preparation (hemodynamic stabilization is achieved at Assist indicators. Above 80 mm Hg and central venous pressure of not less than 5-7 sm.vod.st.) allow time ranging from 30 minutes to 2 hours. These include decompressive craniotomy, laparotomy in case of damage of the hollow organs of the abdominal cavity, bypass surgery or plastic vessels in the trunk of their injury, thoracotomy with open pneumothorax, etc. If it is impossible to stabilize the hemodynamic data operations are conducted within 2 - 6 hours from the time of receipt and are considered delayed emergency.

In third place are carried out delayed operations aimed at the prevention of serious complications that threaten life, and are made after complete stabilization of vital functions: primary surgical treatment of severe traumatic brain injury and open thoracotomy if you can not straighten a slight conservative methods, etc.

The fourth priority is carried out all other corrective surgery, which are aimed at preventing complications, creation of favorable conditions for wound healing and preservation of function of damaged organs and systems. How to calculate the volume and quality of transfusion therapy of shock? For a start, you should determine the amount of blood loss. After this is determined by the total amount of transfusion - it has a 2 - 2.5 times the amount of blood loss. The number of transfused blood should be one third of the blood loss. The rest of the amount reimbursed colloid and crystalloid, which is poured at a ratio of 1to 2.

Modern methods of treatment of fractures.

Therapies used in orthopedics and traumatology, can be divided into two main groups: conservative and operative.
Conservative treatment of patients with injuries and diseases of the musculoskeletal system are diverse, they are used in everyday practice of traumatologist orthopedists much more frequently than operational. If we trace the historical development of orthopedics, it should be noted that at the beginning of the treatment of orthopedic patients used exclusively conservative methods in the future gradually began to resort to surgery. Over time, of specialty, to use only bloodless techniques, orthopedics, including more surgical techniques has reached a high perfection in the use of conservative methods, combined with the most advanced surgical procedures. Modern orthopedics and traumatology is used to perfection a wide range of different therapeutic interventions designed directly in orthopedics and borrowed in surgery, physiotherapy, balneology and other. Skillful comprehensive use of various conservative methods, in most cases, it gives good results in restoring damaged forms and patient functions authority. In cases where conservative methods are not sufficiently effective to cure the patient, it is widely used surgical interventions, the development of which has now reached a high level and perfection.

Operational techniques are almost always used in combination with conservative, they complement each other. Thus, in orthopedics and traumatology operating method should not be opposed to the conservative, it must be considered as part of an integrated treatment of orthopedic and trauma patients. The complex of therapeutic measures along with special techniques specific to orthopedics and traumatology, also includes drug therapy: antibiotics, hormones, drugs, etc.

There are four types of osteon synthesis in the treatment of fractures:

1. Simultaneous manual repositioning (skeletal traction) with subsequent fixation of plaster bandage.
2. Intraosseous fixation (a means of achieving - pins, rods, etc.).
3. Osteon synthesis (means of achieving - plate, screws).
4. Trans osseous (extra focal) osteon synthesis (means of achieving - external fixation devices: spoke, rod or rod-spoke).

Clearly we must understand that the goal of any treatment is not only to achieve fusion, but also to restore the function of the affected limb. Therefore, treatment of
fractures, ensuring early recovery limb function called function. The same techniques that provide fracture healing due to the immobility of joints closest to the fracture (and regenerating treatment is carried out after termination of fusion and immobilization) are non-functional methods.

Plaster bandages, in the form as we now use them for the treatment of fractures have been suggested Dutch doctors and Matissenom Vanderloo in 1852. NI Pirogov, referring to the work of Dutch colleagues, in 1854 published an article on the use of plaster casts in the military field. Thus, the history of the use of plaster casts goes back about 150 years. Over the years, they are widely used in both outpatient and inpatient, both in peacetime and in wartime, in the treatment of both closed and open fractures. Of particular significance were casts in wartime in the treatment of gunshot fractures of both the cheapest and the easiest method to use. After World War II has been more than 50 years, but now the plaster bandages are widely used as an independent method of treatment of fractures (especially in the outpatient setting), and how to receive primary medical immobilization before osteon synthesis operation.

An indispensable condition for the treatment of fresh fractures plaster immobilization bandages considered two adjacent to the damaged joints. If a broken femur, it is necessary to immobilize the knee and hip joints, so the cast captures the leg from the ankle joint at the top of the entire leg and ends with pelvic girdle. This dressing is called "gonit". It is applied with injuries and diseases of the knee joint and the treatment of fractures of the proximal end b / tibia.

When hip injuries, hip fractures, fractures of the trochanteric area and sub trochanteric fractures cast extends from the top to the costal arches on the injured ankle and leg to the knee on the affected leg until the knee joint on the healthy.

In the treatment of injuries of the ankle in a plaster cast is applied from the fingertips to the knee "boot."

In the treatment of fractures of the hummers plaster cast must be immobilized first and second joints. Impose so-called thorax cast. The hand must be in the position - assigned to of 60 °, withdrawn forward - 30 °, elbow flexion - 90 °, dorsiflexion brush - 30 °.
In the treatment of fractures of the forearm plaster cast is applied from the base of the toes to the upper third of the shoulder. In the treatment of fractures of the radial bone in a typical place, fractures of metacarpal bones from plaster cast is applied to the proximal interphalangeal joints of the upper third of the forearm.

**Plaster bandages can be circular (deaf), fenestrated, bridges. On the forearm after simultaneous repositioning never superimposed circular plaster bandages.**

Traction refers to the ancient healing methods. Hippocrates (460-377 BC) described several methods of stretching. It was carried out in one stage belt loop on devices using blocks, levers, winches. In 1939, James in America for permanent extension proposed a rubber patch. Since that time traction is widespread. The credit for this belongs to the German scientist. In the Russian edition of his book "Treatment constant traction" (1889) formulated the rules of the method.

1. Traction should be imposed as early as possible after the fracture (warning resistant muscle retraction).
2. Traction sticky patch should be applied to the entire limb.
3. Along with the longitudinal traction is necessary to use the side, suspended and rotating rods.
4. The distal fragment is mounted on the proximal axis.
5. The joints must be free of active movements with strict immobility of the fracture site.
6. Must be carried out daily monitoring of the treatment.

Development of the issue of middle position in the treatment of limb fracture traction associated with the name Henschen (1908). They entered and the term "middle position" - the middle position the limb joints, in which the joints move towards equal flexion and extension. Power of all muscles should be minimal and evenly, and their own weight is balanced by external power limbs. Thus, he formulated the principle of peace, which is still a major in the treatment of fractures of the constant traction.

**Internal fixation** is used in three ways: intramedullary, extra medullary, Trans osseous (focal). Intraosseous (intramedullary) fixation using rods of different design: Kyuncher, Tsigo, Bogdanova et al osteon synthesis plates and screws - it implants to
perform osteon synthesis, that is, a type of surgical treatment, in which construction the locking fragments are placed on the bone surface.

The materials of which are made of screws and plates must have the strength and ductility to hold the fragments before the seam and modeled on the bone contour. At the same time necessary and good biocompatibility with body tissues. Therefore, as industrial materials for the production of plates and screws are used: stainless steel, titanium-aluminum-vanadium alloy and, more rarely, chrome-cobalt. The most important property that combines the design of plate is their high resistance to corrosion. Titanium and its destruction products behave passively and do not cause any toxic or allergic reactions.

It is generally known that the presence of diastasis between fragments bone main load falls to their locking implant. Closing the fracture gap by applying a compression inter recreates the structural integrity of the bones. Physiological load is transferred from fragment to fragment, the implant is subjected to less deformation fixation strength increases. Thus, the most stable way to fix a compression osteon synthesis. To create inter fragmentary compression using screws need to be thread wedged in one fragment, then when tightening increases the compression between the screw head and the subject fragments and fragments opposite attracts threaded screw. Such tightening screws called.

**Transosseous extrafocal osteonsynthesis** - this method has a long history since the nineteenth century (the first devices Schantz, Andersen, Belair). And in the first apparatus of external fixation pins were used to secure them to the bone. Later, in the Soviet Union, spoke machines (Sivash Gudushauri, Hovhannisyan) have been proposed.

The most significant contribution to the development of this method has made GA Ilizarov, who suggested in 1951 "method of matching bones in fractures, and apparatus for carrying out this process." The basic principle of this device - two crossed spokes held in the perpendicular plane of the axis of the segment attached to the ring. Such rings may be multiple (e.g., two at the central fragment, at two peripheral). The rings are interconnected rods. Bringing together the rings can achieve compression, pushing - distraction. Similarly, we can eliminate the angular displacement. At present,
widely used in our country and abroad have found the spoke-core devices, design
combines the principles of spoke and rod attachment to the bone structure of basic
elements.

5. Materials activate students during a lecture presentation.
   A. Questions to control absorption material
   1. Definition of the concept of poly trauma
   2. The stages of traumatic disease
   3. Classification of shock
   4. Classification of osteon synthesis
   5. Principles osteon synthesis
   6. What is the internal fixation.

6. Total financial and methodological support of the lecture.
   - Training room - conference room of the Department;
   - Equipment - computer, multimedia projector;
   - Illustrative material - multimedia presentation.

7. Literature, which is used in preparing of the lecture.
   - basic: