

MINISTRY OF HEALTH OF UKRAINE
O.O. BOHOMOLETS NATIONAL MEDICAL UNIVERSITY

**TUMORS AND TUMOR-LIKE DECEASES OF MUSCULOSKELETAL
SYSTEM**

WORK BOOK

For independent work of students of the 5th course

Study discipline "Traumatology and Orthopedics"

direction "Medicine"

specialty "Curative care"

Department of Traumatology and Orthopedics

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Introduction

One of the effective means of organizing an independent work of students on topics of disciplines assigned for independent study is the work of a student with his/her workbook. Work with the workbook should begin with the acquaintance with the key issues on the topic. The next step includes the acquaintance with the list of sources from which the student can find the answers to the posed questions. For more deep study of the problem students can visit professional websites.

Having become acquainted with the theory, the student needs to assess his/her degree of mastering the material. In this regard, he/she resolves the proposed tasks; answers test questions on the topic. Students should pay particular attention in preparing for classes to the required minimum of practical skills to be mastered. In the relevant sections of textbooks, manuals, he must glean the information that he needs for mastering further practical skills.

Arrangement of independent work with the use of workbook is conducted as follows: tutor provides the workbook to a student in digital format (to be downloaded from website of the Department), or in printed version; later the students do the tasks at their extra-curricular time, whereupon the tutor checks and assesses them **at the initial stage of practical classes.**

Criteria for assessing the tasks in the workbook

Each task requires a separate approach when assessing the quality of its implementation under particular criteria. And yet, with a 5-point evaluation ranking for each type of tasks, one should observe the general didactic criteria, namely:

“5” is graded when the student:

1. Executed the work w/o errors and deficiencies.
2. maximum one deficiency.

“4” is graded when the student executed the work in full but made:

1. maximum one gross error and one deficiency.
2. maximum two deficiencies.

“4” is graded when the student executed at least one half of a work correctly or made:

1. maximum two gross errors or one gross and one mild errors and one deficiency.
2. maximum two mild errors or one mild error and three deficiencies.
3. In the lack of errors but when four or five deficiencies are available.

“2” is graded when the student made:

1. number of errors (deficiencies) exceeding the limit when grade “3” could be applied.
2. In case less than half of work is completed.
3. Failed to start the work.

Topic. "Tumors and tumor-like deceases of musculoskeletal system"

Goal (educational goals):

1. To get an idea of the definition, epidemiology, etiopathogenesis and classification of tumor and tumor-like bone disease.
2. To get acquainted with the general features of the stage-by-stage medical care for bone and joint malignancies.
3. To master the algorithm of clinical and radiological examination of a patient with a musculoskeletal tumor.
4. To study algorithms for assisting patients with benign and malignant bone tumors.
5. To get acquainted with the x-ray picture of bone neoplasms and other instrumental diagnostic methods. To carry out differential diagnosis of bone tumors with inflammatory and degenerative diseases as well as the injuries of the musculoskeletal system.
6. To know the principles of indications and contraindications to conservative and surgical treatment, complications of tumor and tumor-like bone disease.

The student should know:

1. Definition of the concept of benign, malignant tumors and tumor-like bone diseases.
2. Classification of tumors and tumor-like bone diseases.
3. The main types of benign bone tumors (osteoid-osteoma, osteoblastoma, osteochondroma, chondroma, chondroblastoma, giant cell tumor, hemangioma) tumor-like bone lesions (bone cyst and fibrous dysplasia).
4. The main types of malignant bone tumors (osteosarcoma, chondrosarcoma, Ewing's sarcoma, plasma cell myeloma, metastatic tumors).
5. Methods of examination of patients. Peculiarities of the anamnesis, clinical and radiological signs of various benign and malignant bone tumors, pathological fracture. To establish differential diagnosis of bone tumors.
6. The main methods of treatment (surgical, radiation therapy, chemotherapy, combined /complex treatment). Indications and contraindications to their use.

7. Types and principles of organ-preserving surgical interventions and features of amputations in benign and malignant bone tumors.

8. Algorithm for the use of chemotherapy, radiotherapy, basic chemotherapy regimens. Typical mistakes (appointment of physiotherapy, untimely radiography, etc.) and complications of treatment, complications of the disease (pleurisy).

Student should be able to:

1. to recognize a typical clinical picture of benign, malignant tumors and tumor-like bone diseases based on complaints.

2. Analyze the information content of biopsy and morphological study.

3. To collect oncologic and orthopedic-traumatological anamnesis, to determine the time of the occurrence of the disease, relation to trauma, to estimate the growth rate of the tumor and general condition of the patient.

4. to describe the local status: the gait, usage of the support, the presence of languette, volume of movements of the affected skeleton, condition of the skin over the tumor (the expansion of the subcutaneous veins, presence of a scar, wounds, ulcers, their origin and condition, the disintegration of the tumor with bleeding, infection), localization of the tumor in the bone segment upper, middle or lower) and on its surface (anterior, inner, outer, posterior), tumor dimensions, circumference of the diseased and healthy limbs above the tumor; the soreness of the tumor, consistency of the tumor, mobility; condition of regional lymph nodes (mobility, soreness, consistency, shape, size) peripheral circulation and sensitivity.

5. To assess the radiographic study: location of the tumor in segments (epiphysis, epimetaphysis, diaphysis, periosteum, cortical or endosteal layers), solitary or multiple lesions. Identify the signs of a benign tumor: sharpness of the contour, normal structure, slow growth. Identify the signs of a malignant tumor: disruption of the bone tissue with the formation of defects, fuzzy, irregular shape, disordered, heterogeneous structure, lack of structure, periosteal reaction, needle-shaped periostitis (spicule), rapid growth, Codman triangle, periosteal reaction, absence of border between tumor and area of healthy bones. To assess CT, MRI, angiography, osteoscintigraphy (accumulation of radiopharmaceuticals 200% or more), ultrasound study.

Main terms of the topic.

Term	Definition
Malignant tumor	is a solitary or multiple pathological uncontrolled reproduction of own cells, from which it occurs.
Tumor	is a pathological process caused by uncontrolled reproduction of own cells, invasion of surrounding tissues and, sometimes, metastasis.

Combined treatment	- The combination of two or three of these methods
Comprehensive method of treatment	- Using of auxiliary methods of treatment, such as immunotherapy, hormone therapy, magnetohydrathermia etc. along with basic methods.
Pathological fractures	- Fractures of an altered bone with a malignant tumor.
Benign tumors of bones	- Osteoid osteoma, osteoblastoma, osteochondroma, chondroma, chondroblastoma, chondromixoid and desmoplastic fibroids, fibroma, benign fibrotic histiocytoma, giant cell tumor, hemangioma.
Tumor-like lesions of bones	- Aneurysmal bone cyst, solitary bone cyst, fibrotic dysplasia, osteofibrosis dysplasia, synovial chondromatosis.
Malignant tumors of bones	- Osteosarcoma, parosteal osteosarcoma, periosteal osteosarcoma, chondrosarcoma fibrosarcoma, malignant fibrous histiocytoma, Ewing's sarcoma, plasma cell myeloma, lymphoma, malignant giant cell tumor, chordoma, angiosarcoma, adamantinoma, metastatic tumors.
Divisions of a bone	- Epiphysis, epimetaphysis, diaphysis, periosteum, cortical layer
Closed fracture	- Fracture, when there is no communication of the fracture region with the surrounding medium.
Immobilization	- Creating conditions for complete immobility or reducing the mobility of one or more body parts.
Callus bone (callus)	- A patch of bone tissue which is formed at the site where a bone is disintegrated and connects its fragments.
Signs of a benign bone tumor	- Clear contours, sclerotic rim, normal structure, slow growth.
Signs of a malignant bone tumor	- Disturbance of bone tissue with the formation of defects, fuzzy, irregular shape, disordered, heterogeneous structure, lack of structure, periosteal reaction, needle-shaped periostitis (spicule), rapid growth, Codman's triangle, periosteal reaction, absence of border between tumor and healthy bone.

Reference literature.

Basic:

1. Опухоли и опухолеподобные заболевания костей и суставов (клиника, диагностика, лечение) / под ред.: Коноваленко В. Ф., Бурьянова А.А., Проценко В.В., Черный В.С. —Кийв: ТОВ “Лазурит Поліграф”, 2015. — 344 с.

2. Травматологія и ортопедія : підручник для студ. вищих навчальних закладів / за ред.: Голки Г.Г., Бур'янова А.А., Климовицького В.Г. – Вінниця : Нова книга, 2014. – 416 с. : іл. С. 344-359

Auxiliary:

1. Онкологія, ортопедія, травматологія, реабілітація - <http://www.oncoortoped.kiev.ua/oncology-surgeon/rak-kosteij/>
2. Армований кістково-цементний остеосинтез в лікуванні метастатичних пухлин кісток кінцівок. - Чорний В.С., Проценко В.В., Ільніцький О.В., Найдьонов О.І./ Літопис травматології та ортопедії. - № 1-2, - 2015 (31-32). – С. 88-92.
3. Методична розробка заняття для підготовки студентів на тему: «Пухлини та пухлиноподібні захворювання опорно-рухового апарату» О.А. Бур'янов, М.П. Комаров, Є.Т. Скляренко, В.С. Чорний/ Літопис травматології та ортопедії. - № 1-2, - 2014 (29-30). – С. 199-203. 4. Прогностическое значение VEGF, Her-2/neu и лечебного патоморфоза для оптимизации комбинированного лечения больных остеосаркомой костей конечностей.- Черный В.С., Тарасова Т.А., Бурьянов А.А., Коноваленко В.Ф., Проценко В.В. /Літопис травматології та ортопедії.— 2012. — № 1-2. . – С. 36-40

Tasks for unsupervised work.

To be answered in written.

Variant 1

Task 1.

Fill in the table for the variants of the clinical course of benign, malignant and tumor-like bone diseases.

variant of the clinical course of bone tumor deceases?	Main clinical forms.
1.	Osteoid osteoma, osteoblastoma, osteochondroma, chondroma, chondroblastoma, chondromixoid and desmoplastic fibroids, fibroma, benign fibrotic histiocytoma, giant cell tumor, hemangioma.

2.	Aneurysmal bone cyst, solitary bone cyst, fibrous dysplasia, osteofibrosis dysplasia, synovial chondromatosis.
3.	Osteosarcoma, parosteal osteosarcoma, periosteal osteosarcoma, chondrosarcoma fibrosarcoma, malignant fibrous histiocytoma, Ewing's sarcoma, plasma cell myeloma, lymphoma, malignant giant cell tumor, chordoma, angiosarcoma, adamantinoma, metastatic tumors.

Task 2.

Modern theories of carcinogenesis:

1. chemical,
2. Physical,
3. biological,
4. genetic,
5. biochemical.

Task 3.

A 52-year-old patient was diagnosed with chondrosarcoma of the ilium of medium degree of malignancy (G2), without metastases. What is the treatment tactic?

1. chemotherapy
2. Radiation treatment
3. surgical intervention
4. complex treatment

Task 4.

Among all bone lesions most often are

1. benign tumors of bones
2. Primary malignant tumors
3. Bone metastases
4. tumor-like lesions
5. lesions in systemic tumor diseases

Task 5.

B in the age from 16 to 20 the most common are:

1. osteosarcoma and Ewing's sarcoma
2. Myeloma
3. lymphoma
4. giant cell tumor

Task 6.

Among benign bone tumors, the most common are:

1. osteochondroma, osteoid-osteoma, giant cell tumor;
2. Chondroma, fibrotic dysplasia, fibrous histiocytoma, chondroblastoma.

Task 7.

In oncoortopedia, organ-preserving surgical interventions are applied as follows:

1. bone biopsy, exochleation (curettage), or intraosseous resection;
2. resection of the bone section with tumor (marginal, wedge, segmental) + autoplasty (or alloplasty) + metalloosteosynthesis (plates or aparatue for external fixation)
3. resection of the joint with the tumor + arthroplasty of the joint bone - in malignant tumors
4. Extirpation
5. limb amputation, exarticulation of the limb or finger.
6. cryodestruction of the tumor; X-ray surgery.

Test questions.

1. The following tumors often metastasis into bones

- a) kidney cancer
- b) lung cancer
- c) prostate cancer
- d) correct answers a) and b)
- e) all answers are correct

2. Benign tumors of bone tissue include:

- a) osteoblastoclastoma
- b) osteoid-osteoma
- c) all answers are correct

3. Bone marrow tumors are:

- a) myeloma
- b) lymphoma
- c) osteogenic sarcoma
- d) Ewing's sarcoma

4. Benign tumor of a cartilaginous tissue includes

- a) chondroma
- b) osteochondroma
- c) osteblastoma
- d) chondroblastoma
- e) all answers are correct

5. Differential diagnosis of bone tumors is carried out on the basis of

- a) radiography
- b) ultrasound study
- c) Morphological study
- d) CT

6. Malignant tumors of bones should be differentiated with

- a) chronic osteomyelitis
- b) fibrous dysplasia
- c) bone cyst
- d) all the answers are correct

7. Osteosarcoma and Ewing's sarcoma are more common in the age of

- a) up to 20 years
- b) from 25 to 40 years
- c) from 40 to 50 years
- d) above 50 years

8. The main clinical symptom of osteoid-osteoma is

- a) intensive night pains, removed with aspirin
- b) intensive night pains, removed with promedol
- c) throbbing pain and rise of body temperature

9. Chondrosarcomas are more common in the age of

- a) up to 20 years
- b) from 25 to 40 years
- c) from 40 to 50 years
- d) above 50 years

10. Osteosarcoma is characterized by X-ray symptoms

- a) Codman's "Triangle" (Visor)
- b) spicules
- c) ossification of the extraosteal component
- d) all answers are correct

11. Osteosarcoma, primarily metastasizes into

- a) in lymphonoduses
- b) in the bone
- c) into the lungs
- d) all the answers are correct

Variant 2

Task 1.

To which type bone tumor (1, 2) the following X-Ray signs relate and name the groups of symptoms (3,4,5)?

symptoms	X-Ray signs	
	1.....	2.....
3.....	the edges of the destruction are distinct, separated by a "rim of osteosclerosis"	lack of clear boundaries (smooth transition to normal tissue)
	Large single focuses of destruction (cm)	Multiple and small (cm) and large (cm) focuses of destruction (cm)
4.....	one homogeneous node (exostosis)	many dense nodes (osteosarcoma)
5.....	hyperostosis (osteoid-osteoma), pathological fracture	needle-shaped periodontal disease, Codman's triangle, lamellar periostosis, cortical layer destruction, pathological fracture

Task 2.

Among malignant tumors, bones the most common are:

1. osteosarcoma, chondrosarcoma, Ewing's sarcoma
2. metastases of cancer
3. myeloma disease

Task 3.

Comprehensive method is used for treatment (Chemo+ RT + PS + HRT):

1. Cancer metastases
2. Ewing's sarcoma
3. Reticulosarcoma
4. lymph,
5. myeloma disease
6. giant cell tumor

Task 4.

Metastases are more common in

1. spine,
2. pelvic bones,
3. Ribs
4. tubular bones,
5. Skull bones.

Task 5.

more common are

1. metastasis of breast cancer,
2. lung cancer,
3. kidney cancer,
4. prostate cancer.

Task 6.

The surgical method is applied for

1. Benign tumors of bone, chondrosarcoma,
2. Parosteal osteosarcoma
3. chordoma, adamantine
4. Lymphoma

Task 7.

Combined treatment (chemotherapy + surgery) is used for:

1. osteosarcoma,
2. Angiosarcoma of the bone,
3. Fibrosarcoma of the bone,
4. mesenchymal chondrosarcoma,
5. malignant fibrous histiocytoma
6. malignant giant cell tumor
7. Chondrosarcoma G1

Test questions.

1. The x-ray picture of a giant cell tumor is characterized by
 - a) large focus of destruction with a cellular contour in the bone epimetaphysis
 - b) disrapture of the cortical layer
 - c) a soft-tissue component containing additional inclusions
 - d) all answers are correct

2. Radiosensitive tumor are
 - a) Ewing's sarcoma
 - b) Giant cell tumor
 - c) Osteogenic sarcoma
 - d) correct answers a) and b)

3. For the treatment of osteogenic sarcoma, radiation therapy is used
 - a) as a possible component of complex treatment
 - b) as a palliative method for an inoperable tumor
 - c) Radiation therapy is inappropriate
 - d) correct answers a) and b)

4. In sarcomas of bones, invalidating operations include
 - a) resection of the joint and arthroplasty of the joint
 - b) segmental bone resection with defect replacement
 - c) Exarticulation of the limb
 - d) limb amputation
 - e) correct answers c) and d)

5. The basic principles of radical bone resection for a malignant tumor are:

- a) removal of a tumor in a muscle case
- b) wide removal of the tumor within uninfected bone tissue
- c) removal of the tumor in a single block from the biopsy site, lymph nodes
- d) all the answers are correct

6. In the treatment of Ewing sarcoma, the leading role is played by

- a) opesurgical treatment
- b) radiation therapy and chemotherapy
- c) surgical treatment with chemotherapy
- d) all answers are correct

7. In terms of X-Ray picture peripheral chondrosarcoma is:

- a) swelling on a broad leg with indistinct contours and boundaries, with a homogeneous and blurry or mottled pattern
- b) manifested by destruction with fuzzy contours, needle-like periodontal disease
- c) a cluster of cysts measuring 6-10 cm in metaphysis with clear membranes, thinning of the cortical bone

8. Giant cell tumor is most often located

- a) in the diaphysis of long tubular bones
- b) in the bones of the skull, ribs
- c) in metaepiphysis of long tubular bones
- d) all answers are correct

9. The choice of limb amputation is determined by:

- a) degree of involvement in the soft tissue process
- b) the tasks of future prosthetics
- c) prevalence
- d) tumor localization
- e) all answers are correct

10. Osteogenic sarcoma metastasizes in

- a) skin
- b) the lungs

c) flat bones

d) lymph nodes