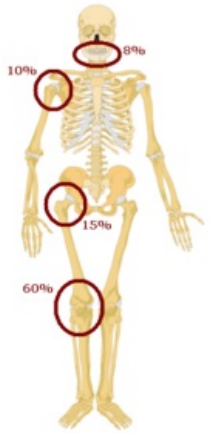
Osteosarcoma

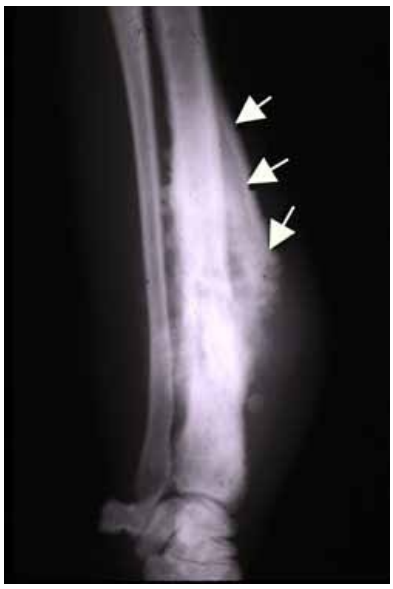
Osteosarcoma is a malignant primary **bone tumor** (the 2nd most common primary malignant bone tumor after the exclusion of multiple myeloma). It most often affects the long bones of the lower limb near the knee joint. Osteosarcoma grows in the bone, which it destroys, and invades the soft tissues around the bone. It soon metastasizes, especially via the hematogenous route to the **lungs**, other **bones**, and the **brain**. It is one of the **most common malignant bone tumors**, along with chondrosarcoma. The age group most at risk is the 10 - 20 years age group. Every year, 4 out of one million children are diagnosed with osteosarcoma.[1]



Predilection sites for osteosarcoma

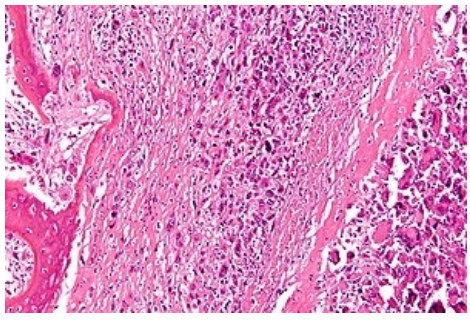
Classification

- **Central** (medullary, conventional) osteosarcoma is a **highly malignant tumor** (the most common malignant bone tumor) that occurs in individuals under 20 years of age (one of the most common tumors in this age group) or in older individuals due to Paget's disease, fibrosis dysplasia, and similar pathological bone processes. It can affect any bone (more often the femur, tibia, humerus, at the transition from the diaphysis to the metaphysis). It soon metastasizes (mainly to the lungs, brain, other bones). It is **clinically** manifested by persistent dull pain, mild swelling of the bone and mild fever. The tumor begins to grow in the metaphyseal marrow, infiltrates the cortex below the periosteum, and then can grow into the adjacent soft tissues. **Osteoid** formation is evident **microscopically** (non-mineralized bases) by tumor cells (the tumor consists of osteoblasts). In different proportions, bone, and cartilaginous and fibrous tissue are represented (or with wide vascular spaces - telangiectatic osteosarcoma - the most malignant form of osteosarcoma). Depending on which type of tissue predominates, osteosarcoma can be:
  - **Fibroplastic** - spindle cell ligament;
  - **Chondroplastic** - tumor of cartilaginous tissue with atypical spindle cell elements;
  - **Osteoplastic** - islets or beams of osteoid (can be mineralized), tumor osteoblasts have atypical or polymorphic nuclei (the only sign that it is a tumor process).
- **Peripheral** (superficial) osteosarcoma: creates a painful protuberance on the bone surface. X-ray shows secondary periosteal ossification. It includes, for example, parosteal (juxtacortical) osteosarcoma with a very good prognosis, osteosarcoma with a high degree of malignancy, and periosteal osteosarcoma.[2]


Codman's triangle

Clinical picture

- Pain in the affected bone, typically resting and nocturnal (i.e., without physical exertion)
- With tumor growth, solid swelling occurs, which may not be painful to the touch (typically around the knee joint).
- At an advanced stage, a pathological fracture of the relevant bone might occur.
- Non-specific general symptoms - night sweating, fever, weight loss
- Cough and difficulty breathing - lung metastases. [1]


Detail of tumor cells

Diagnosis

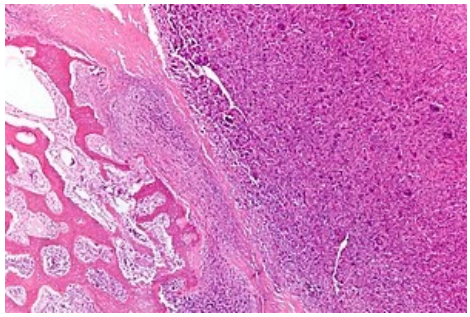
- **Elevated phosphatase levels**[2] are a biochemical marker of bone tumors
- Simple X-ray (typically areas of osteolysis and newly formed bone, unbounded, exhibits periosteal reaction, *Codman's triangle* = space bounded by elevated periosteum, bone surface and tumor), NMR
- Definitive diagnosis histologically (sarcoma stroma, osteoid formation by tumor osteoblasts)
- CT of the lungs and scintigraphic examination of the skeleton– metastases[1].

Treatment

- Chemotherapy (adriamycin, high-dose MTX, leucovorin, cisPt, BCD, ifosfamide)
- Radical surgical removal of the tumor (amputation or limb saving surgery)
- Osteosarcoma generally has a low sensitivity to radiotherapy[1].

Prognosis

Patients with a radically operated tumor and a good response to chemotherapy have up to an 80% chance of recovering.[1]



Normal bone tissue is visible on the left, while osteosarcoma is visible in the middle. Stained with HE

References

Related articles

- Osteoma
- Mesenchymal tumors
- Osteosarcoma (preparation)
- Ewing's sarcoma
- Spinal tumors

References

1. FN Brno. *Osteosarkom* [online]. Klinika dětské onkologie FN Brno, [cit. 2011-01-02]. <https://www.fnbrno.cz/detska-nemocnice/klinika-detske-onkologie/informace-pro-pacienty/t2698>.
2. PASTOR, Jan. *Langenbeck's medical web page* [online]. [cit. 18.04.2010]. <https://langenbeck.webs.com/>.

Used literature

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