

**MINISTRY OF HEALTH OF UKRAINE**  
**POLTAVA STATE MEDICAL UNIVERSITY**  
 Department general surgery with care of the patient

“APPROVED”

The head of the department  
 of general surgery with care of the patient  
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**METHODICAL INSTRUCTIONS**  
**FOR STUDENT SELF-DIRECTED WORK**  
**WHEN PREPARING FOR AND DURING PRACTICAL CLASS**

<b>Study discipline</b>	<b>General surgery</b>
<b>Module №1</b>	<b>INTRODUCTION TO SURGERY. SURGICAL EMERGENCY CONDITIONS. FUNDAMENTALS OF ANESTHESIOLOGY AND INTENSIVE CARE</b>
<b>Content module 4.</b>	<b>Injury and damage.</b>
<b>Lesson theme №14</b>	Fractures and dislocations: classification; clinical manifestations; diagnostics; first aid; principles of treatment.
<b>Years of study</b>	<b><i>III</i></b>
<b>Faculty</b>	<b>Medicine, Foreign students training faculty</b>

Poltava 2021

<b>Content module 4.</b>	<b>Injury and damage.</b>
<b>Lesson theme №14</b>	Fractures and dislocations: classification; clinical manifestations; diagnostics; first aid; principles of treatment.

### **1. Relevance of the topic :**

Among the total injuries with loss of disability , fractures account for 6.3%. Mortality in trauma accidents in Ukraine ranks third after cardiovascular disease and cancer. Most of the fractures account for most working age - from 20 to 40 years. During the high technological progress is particularly important issues prevent the occurrence of fractures, their proper treatment , disability due to fractures.

### **2 . Learning Objectives :**

1. Determination of fracture.
- 2 . Determine the mechanism of fracture .
- 3 . Classify fractures .
- 3 . Know the main clinical symptoms and probable absolute fracture.
- 4 . Learn the diagnosis of fractures.
- 5 . Know the signs of radiographic fractures.
6. Types of displacement of bone fragments .
7. Callus formation .
8. Know the means of transport immobilization .
9. First aid for fractures, her task.
- 10 . The structure of the tire and Diterix Cramer .
11. First-aid treatment of the patient with a fracture.
12. Demonstrate the imposition of tires from scrap materials , tires and Diterikhs Cramer .
- 13 The patient immobilization during transport .
14. Know the complications of fractures and their prevention.

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

<b>The names of the preceding disciplines</b>	<b>The skills</b>
1. Anatomic person	To know the structure of the skeleton, the musculoskeletal system, anatomy of blood vessels, nerves extremity.
2. Organic and inorganic chemistry	Determine the chemical structure of the bones.
4. Microbiology	Major groups and properties of the bacterial flora that plant grows on the wounds. Tetanus and gas gangrene.

5.Patofiziologiya	Pathophysiological responses and tissue damage during inflammation.
6.Propedeutika Internal Medicine	Symptomatology know, to be able to carry out the clinical, laboratory and instrumental diagnostics.
7. Latin	The Latin name of the bones, muscles, types of displacement of fragments.

**The student must have an idea :**

- Local tissue changes in fractures ;
- About the kinds of displacement of bone fragments ;
- Modern classification of fractures ;
- The formation of callus ;
- Healing of fractures ;
- About the anatomy of the musculoskeletal system , which is localized pathological

process .

**The student should know :**

- The main clinical symptoms and probable absolute fracture ;
- Diagnosis of fractures ;
- Radiological signs of fracture ;
- Means of transport immobilization ;
- Build Tire Diterix and Cramer ;
- A complication of fractures and their prevention ;
- Preparations for adequate pain relief .

**The student should be able to:**

- Provide first aid to the patient with a fracture ;
- Provide first medical aid at the turn ;
- To assess the severity of the patient's condition ;
- To carry out initial processing at an open fracture wounds ;
- Cash on tires from scrap materials , tires and Diterikhs Cramer ;
- Master the technique of drawing up infusion therapy suffered from a traumatic shock ;
- To prevent tetanus and gas gangrene .

**Mastering the skills of students:**

- Demonstrate the methods of examination in a patient with a fracture ;
- To organize first aid to the victim with a fractured ;
- to determine what type of fracture on radiography ;
- Establish transport immobilization ;
- To learn to wash the wound with an antiseptic solution ;
- To carry out adequate pain relief ;
- Master the classical techniques of bandaging a patient with an open fracture , observing aseptic and antiseptic .
- to - tetanus prophylaxis ;
- To make a diagnosis of traumatic shock ;

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

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

#### 4.2 . Theoretical questions for the class :

1. Classification of fractures of the etiological factors.
- 2 . Classification of fractures of the origin , the degree of damage , localization, number of fragments.
- 3 . What is different from the crack fracture .
- 4 . What are the symptoms of absolute fracture.
- 5 . What are the relative signs of fractures.
6. Name the layers of the callus .
7. Callus formation .
8. Perchislite principles transport immobilization .
9. First aid for fractures .
- 10 . Means of transport immobilization .
11. Complication of fractures.
12. Imposition of tires from scrap materials , Cramer Diterikhs ..

#### 4.3. Practical skills ( problem) that are performed in class:

- Provide first aid to the injured on the spot ..
  - To provide first medical aid to the victims with fractures .
  - Set the examination of the patient .
  - What are the radiological signs of fracture.
  - Define the sequence of first aid ( hospital phase) open fractures with the presence of bleeding.
  - Select the correct sequence of regenerative - reparative processes in the formation of callus .
  - Name the layers of the callus .
  - What are the basic rules for the transport of immobilization .
  - List the main groups of drugs for pain relief .
  - Apply rollers bandages.
  - Apply a plaster cast .
  - Apply a tire Diterikhs and Kramer .
- 5 . The content of the topic.

#### Classification of fractures :

##### A.

- ▶ congenital - occur in the womb because of the inferiority of fetal skeletal bone formation , brittle bones (osteogenesis imperfecta)
- ▶ acquired : - traumatic
  - Pathological - there are pathological changes in the bone ( osteomyelitis , tuberculosis , syphilis , malignant tumors , syringomyelia ) . They occur without the influence of the traumatic factor.

### Classification : B.

▶ open - as a result of damage to the soft tissues of the fracture site is connected with the environment. They may be contaminated with pathological microbes.

▶ closed - without compromising the integrity of the soft tissue in the area of the fracture.

Classification: C, depending on the location of fractures are divided into:

▶ epifizarnye ( intra )

▶ metaphyseal ( periarticular )

▶ diaphyseal - may be in the upper, middle and lower third of the leg.

Children can be a turning point in sprout layer called epifiziolizom . In adults, metaphyseal fractures can be compression .

Classification : D Depending on the placement of the plane and the presence of fragments of diaphyseal fractures are divided into:

● cross ;

● oblique and helical ;

● comminuted ..

### The mechanism of fracture

Depending on the mechanism of occurrence of fractures occur from direct and indirect force, compression , bending , twisting , tearing off. The degree of impairment caused bone speed and duration of action of traumatic external factor and the direction of the force. Typical compression fractures are vertebral compression fractures , metaphyseal cortical bones from bending more likely to be comminuted , transverse fractures from twisting - helical fractures, avulsion fractures occur at the sudden contraction of the muscles .

Types of displacement of bone fragments (dislocatio)

◆ Primary - under the influence of mechanical action ;

◆ secondary - due to the contraction of muscles , if not properly transferring , transporting the victim, in the absence or poor quality of transport immobilization.

### **In the process of regeneration of the bones are 4 stages :**

Stage I - reparative regeneration - catabolism of tissue structure and differentiation , proliferation of bone cells. Hematoma in land fills the fracture site of soft tissue , periosteum , bone marrow, endosteum , the different cellular and sub-elements , the particles of the nuclear envelope , plasma DNA content , RNA fractions , blood elements . As a result of spasm of blood vessels, the development of normal body processes at the site of the fracture cells of these tissues are in a state parabolic . Formed organic acid acidosis occurs . Increased yield microcytes proteins, accumulates a significant amount of acid degraded products - and glyukoproteidov , denaturation of collagen , increasing the concentration vodoroda. Usilivaetsya ion exchange water in the tissues , which lose potassium which leads to a fracture site hyperkalemia . There is a disruption of intercellular substance with the formation of histamine, bradykinin , serotonin , acetylcholine. In strengthening catabolism - the breakdown of fats , carbohydrates , activation of glucocorticoid , thyroxine , excited mineral and energy metabolism .

Stage II - the formation and differentiation of tissue structures. Courses depends on general and local conditions : the state of the victim, comorbidities quality comparison of the fragments , their stillness, recovery of capillary blood flow. With the active capillary sprouting towards the ends of fragments provided with nutrients and oxygen polyblasts differentiate into osteoblasts that produce osteoid . In such cases, the process of reparative regeneration occurs by direct bone formation . In cases of injury to the mobility of fragments of capillaries polyblasts differentiated chondroblast . Chondroblastoma produce intermediate fabric which becomes metaplasia by osteoid . This indirect way of reparative regeneration is much longer . With a significant displacement of bone fragments , their mobility and permanent injury of capillaries polyblasts differentiated fibroblast with the further development of the connective tissue between the fragments . At the site of the fracture formed a false joint.

Stage III - the process of active dissemination of osteoblasts in the direction of sprouting capillaries. Rebounding aerobic process , reducing the number of biologically active substances (histamine , bradykinin , serotonin ) , recovering oncotic pressure , increased protein synthesis , increases mineralization of collagen fibrils.

Stage IV - the formation of lamellar structure of bone , periosteum , endosteum , cortical layer of muscle under physiological pressure , the dosage of power load.

#### Methods of diagnosis :

- Querying the patient;
- Inspection , during the inspection should definitely simultaneously examine and compare the sick and the healthy limb ;
- Palpation of the survey ;

One of the symptoms that define a fracture is abnormal mobility and shortened limbs .

Abnormal bony crepitus and abnormal mobility of the fragments can be determined if we fix the bone with one hand above, and the second - below , from the fracture and make careful movements . In this case, there is sometimes noise from the friction of bone fragments - crepitus .

An additional method of examination of the patient with a fracture is the X-ray method . X-rays of one or the other extremity should be conducted carefully in two mutually projections. Radiography clarifies the presence of a fracture , and the nature and type of displacement of fragments .

**First aid is** provided on-site accident in self - or mutual aid as medical personnel may not be available . It includes :

1. stop bleeding in an open fracture ;
- 2 . imposition of aseptic dressings ;
- 3 . analgesics , if you have ambulance drugging , futlyarnaya anesthesia of the fracture ;
- 4 . transport immobilization ;
- 5 . repeated anesthesia after immobilization ;
6. if necessary - artificial ventilation , chest compressions .

#### **6. Materials for self-control.**

##### **A. Questions :**

1. The percentage of fractures to the general surgical pathology.
2. The value of the classification of fractures to the right diagnosis.
3. Features of bone repair .
4. The layers of callus .
5. The most common symptoms that characterize the fracture.
6. The relative clinical symptoms of fractures.
7. Absolute clinical symptoms of fractures.
8. Complications of fractures.
9. Prevention of complications in fractures .
10. Providing first medical aid at various fractures .
11. Direction of urgent measures at the breaks .
12. The development of methods of transport immobilization.
13. Protect the value of transportation of patients.
14. Types of displacement of bone fragments.

**assignments :**

1. Identify the bone crepitus .
2. Identify abnormal motility fragments.
3. Determine the shortening .
4. Calculate the required amount of fluid infusion in traumatic shock ..
5. Prepare a kit for primary surgical treatment of pa s with an open fracture ;

**Case Studies :**

1. Enter the correct sequence of regenerative - reparative processes in the formation of callus :

1. Formation lamellar bone structure , periosteum , endoost , cortical layer of muscle under physiological pressure , dosed power load
2. Formation and differentiation of tissue structures : polyblasts > osteoblasts > osteoid tissue
3. Catabolizm of tissue structure and differentiation , proliferation of bone elements
4. Process active osteoblasts conclusion towards sprouting capillaries

2. Define the sequence of first aid ( hospital phase) open fractures with the presence of bleeding :

1. Introduce painkillers ( analgesics , drugs, anesthesia futlars 0.5 % novocaine )
2. Nemed aseptic bandage

3. Stopped of bleeding

4. Immobilised 2 adjacent , and at the turn of the humerus , femur - 3 joints , using standard or improvised bus

**6.3 . Tests for self-control (basic knowledge ) .**

1. The Latin name of the fracture ?
1. Combustio

2. Luxatio
3. Fractura
4. Interpositio
5. Reclinatio

2 . Congenital fractures are:

1. the wedged
2. Plural
3. Radial
4. oblique
5. fragmental

3 . The Latin name of the displacement of bone fragments :

1. Dislocat
2. Interpositio
3. Reclinatio
4. Combustio
5. Compressio

4 . The main clinical symptom of fracture is :

1. relative shortening
2. Deformation of limbs
- 3 . " Spring-loaded "
4. Crepitation bone fragments
5. the forced position of the limb

5 . Transport immobilization applied to the patient in order to:

1. Formation of callus
2. Reduce tissue interposition
3. Prevention secondary angular displacement
4. decreases of tissue swelling
5. Prevention emergence of open fracture

6. Transport immobilization applied to the patient in order to:

1. For reduce tissue interposition
2. For the prevention of pathologic fracture
3. For the stimulation of reparative processes
4. Formation of callus
- 5 For prevent damage to major blood vessels and the surrounding tissues and organs

7. The major importance in the formation of callus is played:

1. surrounding tissue
2. Periosteum
3. Periost

4. Endost
5. spongy bone is

8. The rotation of the bone fragments Latin name

1. Dislocatio ad axin
2. Dislocatio ad latum
3. Dislocatio ad pereferiam
4. Dislocatio ad londitudinale

9. Name the layer of callus that forms the periosteum :

1. Paraossal
2. Intramedial
3. Periossal
4. Endoostal

10 . Name the layer of callus , which form the surrounding bone tissue :

1. Paraossal
2. Intramedial
3. Periossal
4. Endoostal

11. Name the layer of callus that forms the cancellous bone :

1. Paraossal
2. Intramedial
3. Periossal
4. Endostal

12. What are the clinical signs of fracture are absolute :

1. Patological movable segment of bone fragments
2. Bones crackling debris
3. Deformation of limbs
4. Shorting limbs
5. Data X-ray examination

13. What are the complications of fractures should be considered earlier :

1. Travmatic shock
2. Fat embolism
3. Demages of the nerves
4. the slowed-down healing of fractures
5. circulator violations in comminuted fractures in the upper third of the leg

14. Hypoporosis manifest clinical symptoms :

1. Podvizhnost in the fracture site
2. Uvelichenie term seam is 1.5 - 2 times

3. Schell between the fragments on the radiograph
4. Passability bone - cerebral canal on the radiograph
5. Sklerosation ends and the replacement of bone fragments - a cerebral channel

15. Open fractures on to hospital step is to give priority to :

1. Stopping of bleeding
2. analgesia
3. closed reduction of bone fragments
4. applying of aseptic dressings
5. transport immobilization

16. What are the characteristic symptoms of torn ligaments :

1. Bol
2. Haematoma
3. Aedema
4. External bleeding
5. malfunction

17. What do you recommend in the first days after injury at break of the ankle ligaments :

1. rest
2. Pressure bandage
3. analgesia
4. Immobilisation of joint plaster splint .

### **Case studies for emerging knowledge**

1. Before the ambulance turned 40 years old patient complaining of constant aching pain in the right radial- carpal joint , swelling, and his lack of movement because of the pain . According to the patient a few hours ago, fell on his hand , relying on the palmar surface of the hand unfolded . When viewed in profile resembles the dining fork arm by palpation - towards the rear of the distal fragment of the radius is defined as the stage . Marked swelling of the beam - the carpal joint and the lack of features in it . Enter your preliminary diagnosis ? What will be the amount of first aid?

2 . Boy 20 years after falling from a height on moderately bent legs felt a sharp pain below the knee. He complains that the calf does not listen at step forward. On palpation of the tibial tubercle - significant pain, the patella was displaced upward. What is the preliminary diagnosis you put ? What is the amount of first aid?

3 . The patient brought to the emergency room after the accident revealed the outer surface of a wound on the right leg , a  $3 \times 5$  cm . Filled with a blood clot , the axis of deformed leg , soft tissue thickened. In the site of an injury is determined by the abnormal mobility . Pulse 90 beats . / Min. rhythmic, weak filling , blood pressure 100/60 mm.rt.st. Preliminary diagnosis.

4 . In the casualty department of admissions after the accident complaining of pain in the right hip dysfunction . On examination, the hip showed a significant thickening of the soft tissue in the middle third , shortening by 5 cm , the limb is fixed bus Diterikhs . Blood pressure 85/60 mm Hg , pulse 105 beats . / Min. Enter a preliminary diagnosis .

5 . Elderly man hit by falling front surface of the knee joint. Worried about a sharp pain in the knee joint , the joint is thickened , with the presence of fluid , palpation - indentation in the middle of the elbow, lift the leg can not be straightened . Enter a preliminary diagnosis . Specify the method of transportation of the victim .

6. In the casualty department of admissions after the accident complaining of pain in the right hip dysfunction . On examination, the hip showed a significant thickening of the soft tissue in the upper third , the positive symptom "breeches" , the limb is shortened by 5cm. At the first stage, conducted by immobilization bus Diterikhs . BP 80/55 mm Hg , pulse 106 beats . / min ..

1. Place a preliminary diagnosis.
- 2 . What is necessary to conduct a survey .
- 3 . The plan pre- treatment of the victim.

7. A man falling from a height on a moderately bent legs felt a sharp pain below the knee. He complains that the lower leg " do not listen " at the step forward. On palpation of the tibial tubercle - significant pain, the patella was displaced upward.

- 1) Place a preliminary diagnosis.
- 2) Name the radiological sign of damage .
- 3) What method of treatment should be applied
- 4) What is the urgency of remedial measures .

8. Patient C after falling from a height on bent knees observed limit flexion and extension of the right knee joint . The contours of the joint smoothed. The sharp weakening of rotational movement in the joint , " clatter " , which is accompanied by pain .

Your likely diagnosis ? First aid.

9. After falling to the knee, the patient marked limitation of extension of the knee. Your diagnosis ?

10 . If you fall from a height on the foot in a patient painful swelling at the site of attachment of the Achilles tendon on the right. , Tenderness , and swelling at the outer edge of the foot. Limitation of flexion and extension . Your diagnosis ?

11. After accident patient can move, but only to move forward. Your diagnosis , type of transport immobilization ?

12. After falling from a height on the back of the patient avoids bending of the spine, complains that the subjects raised crouching with his hands on hips. Your diagnosis? The patient immobilization during transport .

## 7. References:

### General:

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## 8. The distribution points are awarded to students:

At mastering topic number 14 to content module 4 for training activities for students rated a 4-point scale (traditional) scale, which is then converted into points as follows:

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

Guidelines prepared

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