Osteoblastoma

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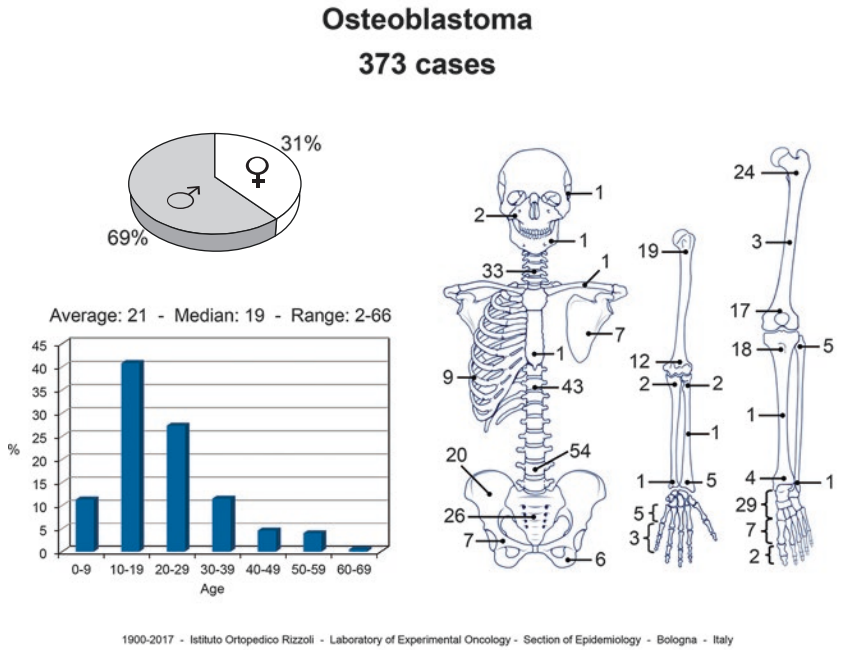
Definition: Benign tumor producing osteoid and woven bone. Differently from osteoid osteoma, it does not have a limited growth potential; for this reason it can become very big, generally more than 2 cm in larger diameter, up to more than 10 cm.

Epidemiology: It is rare. It has predilection for males (2–3:1). Rarely observed prior to 8 and after 40 years of age.



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Localization: Osteoblastoma shows evident predilection for the vertebral column (posterior arch) and the sacrum, but it may occur in any skeletal site.

Clinical: In the spine, it presents symptoms similar to osteoid osteoma (pain, scoliosis) with frequent signs of root compression. Usually it grows slowly but aggressive lesions manifest a rapid growth with severe symptoms due to the peritumoral inflammation.

Imaging: It is an osteolytic tumor containing a variable extent of osseous-type mineralization. Its size varies from 2 to 10 cm, majority being between 3 and 5 cm. The tumor may be central, eccentric, and rarely periosteal. It tends to be roundish, with margins often demarcated by a rind of bone sclerosis (not as dense as in osteoid osteoma). The cortex may be destroyed with intense periosteal reaction. In aggressive lesions, the limits may appear blurred. Rarely the tumor blows the bone out or contains cystic spaces like ABC. A regional osteoporosis may be associated (due to peritumoral inflammation). Isotope bone scan is very hot. CT at best depicts intratumoral densities (mineralization of the woven bone formed by the tumor). MRI may show extensive peritumoral inflammatory reaction. It is highly vascularized.

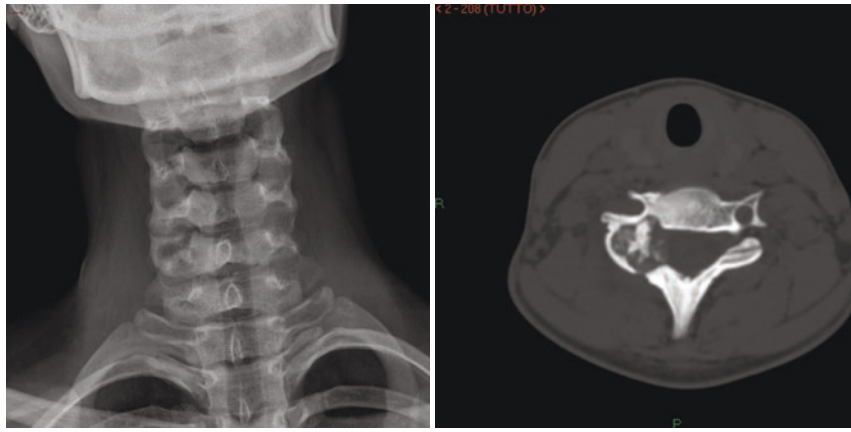
Histopathology: The tissue is compact, reddish-brown, of soft to gritty consistency. Occasionally wide cavities typical of ABC are observed. The cortex is thinned, expanded, sometimes absent, with a pseudo capsule covering the tumor.

Microscopically the tumor consists of large osteoblasts producing osteoid and woven bone. Trabeculae are usually thin, with a regular "organoid" pattern. Osteoblasts rim the trabeculae. Cytologic features of activity (large cytoplasm, plump dark nuclei, and evident nucleolus) may be present. Scattered mitotic figures can be seen but never atypical. Large cells with bizarre hyperchromatic nuclei may be seen: they are never in mitosis and are interpreted as regressive cells (the so-called pseudo-malignant osteoblastoma). Intertrabecular tissue contains a loose fibrovascular stroma, with abundant capillaries. The interface between tumor and surrounding bone is sharp with no permeative pattern (differential diagnosis vs. osteosarcoma). Multifocal growth defines the so-called multifocal osteoblastoma. Aggressive osteoblastoma is characterized by large epithelioid osteoblasts with abundant eosinophilic cytoplasm, vesicular nuclei, and prominent nucleoli; in the last WHO classification, it is reported that there is no evidence that aggressive osteoblastoma seems to have a worse prognosis than conventional osteoblastoma.

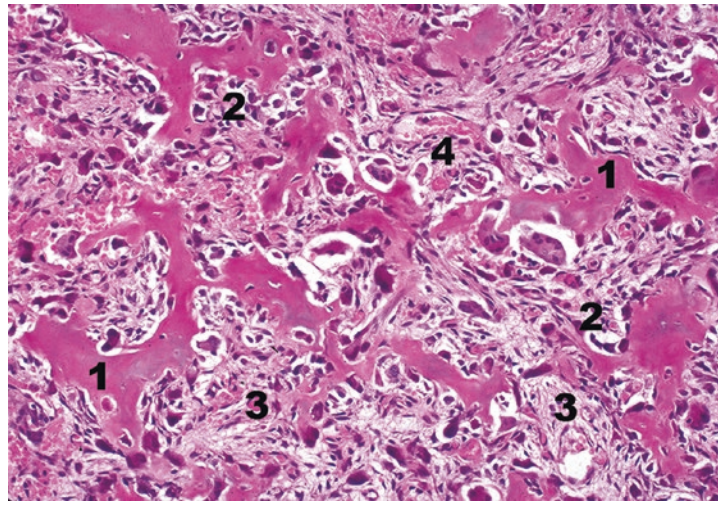
Course and Staging: Most osteoblastoma are actively growing but well contained (stage 2). Occasionally they are more invasive, bulging into the soft tissues (stage 3). Rarely the tumor appears almost quiescent and heavily mineralized, so that it can be approximated to a stage 1 lesion. The vast majority of "osteoblastomas" that end up metastasizing to lungs, leading to patient demise, were probably osteoblastoma-like osteosarcomas from the beginning. It is very important to assess the matrix of the "osteoblastoma" lesion with the host bone. If it permeates the marrow spaces and traps host lamellar bone, the lesion is an osteosarcoma, osteoblastoma-like.

Treatment: In stage 1 (latent) or stage 2 (active): intralesional curettage. In stage 3 lesions (aggressive): marginal or wide resection is indicated. In vertebral localizations, aggressive curettage or resection. Selective preoperative arterial embolization may be useful to reduce bleeding during surgery.

Key points	
• Clinical	Pain and swelling, depending on the site. Frequent in the spine (posterior aspect)
• Radiological	Mixed lesion (lytic/mineralized)
• Histological	Osteoblasts producing osteoid and woven bone in a regular organoid pattern
• Differential diagnosis	Low-grade central osteosarcoma



Radiograph and CT of the cervical spine. The lesion is well limited, contains ossifications, and is surrounded by reactive sclerosis



(1) Irregular bars of neoplastic osteoid. (2) Plump, deeply stained, and slightly pleomorphic osteoblasts encircling woven bone trabeculae. (3) Proliferation of mesenchymal cells that tend toward osteoblastic differentiation. (4) Rich capillary vascularization

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