

BONE

TUMORS

Lecturer: Phd Iu. Piven



Scientific and methodological substantiation of the topic.

Treatment of fractures refers to the ancient history of medicine in general and traumatology in particular. It can be argued that rational treatment of fractures is one of the main problems of modern surgery and traumatology. There are many different methods and methods for treating fractures. Their clinical picture is very diverse and does not always fit into the classical one. Different forms of damage sometimes put the doctor in a quandary in the diagnosis and choice of treatment.

Treatment of victims with fractures has a number of specific features, without knowledge of which it is not possible to correctly determine therapeutic tactics. The frequency of skeletal injuries, the weight of the clinical course, the possible difficulties in diagnosis, the complexity of treatment, a significant percentage of various complications determine the relevance of this topic in the training of a doctor.

Among all tumors of different locations, the neoplasm of the skeleton was noted in 11.4%. The improvement of radiotherapy, the synthesis of more active antitumor drugs, as well as a detailed study of the morphology and course of malignant neoplasms, have expanded the possibilities of treating bone tumors. However, early diagnosis of tumors continues to be the main factor on which the success of treatment depends.

Goals of future personality development

- Convince internists in the practical meaning of this topic.
- During the presentation of lecture material, emphasize the contribution of domestic scientists in the treatment of injuries, bone tissue tumors.
- To bring up a sense of professional responsibility, the general ethical qualities of future doctors.
- Promote healthy lifestyles, explain to students the dangers of smoking, stay in dusty rooms, etc.
- To form an idea of the need for preventive measures in relation to the development of pathology of the musculoskeletal system.



The plan and organizational structure of the lecture

1. Preparatory stage

Determining the relevance of the topic, the learning objectives of the lecture, motivation

2. Main Stage

The presentation of the lecture material according to the plan:

Thematic lecture

Means of clarity:

1. Multimedia presentation

2. Radiographs.

3. Questions, problem situations, tasks

1. Modern methods of diagnosis of fractures.

2. Principles of fracture treatment.

3. Consequences of fractures of the extremities

4. Origin and classification of bone tumors.

5. Benign neoplasm of bones.

6. Malignant neoplasm of bones.

- Primary malignant neoplasm

- Secondary malignant tumors

7. Diseases borderline with bone tumors.

8. General patterns of metastasis of bone tumors.

9. Principles of treatment of bone tumors.

3. The final stage

1. Summary of the lecture, general conclusions

2. Answers to possible questions.

3. Tasks for self-preparation of students. Educational literature, tasks, questions.

In no other area of bone pathology does the life or death of a diseased person depend on the doctor to a greater extent than in bone oncology.



LECTURE PLAN

**The origin and
classification of bone
tumors.**

Benign bone tumors:

Osteoma

Osteoid osteoma

Osteochondroma

Chondroma

Chondroblastoma

Hemangioma

Hemarthroma





Malignant neoplasms of bones:

Primary malignant neoplasms

Periosteal fibrosarcoma

Paraostal Osteosarcoma

Ewing's Tumor

Reticulosarcoma

Secondary malignant tumors

**General patterns of bone tumor
metastasis**

Border diseases with bone tumors:

Fibrotic dysplasia

Paget's disease

Giant cell tumor



Bone tumors are a neoplasm that occurs and grows on bone or originates from bone cells.

Among all tumors of different localization, skeletal neoplasms were noted in 11.4%.

The origin of the tumor in the skeleton is associated with dysplastic processes, which is especially noticeable in children.

Until recently, the main method of treating tumors has remained surgical, therefore bone tumors are, in addition to the surgical problem, also orthopedic.



Classification of tumors of the osteoarticular system of T.P. Vinogradova (1960) and M.V. Volkova (1962)

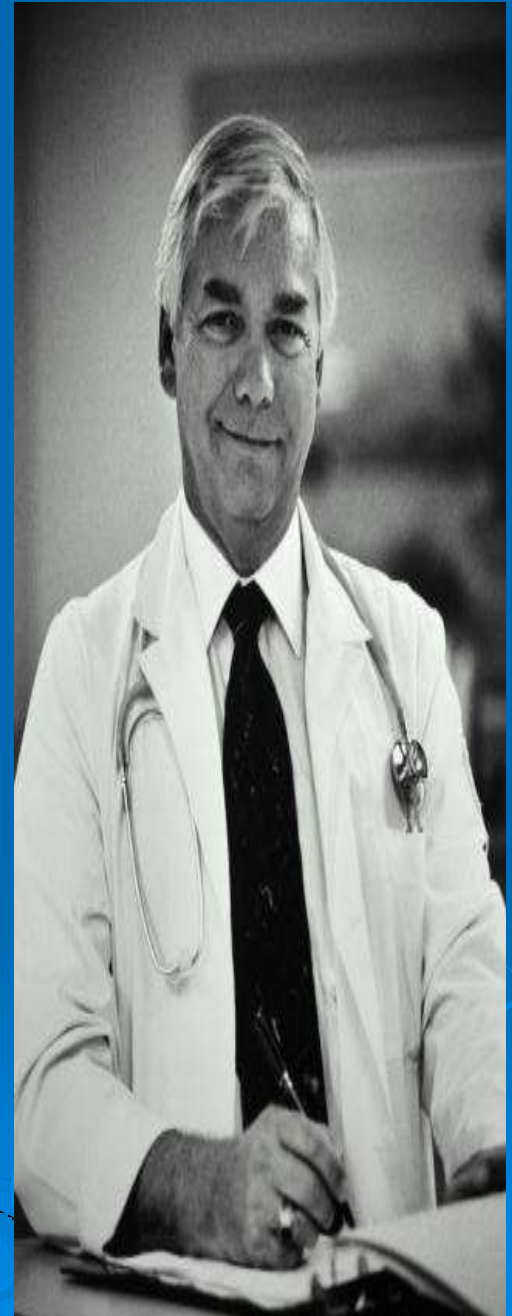
The main forms:

benign;

malignant;

borderline.

Each of these groups, in turn, is divided into cartilage, bone and mixed



Cartilage Tumors

Benign cartilage tumors.

In children, cartilage tumors, along with dysplasia, make up half of all bone tumors.

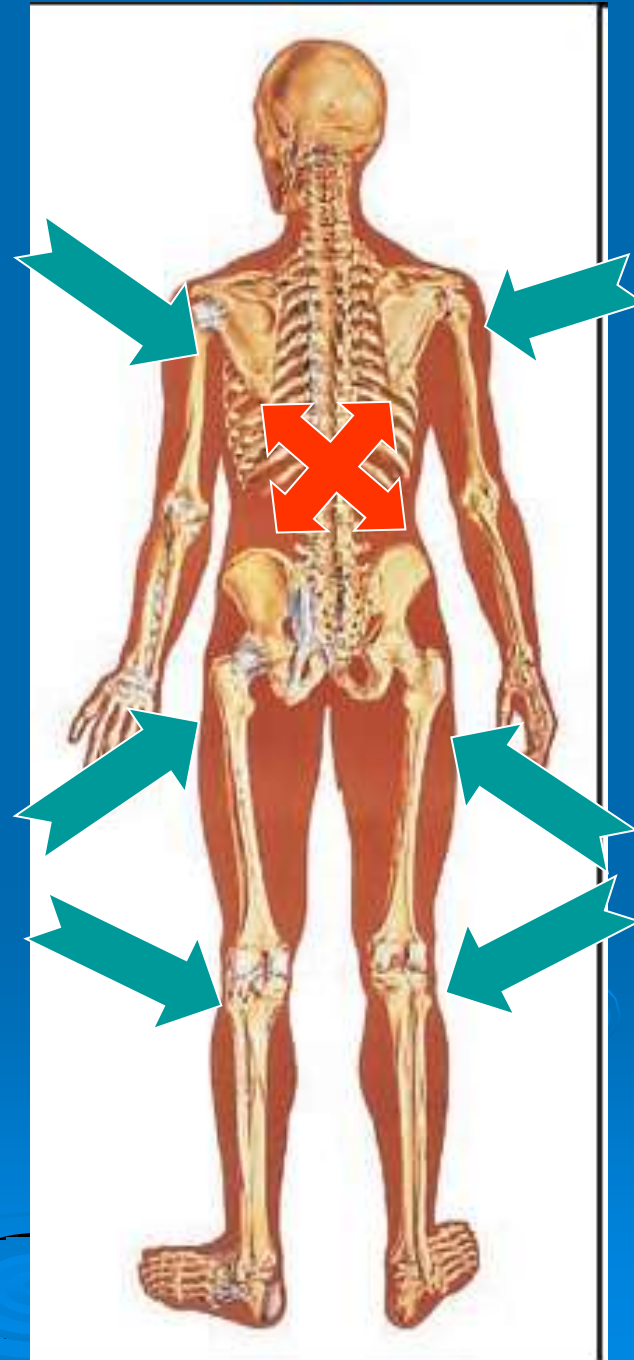


Chondroblastoma

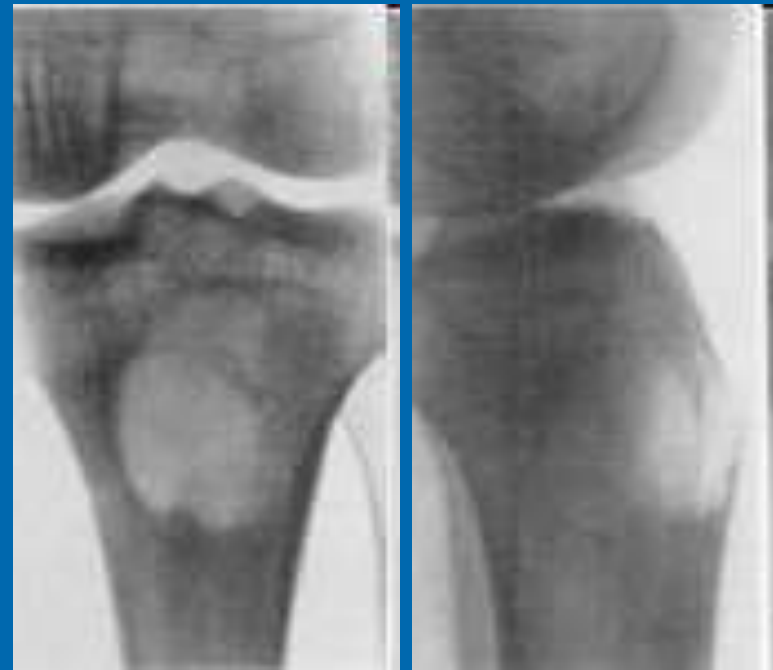
The classic location of chondroblastoma is the epiphysis of long tubular bones, but it is also found in the bones of the pelvis, scapula, etc.

It is relatively rare and is observed in 1% of all primary skeleton tumors.

Most often, chondroblastomas occur between the ages of 10 and 20 years.



X-ray - an oval formation located in the center of the pineal gland or metaphysis. Bone inclusions are visible, which facilitates differential diagnosis with the infectious process.



Treatment. With timely surgical intervention - a favorable prognosis. Given the possibility of relapse after curettage and malignancy X., it is better to perform a bone resection.



Patient K., 30 years old 1) Chondroblastoma before surgical treatment. 2) X-ray, 2 weeks after surgery for excision of the lesion, the defect was filled with spongy autologous bone. 3) 14 months after surgery. On the radiograph: an increase in bone density.

Chondroma.

By location - enchondroma and echondroma. The enchondroma is located inside the bone and, as it grows, it bursts from the inside. Radiologically in the center of the bone, a round-shaped focus of enlightenment is visible, sharply limited from the unchanged bone. Against a uniform background, single foci of calcification of cartilage can be found.



Echondroma is a tumor that originates from the bone and grows towards the soft tissues.

Radiological - against the background of compacted soft tissues, calcification sites. The border of the tumor and its base are difficult to detect.

Clinic. The phalanges of the fingers and feet, metatarsal, tarsal and metacarpal bones are more often affected.

A gradually developing swelling is noted, with a close proximity to the joint - arthralgia, synovitis.



Enchondroma is susceptible to malignancy.

There is a rapid increase in the tumor, the appearance of pain. Radiologically, the transition to chondrosarcoma is characterized by developing calcification.

Treatment. Only surgical - tumor excoculation or resection of the affected part of the bone. Suspicion of malignant degeneration of the tumor is an indication for resection, and sometimes amputation.

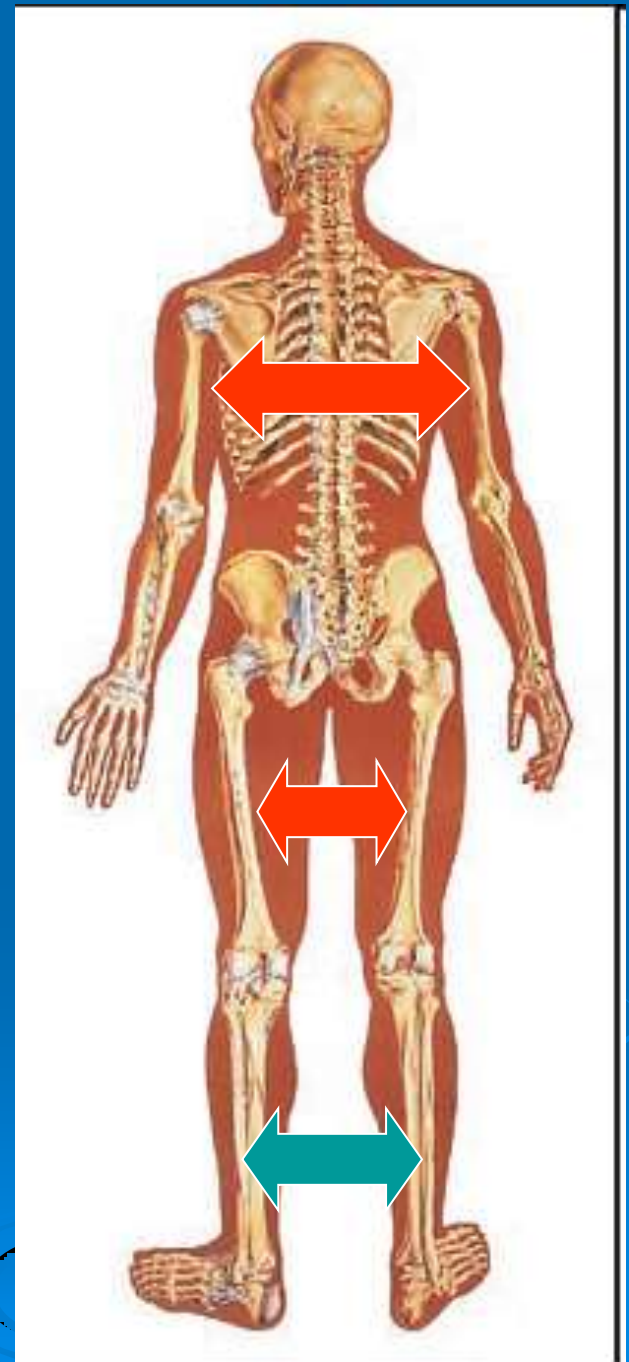


Chondromyxoid fibroma. A rare and slowly growing benign bone form of the tumor.

More often, people aged 20-30 are sick.

Most often tibia are affected, but there may be a tumor in the femur, humerus and other bones.

Clinic: prolonged muscle and tendon pain, after which the tumor begins to be determined already visually.



**X-ray in long bones
eccentrically located oval-
shaped enlightenment is
detected. The focus of
destruction affects the spongy
substance, and the cortical
layer.**

**In structure, the tumor
tissue macroscopically
resembles cartilage.**

**Treatment is tumor
excociation followed by bone
graft defect replacement.**



Malignant cartilage tissue.

Chondrosarcoma (HS).

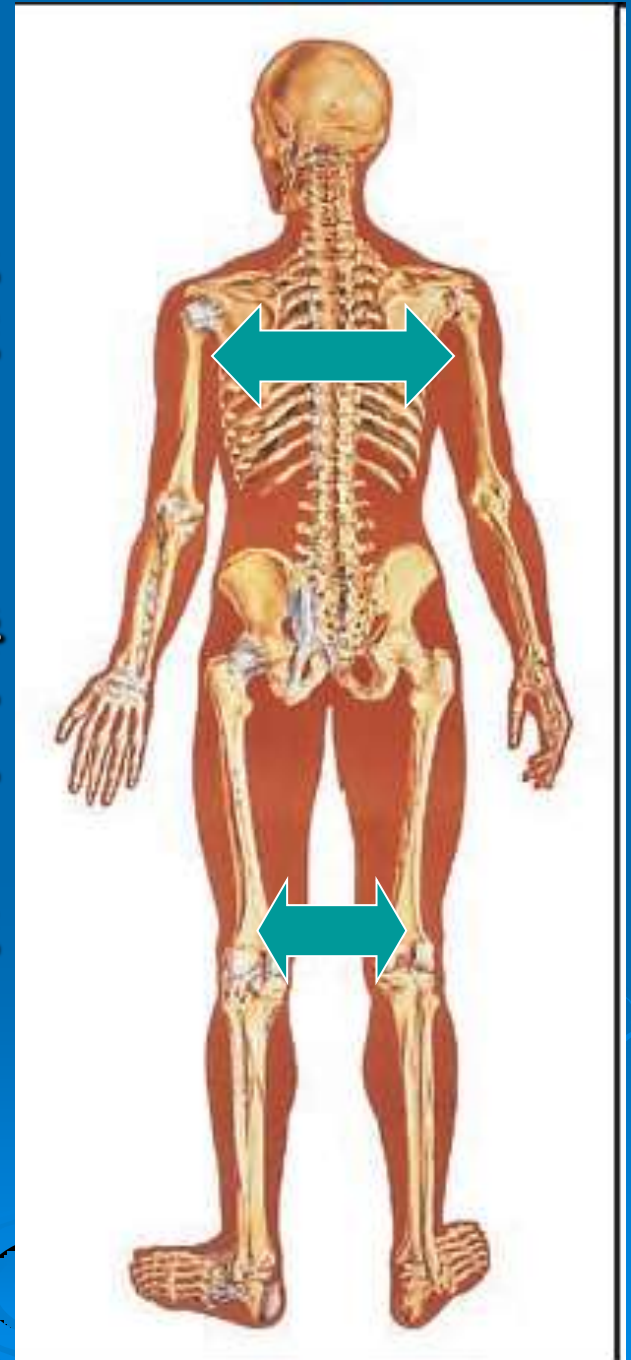
Mostly in the femur and humerus
close to the joints, less often in the
scapula, ribs.

At the age of 30-60 years.

Central - from the intraossal
structure, on the metaphyses of
long bones, proceeds with
perforation of the cortical layer.

Peripheral - from the
cartilaginous surface.

HS metastases to the lungs.



Clinic: intermittent dull pains that increase with tumor growth. During this period, a significant increase in the lesion area is determined. Initially, a slight dense swelling.

Rö - the image of the peripheral HS resembles incorrectly scattered shadows in the form of cauliflower, with an usability of the cortex.

HS is not limited to surrounding soft tissue.



BONE TISSUE TUMORS

Benign bone tumors.

Osteoma. About 10% of all skeletal tumors.

compact

spongy

mixed

X-ray:

on a broad basis;

on the leg.

More common in people aged 10-25 years.

Osteomas are located most often in the metaphyses and diaphysis of the long tubular bones and bones of the cranial vault.



Treatment is only for indications, which include pain, impaired limb function due to the presence of osteoma and large tumor sizes.

Surgical treatment consists in removing only the tumor tissue, knocking it down with a chisel along with the periosteum. Relapses are very rare, malignant degeneration is not observed.



Osteoid-osteoma

is a benign bone tumor that has a peculiar clinical course, a special histological and radiological picture.

Some authors still consider this disease as limited chronic osteomyelitis.



Clinic. Persons aged 20-30 get sick, equally often men and women.

It is often localized in the diaphysis of long tubular bones - tibia, femur, fibula, etc.

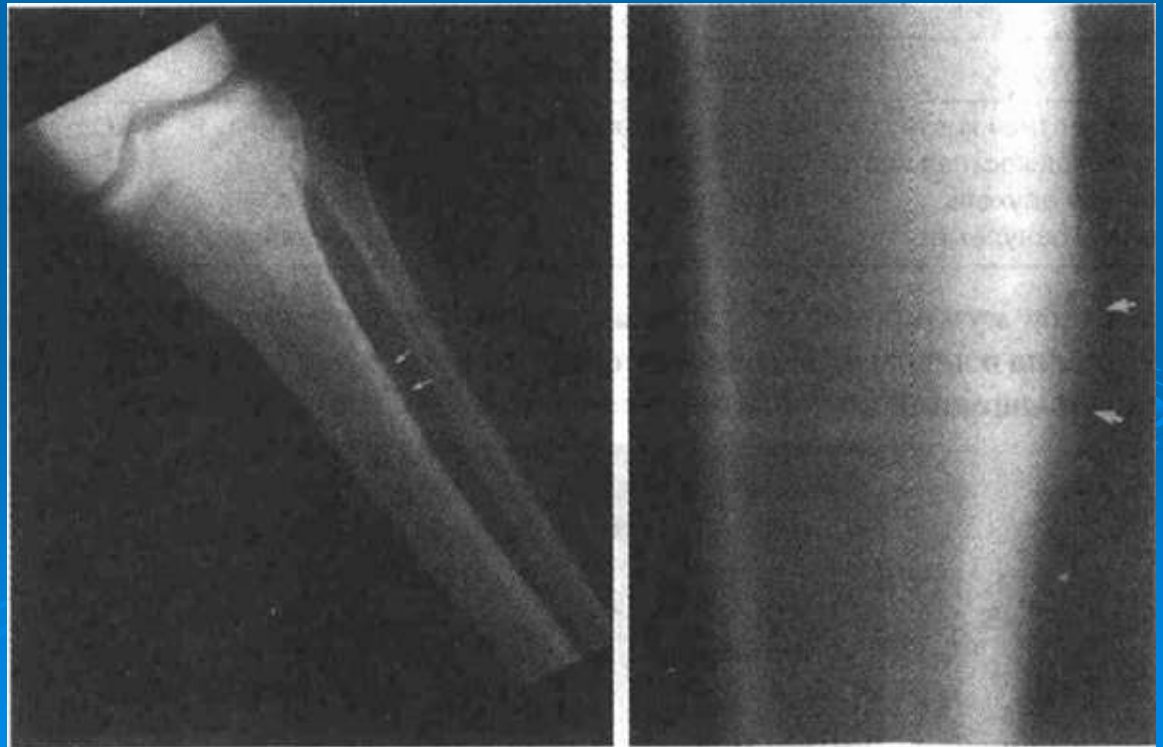
At first, a deep pain resembling muscle pain appears, but soon becomes limited. When taking analgesics, it subsides somewhat. With localization on the lower extremities of the patient, lameness appears.

Pain is especially severe at night, causing patients to wake up.



Radiologically, the osteoid-osteoma has a very peculiar appearance - a small focus of enlightenment measuring 0.5-2 cm, rounded in shape, surrounded by a zone of sclerosis.

The tumor may be on the surface in the bony cortical layer or located somewhat deeper.





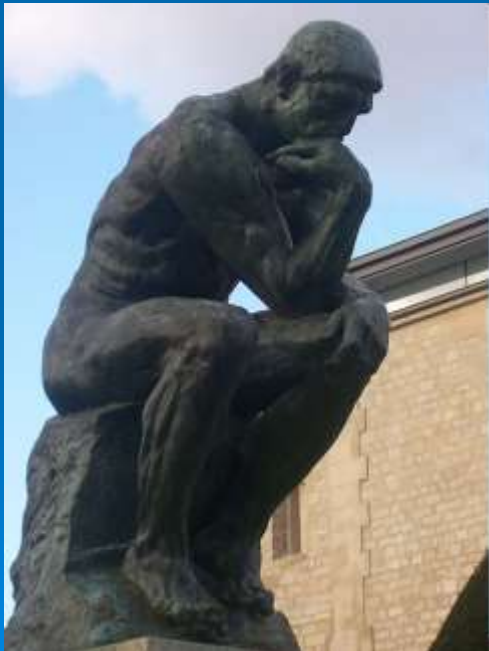
Differential diagnosis:
limited sclerosing osteomyelitis, Brody abscess;
osteoperiostitis;
dissecting osteochondritis.

Treatment. Radical removal of the lesion - partial subperiosteal or segmental resection.

Complete removal of the tumor leads to a permanent recovery.

Partial removal may result in relapse.

Malignancy is not noticed.



Osteoblastoclastoma (giant cell tumor).

The tumor is semi-malignant, often relapsing: expansive growth, and sometimes metastases. Tumor Forms:

lytic;

cellular-trabecular;

mixed

It occurs in childhood, adolescence and middle age. In children, they are asymptomatic and often detected when a pathological fracture occurred at the site of an existing tumor.



Clinic. It is located in the upper metaphysis of the humerus, the lower metaphysis of the thigh, tibia, etc. Initial signs proceed unnoticed.

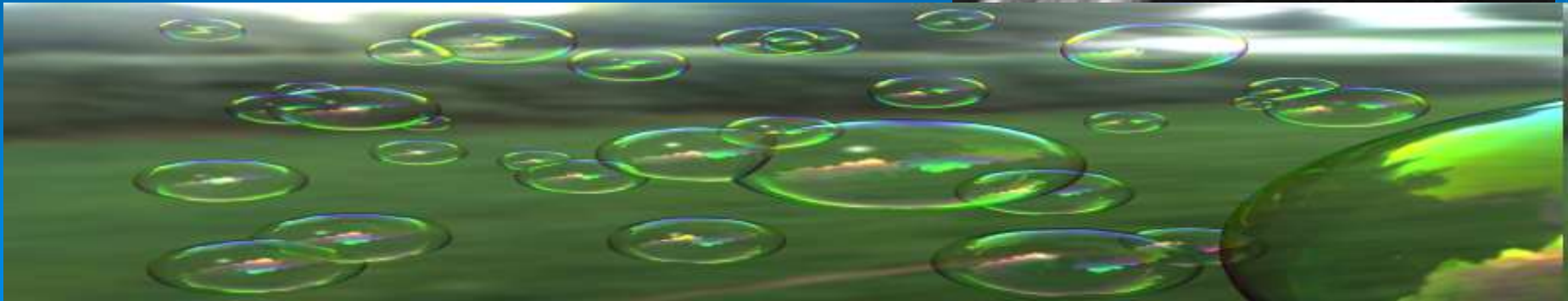
With thinning and perforation of the cortical layer during palpation of the swelling, a sound resembling a crack of parchment paper can be heard.

With trauma to the tumor site, dull pain occurs. Pathological bone fractures at the site of the tumor are characteristic.



X-ray revealed porosity, pseudocystic enlightenment resembling 'soap bubbles'.

Macroscopically, the tumor tissue is fleshy, has a mottled appearance due to hemorrhagic foci or a brown tint due to the loss of hemosiderin.



Surgical treatment is divided into:
palliative (cavity echocleation followed by filling it with bone grafts);
radical (tumor resection with or without graft replacement) and amputation.

Indications for this or that intervention are set according to the localization, morphological and clinical activity of the development of osteoblastoclastoma.

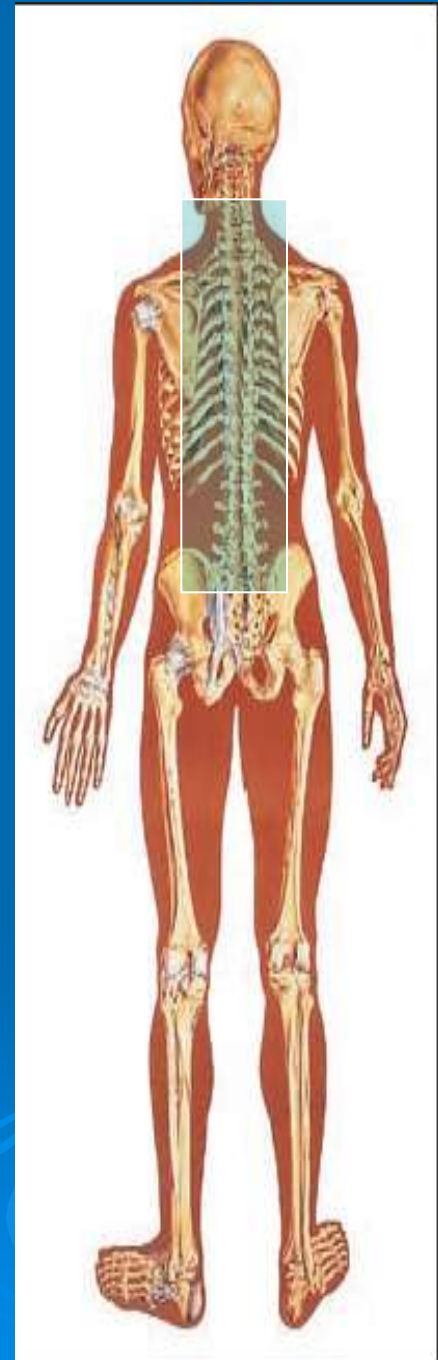


Hemangioma.

The favorite localization of the tumor is the spine, less often the tubular and flat bones are affected.

Most often in the body of the vertebra, less often two, and sometimes three, there is an overgrowth of capillary vessels or cavernous cavities - hemangioma.

The proliferation of soft connective tissue causes partial destruction of the vertebrae. A tumor occurs at any age.





Clinic: minor local pain, especially when pressing on the spinous process of the vertebra. Pain appears when moving, as well as prolonged sitting or walking. The temperature is normal, the blood is unchanged.

On the roentgenogram - a peculiar striation by the type of "stockade".

The disease can last for many years and end with sclerosis of the vertebral body or its compression.

Treatment. In the initial stages of the disease, unloading of the spine with a rigid corset is shown, radiotherapy.

With symptoms of spinal cord compression, a laminectomy is performed.



Multiple exostoses. They arise in the area of metaphyses of long tubular bones. The disease is based on increased cartilage growth not along the axis of the limb, but to the side.

Exostosis consists of a mass of hyaline cartilage on the periphery and an enchondrally formed bone tissue in the center. At the end of exostosis, there is purely a mucous bag. With the end of the patient's growth, the increase in exostosis stops.



Clinic. Depends on the number of exostoses. The number of exostoses can be more than 100, the value is different.

The bones from which they grow are often stunted and bent (dwarf growth).

Exostoses can interfere with muscle movements, compress nerves, causing motor, sensory or trophic disorders.



Treatment.

Surgical - removal of those exostoses that restrict movement, compress blood vessels and nerves.

Sometimes they resort to surgery for cosmetic reasons.

Given the possibility of degeneration of exostoses into malignant forms, the removal of large exostoses is shown.

It is important to remove exostosis together with cartilage cells at its base so that a small depression remains at the site of exostosis.



Malignant bone tumors.

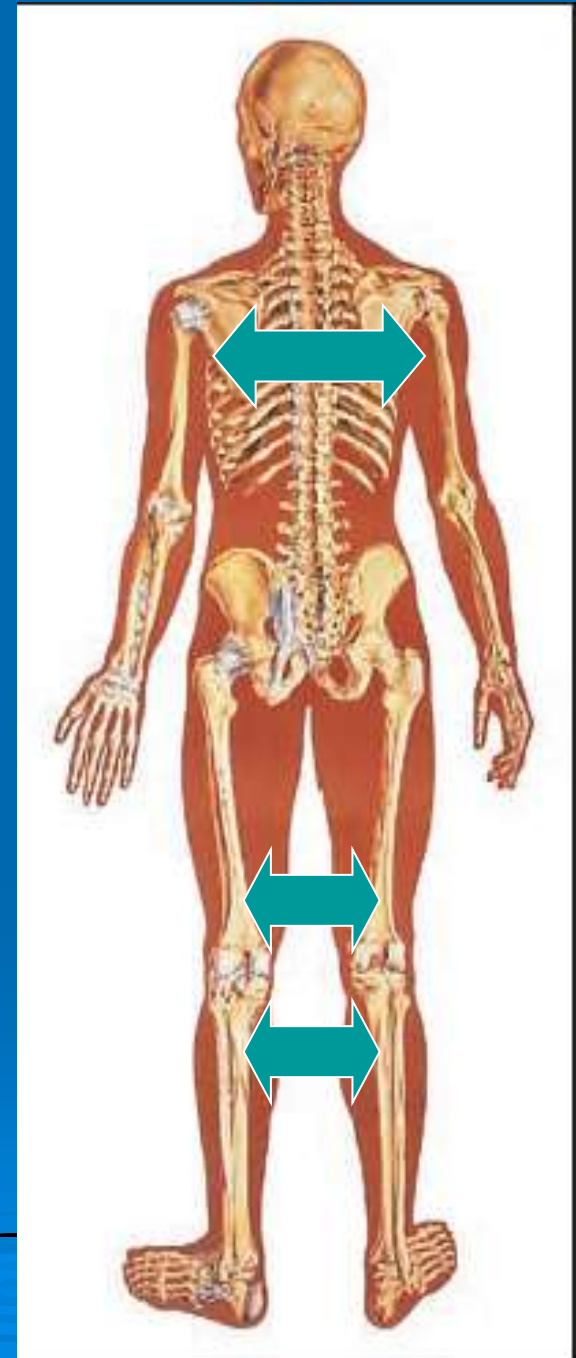
Osteogenic sarcoma.

The most common primary malignant tumor, giving high mortality.

More often sick men aged 10 to 40 years.

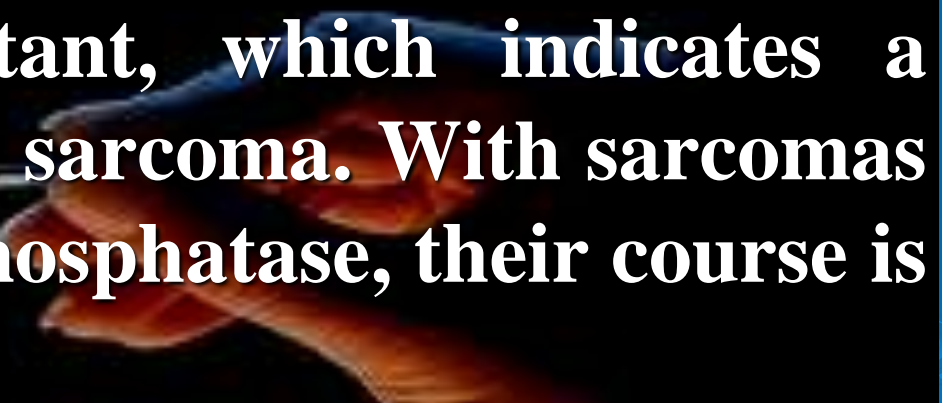
In the first place in the frequency of damage is the femur, its distal end, in second - the tibia and proximal end of the humerus.

In long tubular bones, the favorite localization of the sarcoma is the metaphysis.



Clinic. The main symptom is local pain, in 25% of patients with the appearance of pain, swelling is also observed. Later, restriction of movements in the nearby joint is noted. The skin over the tumor is warm.

From biochemical studies, an increase in alkaline phosphatase is important, which indicates a large malignancy of the sarcoma. With sarcomas with normal levels of phosphatase, their course is less aggressive.



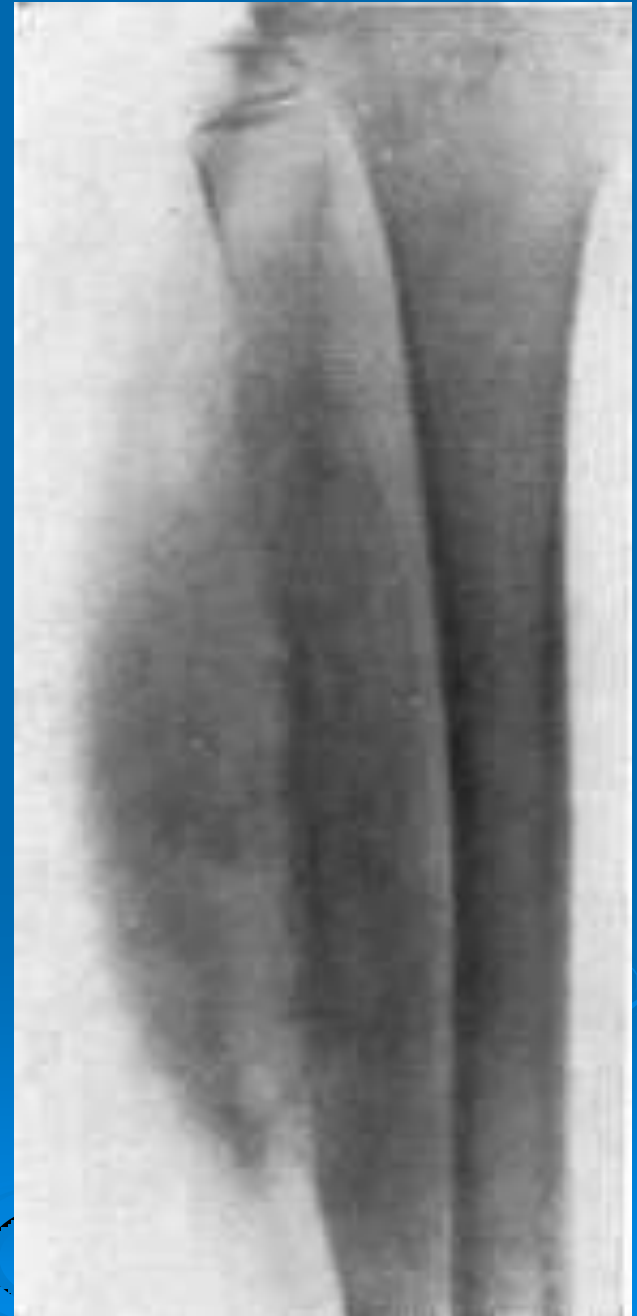
X-ray diagnosis of osteogenic sarcomas is simple.

The initial stages are characterized by osteoporosis of the bone, the contours of the tumor are smeared, it does not extend beyond the metaphysis. Soon a bone defect is outlined.

In the presence of proliferative, osteoblastic processes, the exfoliated periosteum is fusiform in swollen, sometimes interrupted, giving a picture of the “visor”.



Acicular periostitis is characteristic, especially in children, when osteoblasts produce bone tissue along the blood vessels, i.e. perpendicular to the cortical layer, forming the so-called spicules.



**The differential diagnosis of
osteogenic sarcoma is
carried out between:
chondrosarcoma
eosinophilic granuloma,
cartilaginous exostoses,
osteoblastoclastoma.**



X-ray therapy due to the resistance of the tumor to x-rays is practically not used.

Attempts to treat sarcomas with the introduction of radioactive substances (phosphorus) are unsuccessful. There are also no active antitumor chemotherapy drugs. Most patients with osteogenic sarcoma die from lung metastases about a year after surgery.



Ewing's sarcoma.

The tumor affects young people and is most often localized on the thigh.

Clinic. The first sign is pain, but of less intensity than with osteogenic sarcoma. The number of leukocytes increases, sometimes the body temperature rises.

X-ray tumor is characterized by a central diaphyseal location, destruction of bone tissue.

Differential diagnosis is mainly carried out with osteomyelitis and osteogenic sarcoma.



Treatment. The most effective treatment is to irradiate the tumor with X-rays in a total dose of 4000-5000 R.

Ewing's tumors, like reticulosarcomas, 2 months after the onset of the disease metastasize to the bones, regional lymph nodes and internal organs (especially often to the lungs), which leads to the death of the patient during the first two years from the onset of the disease,

With the help of existing therapeutic agents, it is possible to actively influence the primary tumor without the use of surgical intervention (x-ray therapy, chemotherapy). Amputations and exarticulations do not prevent metastasis.

TUMORS OF SOFT TISSUES OF THE SUPPORT-MOTOR APPARATUS

Myeloma, or myelomatosis, is a slowly developing malignant tumor of the bone marrow. The disease affects people aged 50 to 70 years.

The clinic is characterized by general weakness, loss of appetite, fatigue and pain in the limbs. Anemia is characteristic. As soon as the patient begins to complain of pain in the legs, it is necessary to perform sternal puncture to clarify the diagnosis of myeloma - solitary myelomas are often found, especially with localization in the spine.

On radiographs, multiple foci of bone destruction with a pseudocystic structure are determined. Especially frequent are lesions of the skull, ribs, iliac wings and vertebrae.



Treatment. Palliative Chemotherapeutic drugs are used (sarcolysin, especially in combination with hemostatic therapy), as well as ACTH and steroid hormones. The course of treatment with sarcolysin is repeated several times.

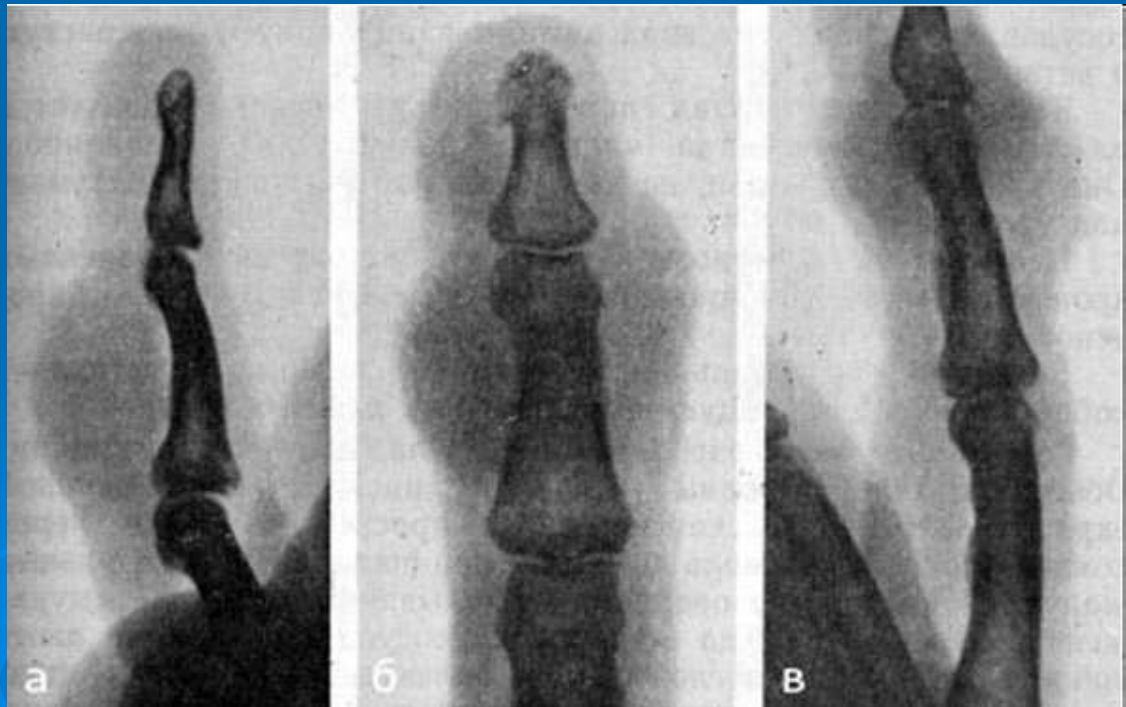


Synoviomas.

Connective tissue tumors that develop in the joints, tendon sheaths, or fascial-aponeurotic structures.
They are characterized by relatively slow growth and a tendency to relapse.

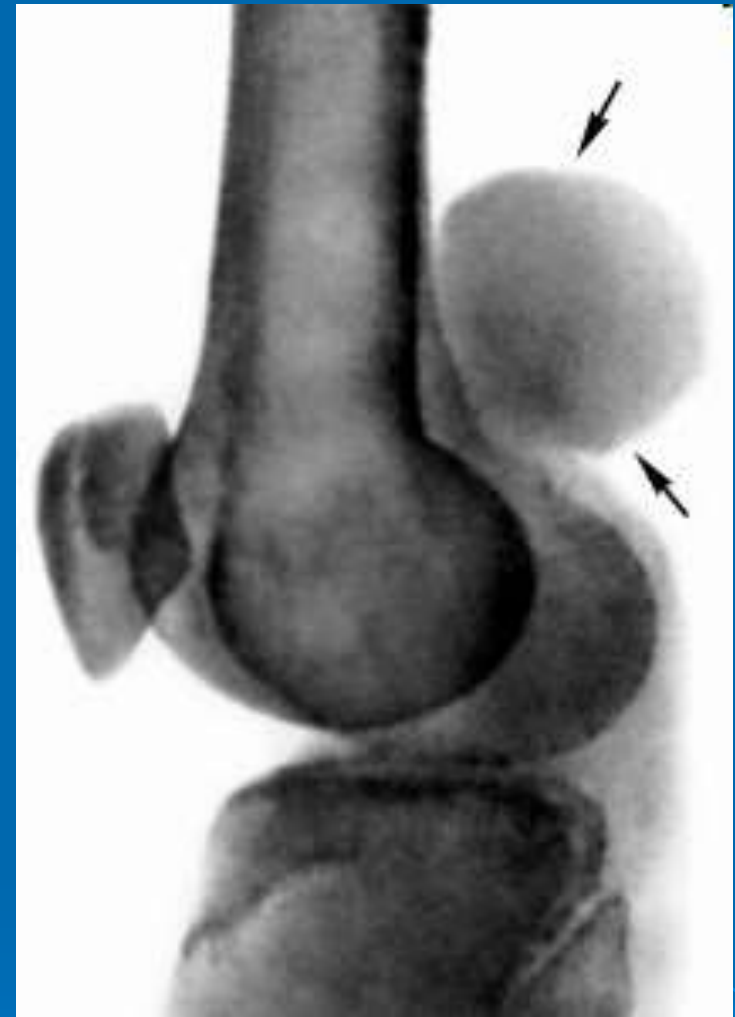
There are benign and malignant synoviomas.

Benign synoviomas are localized on the hands, in the foot, knee and ankle joints.



Malignant synoviomas are located more often on the lower extremities (the area of the knee joints). Tumors have the appearance of tuberous nodes with clear contours, but without a pronounced capsule.

There is germination in nearby bone tissue, which can cause its pathological fracture.



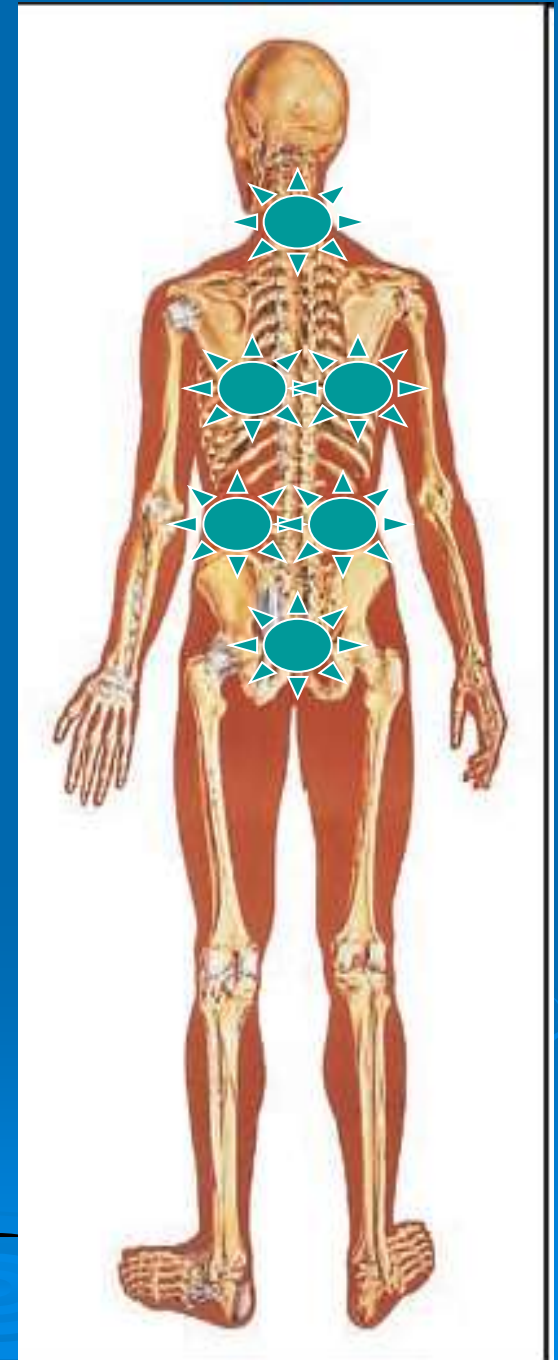
Treatment of malignant synoviomas is surgical, radical.

Metastatic bone tumors.

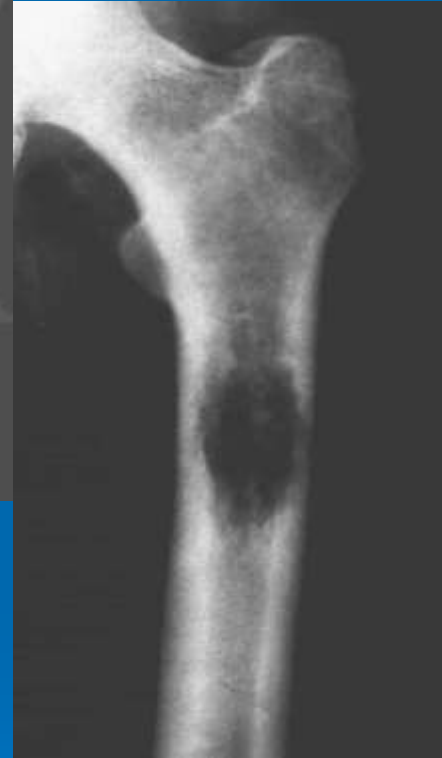
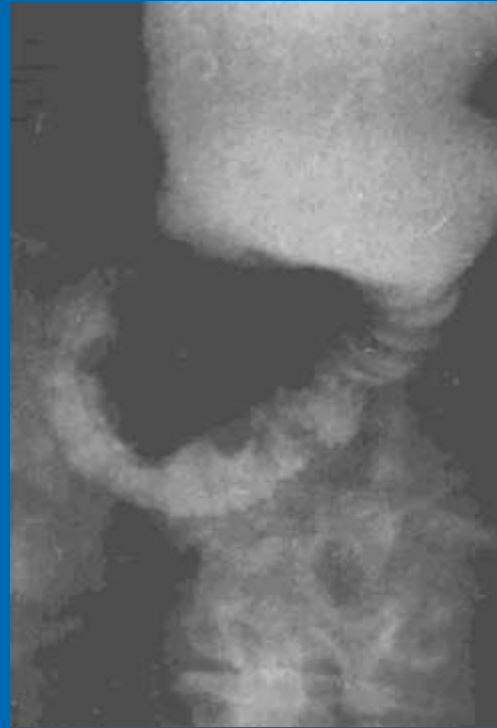
Tumor metastases in the bone are often multiple, but can be isolated.

Most often, metastases occur if the primary tumor is cancerous, less often - sarcoma.

Breast, prostate, kidney, thyroid, and lung cancer metastasize to the skeleton.



The clinical. Metastases to the spine, long and flat bones do not have a characteristic symptomatology and sometimes only manifest a pathological bone fracture. The x-ray picture confirms the presence of destructive changes in it.



**Gastric cancer metastasis
in the femur**

Resection of metastasis and osteosynthesis with a metal rod is especially indicated for pathological fracture and solitary metastasis.

Laminectomy is used in exceptional cases of isolated bone metastasis to the vertebra with signs of compression of the spinal cord.

Osteosynthesis is also shown as the prevention of an emerging fracture with solitary metastasis in a long tubular bone.



Especially often performed osteosynthesis of the femoral neck with metastasis. The main goal of such a palliative surgery is to activate these hopeless patients, saving them from bed rest and facilitate their care.



DIAGNOSTIC METHODS

X-ray study

Marrow puncture and trepanbiopsy of the ilium.

Thermography

Closed biopsy (drill biopsy, trepan biopsy, surgical biopsy).

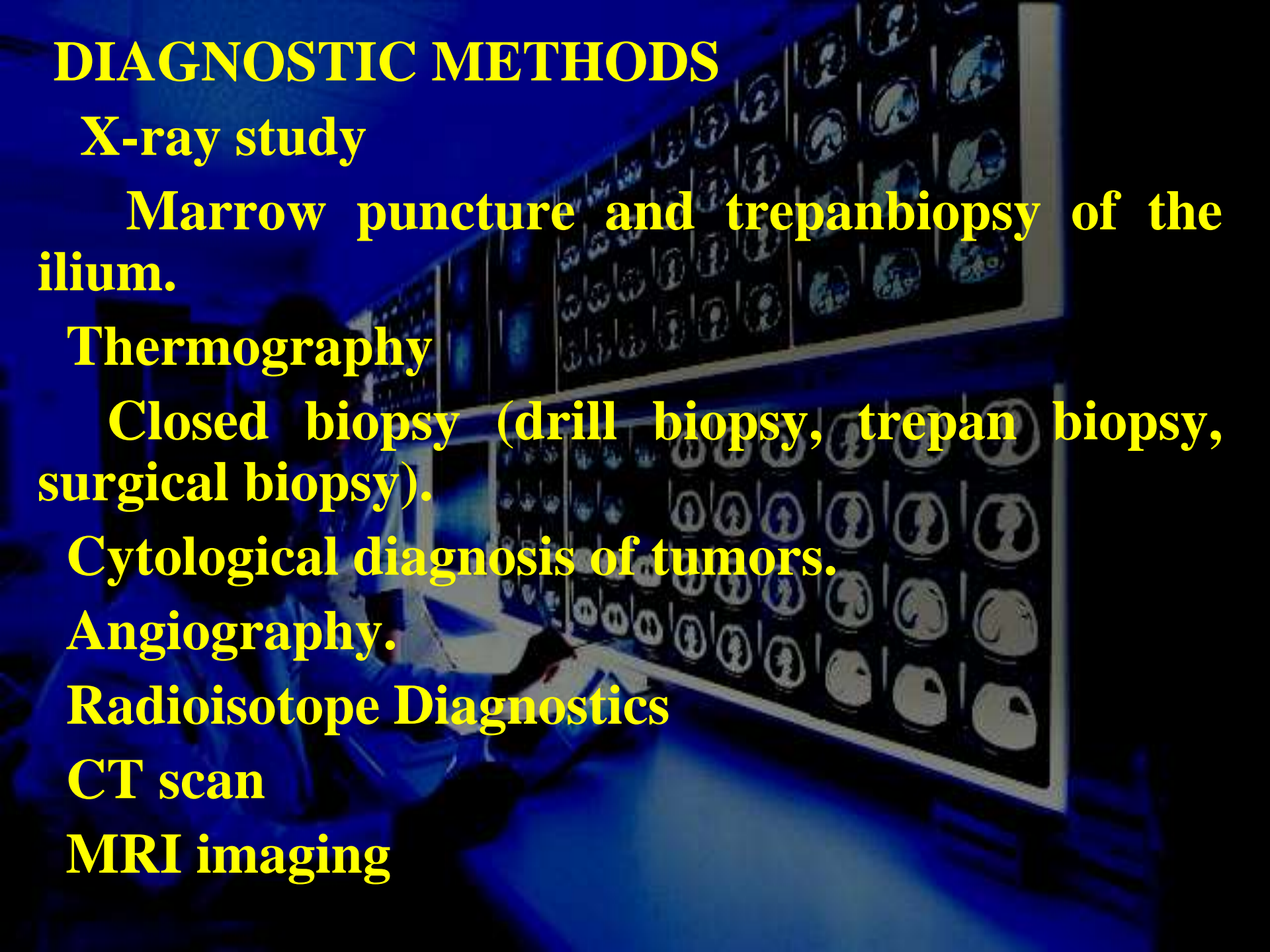
Cytological diagnosis of tumors.

Angiography.

Radioisotope Diagnostics

CT scan

MRI imaging



Rö - signs of goodness:

Small well-defined formation

Thick rim of sclerosis around the tumor

Lack of tumor invasion into soft tissues.

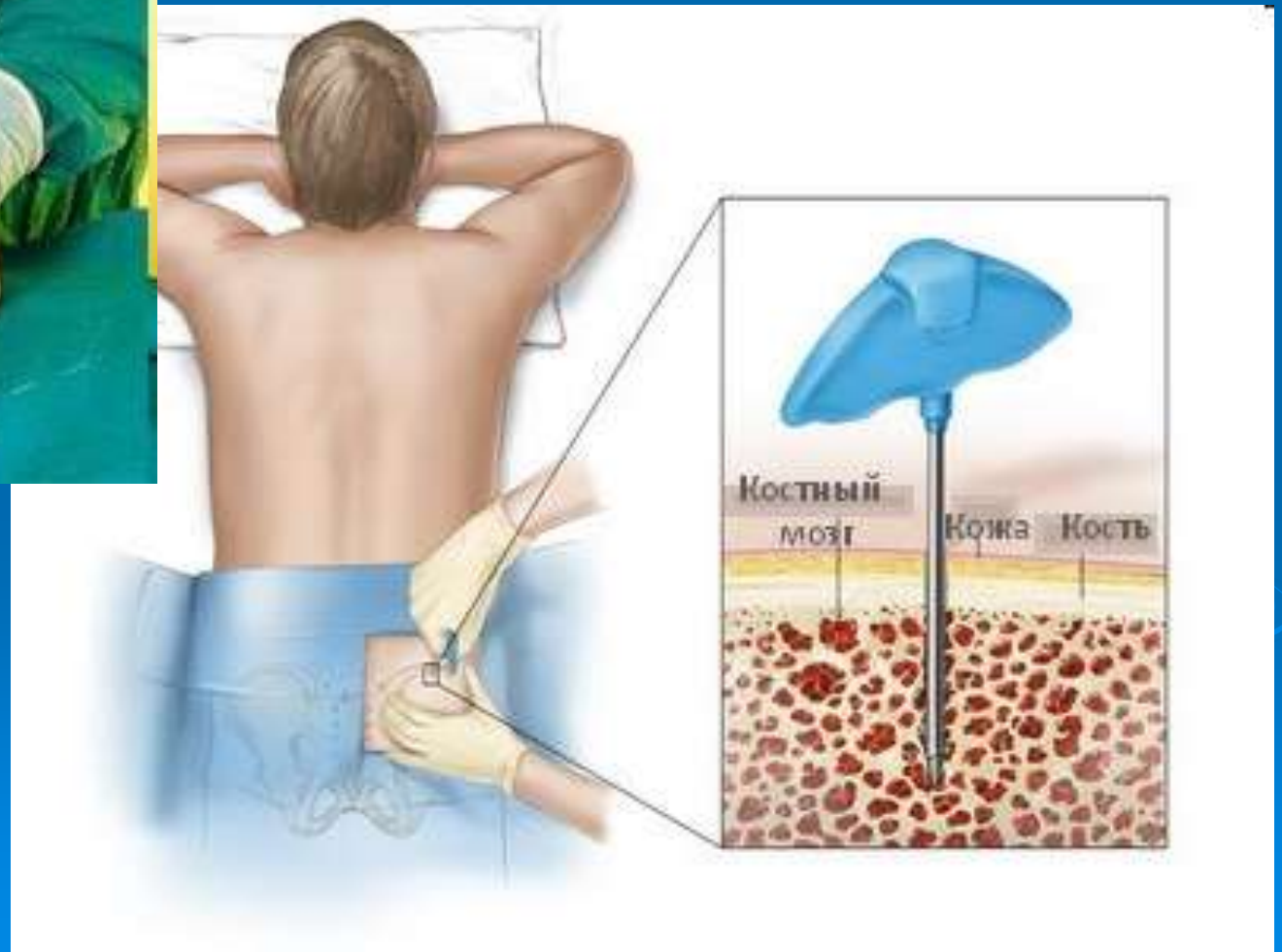
Rö - signs of malignancy:

Large tumor

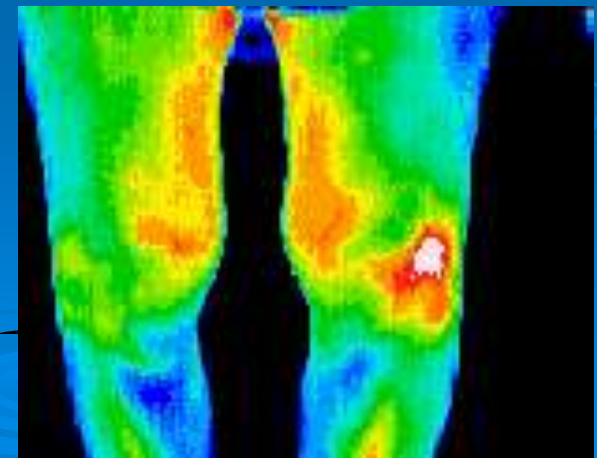
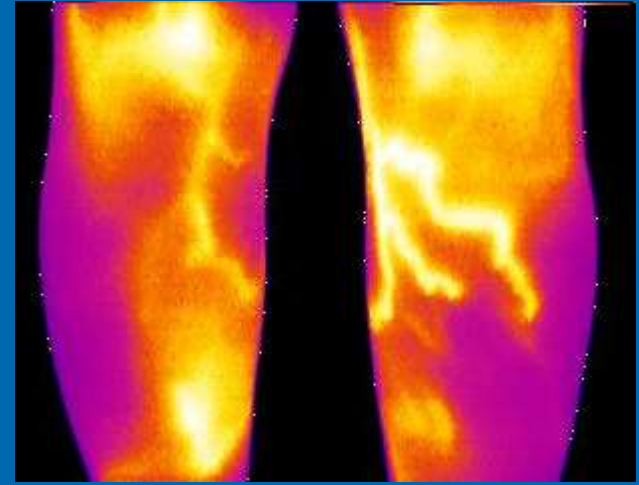
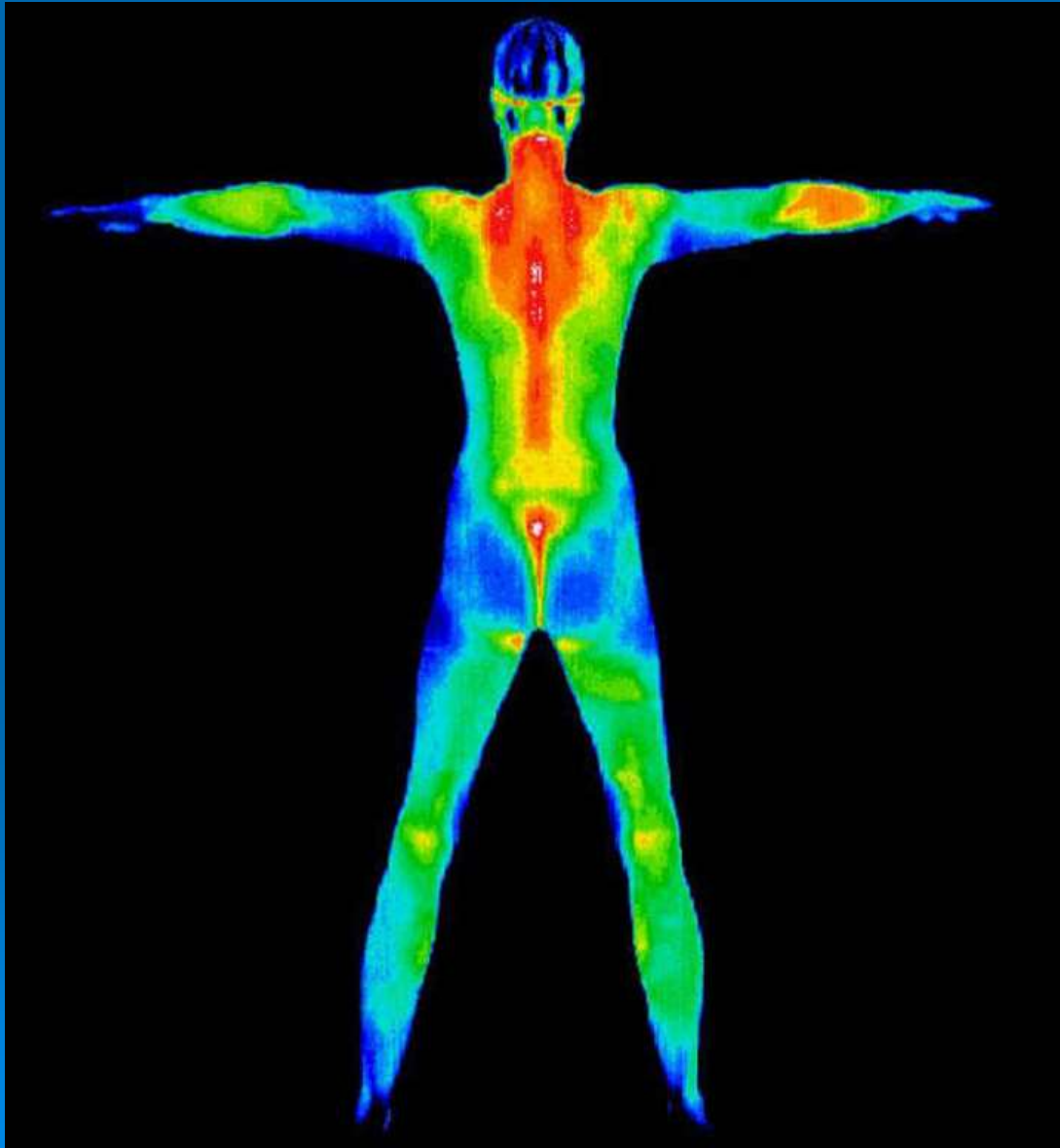
Bone destruction

Germination of a tumor in soft tissue.

Marrow puncture and ileal trepanbiopsy



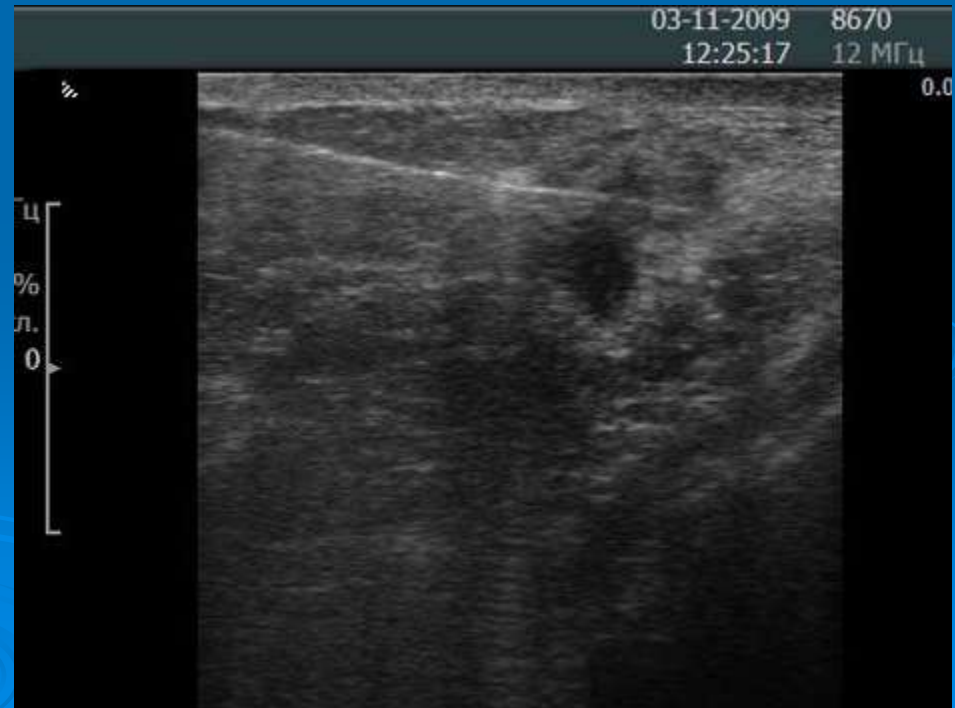
Thermography



Drill biopsy - a biopsy of breast tissue using special needles.

In this case, material is obtained in the form of a column of tissues suitable for histological examination.

The material is taken under ultrasound or x-ray mammography control. Diagnostic accuracy is 100%.



The morphological method is crucial in determining the nature of the tumor tissue.

A biopsy is performed if the nature of the tumor is unclear after examinations.

The possible danger of a biopsy is much less than the real harm that the patient does untimely recognition and improper treatment of a malignant tumor.



Cytological diagnosis of tumors

Benefits.:

the possibility of obtaining material from hard-to-reach areas,

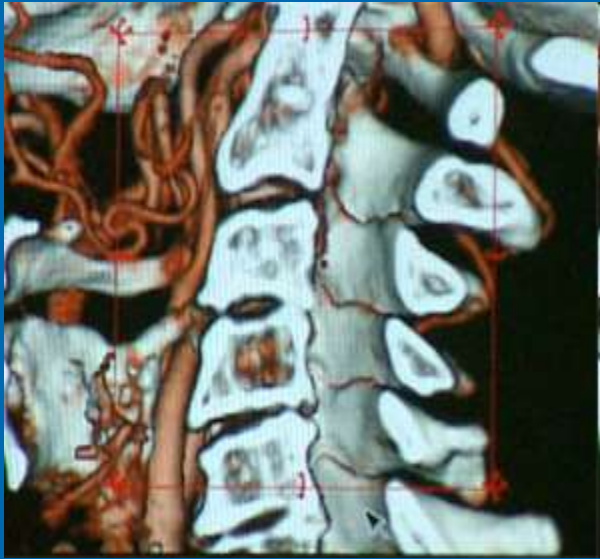
the speed of obtaining information without decalcification.

Disadvantages:

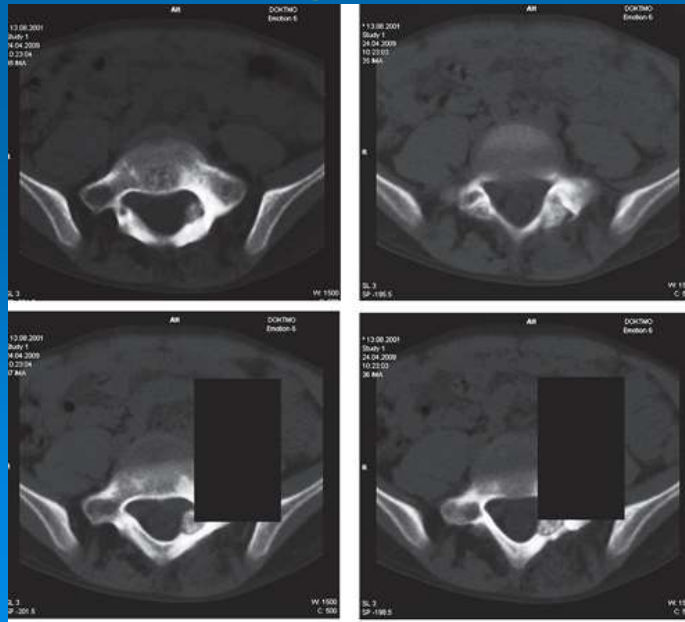
limited material received.



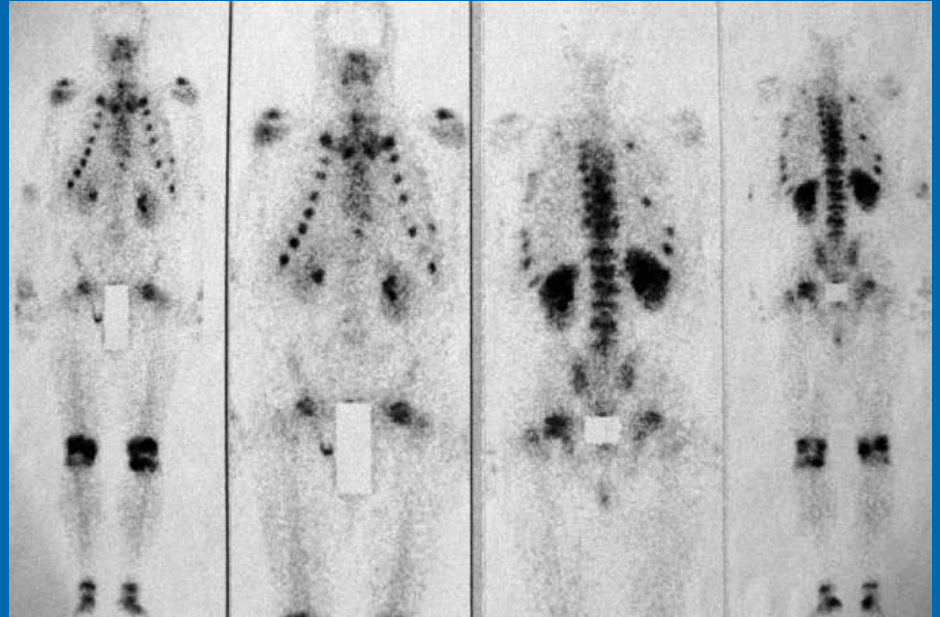
Angiography



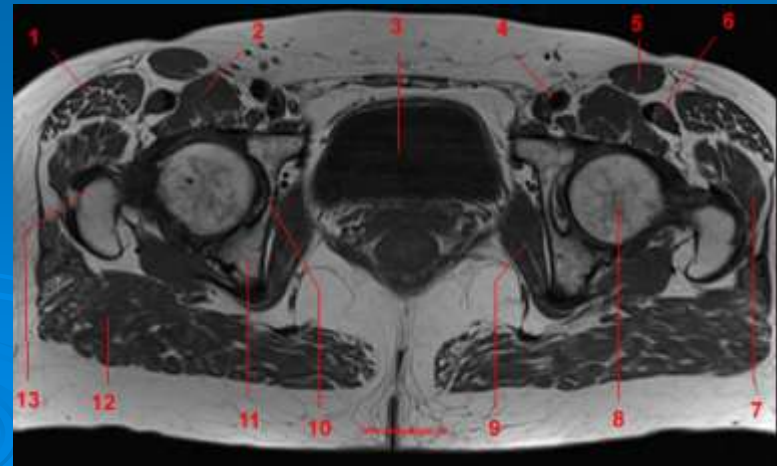
CT



Radioisotope diagnostics (scintigraphy)



MRI



Laboratory diagnostics:

With benign tumors, the shifts are insignificant and uncharacteristic.

For malignant:

ROE,

hypochromic anemia,

changes in the albumin globulin index,

changes in alkaline and

acid phosphatase

an increase in sialic acids, CRP,

DPA reactions, mucoproteins,

hexosamines.



PRINCIPLES OF TREATMENT OF BONE TUMORS



Radiation therapy.

Not widely used in bone tumors due to the insensitivity of most bone tumors to ionizing radiation.

With external exposure, the source is outside the body. The rays focus on the area of the tumor.

Brachytherapy is the use of radioactive material injected directly into the tumor.



Drug therapy for malignant bone tumors.

Chemotherapy is often used in treatment regimens for Ewing's sarcoma and osteosarcoma, but is rarely used for other types of malignant bone tumors.

Doxorubicin (Adriamycin)

Cisplatin or carboplatin

Etoposide (VP-16)

Ifosfamide (Ifos)

Cyclophosphamide (Cytosan)

Methotrexate

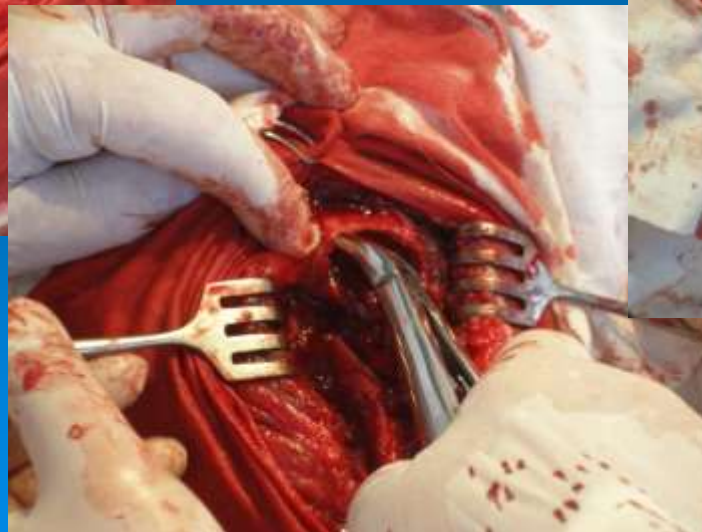
Vincristine (Oncovin)

Usually two or three drugs are administered at the same time.



Surgical treatment methods.

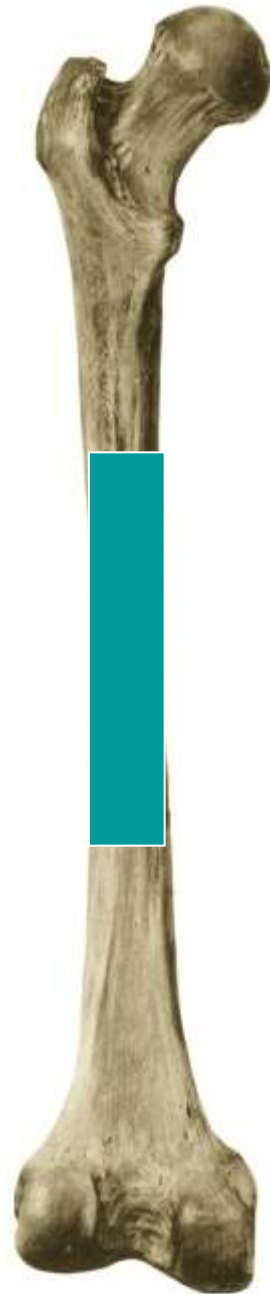
Preserved operations - excochleation - curettage with a spoon of a tumor site located in the bone. This method gives good results with benign tumors located centrally in the bones.



Bone resection is a more radical method of surgical treatment. The operation involves the wide removal of the tumor within healthy tissues,

Edge resection - removal of a bone site without violating its integrity.

Segmental resection of the bone consists in removing a section of the bone with a violation of its integrity, perpendicular to the bone.



The choice of bone resection depends on the nature, size, and location of the tumor.

Edge resection is used for benign, exophytic growing tumors, without replacing the removed bone tissue.

Segmental resection is performed both with bone tissue replacement and without replacement. The latter method is usually used for tumor resection in the fibula, ribs, bones of the foot and hand.



Currently, in the treatment of bone tumors, the combined method is quite widely used - the use of drugs and radical surgical intervention or radiation therapy.



Chemoembolization during organ-preserving operations on the extremities with malignant neoplasms of the bone and soft tissues of the extremities

In patients with sarcomas of bones and soft tissues of the limbs, chemoembolization is performed by the Seldinger method before surgery.

Chemoembolization allows for necrosis and tumor degeneration. This leads to a decrease in the number of relapses and makes it possible to perform organ-preserving surgery.



Long-term (5-year) survival of patients suffering from malignant tumors of bones and cartilage depends on the stage of the disease and is

64 - 80% in the early (I-II) stages

17 - 44% in the later (III-IV) stages of the disease.



THANK YOU !

