# Osteosarcoma

by Lester D. R. Thompson, MD

Osteosarcoma is a mesenchymal malignancy in which the neoplastic cells synthesize and secrete the organic components of bone matrix. While it is the most common primary tumor of bone, it is very uncommon overall.

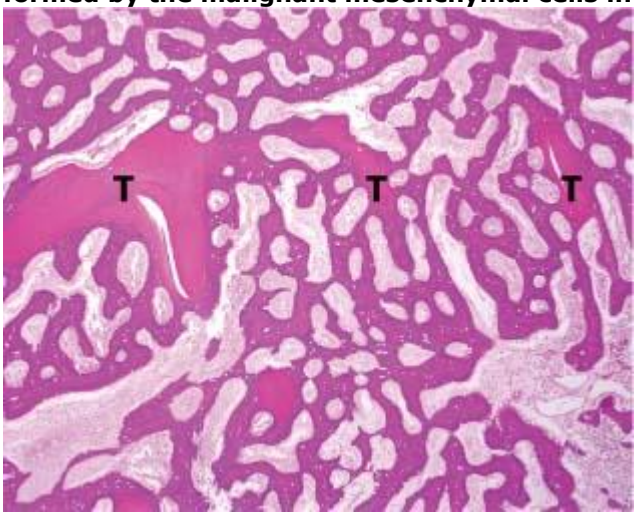
Osteosarcoma of the gnathic bones represents 6 to 8% of all osteosarcomas. Gnathic osteosarcomas usually present in patients in their mid-30s, which is more than a decade later than the peak incidence of long-bone osteosarcomas. This tumor affects the mandible and the maxilla differently, with mandibular tumors tending to arise from the body of the mandible while maxillary tumors arise from the alveolar ridge and sinus. The known etiologic factors include antecedent radiation exposure and Paget disease of bone.

Swelling and pain are the most common findings at presentation; teeth loosening, paresthesia, and bleeding may also be seen. Imaging studies are requisite for the diagnosis, as the destructive findings (sclerotic and/or lytic) and soft-tissue extension help determine the diagnosis and operative planning. Most of these tumors are intramedullary; only a few cases of surface tumors have been described.

The treatment of choice is radical surgery, with or without adjuvant chemotherapy or radiation therapy. Treatment outcomes are similar to those of patients with long-bone osteosarcomas.

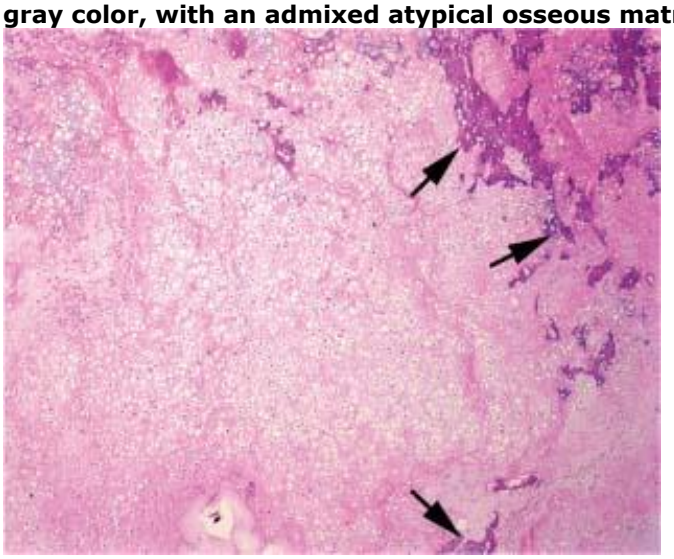
Macroscopically, gnathic osteosarcomas are gritty and tan-white, and depending on the matrix mineralization, they may exhibit a marble-like cut surface. Cartilaginous nodules (pale, blue-gray, and glistening) may be present. Histologically, osteosarcomas display mesenchymal cells that contain spindle-shaped to oval nuclei and indistinct cell membranes. Depending on the type and grade of a particular tumor, the cells may exhibit pleomorphism, a high nucleus-to-cytoplasm ratio, hyperchromatism, and abnormal mitoses. Bone matrix is the hallmark of osteosarcoma, but sometimes the osseous matrix is relatively scant (figure 1).

**Figure 1. A low-power view of a conventional (intramedullary) osteosarcoma demonstrates islands of osseous matrix infiltrating though the trabecular (T) bone. The osseous matrix is formed by the malignant mesenchymal cells in the surrounding stroma.**



One of the most common subtypes of gnathic osteosarcoma is chondroblastic osteosarcoma, which is made up of malignant, osteoid-producing cells with admixed islands and lobules of malignant cartilaginous or chondrosarcomatous tissue (figure 2). If the cartilage predominates, the tumor may be misclassified as a chondrosarcoma.

**Figure 2. In this low-power photomicrograph of a chondroblastic osteosarcoma, most of the field demonstrates an atypical and malignant cartilaginous matrix, identifiable by the pale blue-gray color, with an admixed atypical osseous matrix (arrows).**



## Suggested reading


1. Azizi T, Motamedi MH, Jafari SM. Gnathic osteosarcomas: A 10-year multi-center demographic study. Indian J Cancer 2009; 46 (3): 231-3.
2. Guadagnolo BA, Zagars GK, Raymond AK, et al. Osteosarcoma of the jaw/craniofacial region: Outcomes after multimodality treatment. Cancer 2009; 115 (14): 3262-70.
3. Padilla RJ, Murrah VA. The spectrum of gnathic osteosarcoma: Caveats for the clinician and the pathologist. Head Neck Pathol 2011; 5 (1): 92-9.
4. Ritter J, Bielack SS. Osteosarcoma. Ann Oncol 2010; 21 (Suppl 7):vii, 320-5.



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