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Mandibular osteosarcoma: Literature review and clinical case report

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Abstract
Osteosarcoma is a primary malignant tumor that most commonly affects long bones; however, 10% of cases typically occur in the head and neck. Its histological classification determines the diagnosis of osteosarcoma and the course of treatment. Osteosarcomas of the head and neck primarily affect individuals in their thirties and forties, unlike those of the extremities, which typically occur in adolescents and young adults. Surgical resection is the recommended treatment; it must include negative margins. Chemotherapy and radiation therapy should be used according to the tumor's histological grade. In summary, treatment should be approached in a multimodal and multidisciplinary manner to improve patient survival and quality of life.

Keywords: Mandibular osteosarcoma, histological classification, treatment

Introduction

Head and neck osteosarcomas (OS) are highly disfiguring malignant tumors that primarily affect the mandible and to a lesser extent, the maxilla. Initial management includes surgical resection, which poses significant challenges for surgeons and their surgical teams, given the anatomy of the maxilla and the resulting facial defect. Surgical resection is certainly difficult given the complications that may arise; however, the benefits it offers patients improve their quality of life [1]. At a later stage, and always taking into account the patient's progress and the tumor's remission, facial reconstruction will need to be planned to improve the patient's quality of life. In general, mandibular OS are historically similar to their extragnathic counterparts in that they are generally categorized as either low-grade or high grade, and most high grade mandibular os are regarded as conventional OS in the current world healt organization histologic classification [2] They are malignant tumors that originate in connective tissues and develop in soft tissues or bones. Osteosarcoma of the jaws differs from that originating in the extremities in that it has a higher mortality rate; however, distant metastasis—particularly to the lungs—is rare. This article provides a comprehensive review of current concepts in this field, emphasizing aspects such as diagnosis, clinical and histological characteristics, treatment, and prognosis. It also presents a clinical case treated at the IMSS Oncology Hospital in Mexico City.

Osteosarcomas of the Head and Neck

Osteosarcoma composes a high proportion of bone malignacy, affecting adolescents and older persons. The tibia and humerus are most frequently affected áreas. The 10% of all osteomas cases se presentan on head and neck. Perineural invasión is a manifestation of aggressive tumor behavior [3, 4, 5]. Mutations in the TP53 gene, which regulates apoptosis (programmed cell death), are among the most common alterations in osteosarcoma and are associated with Li-Fraumeni syndrome, a genetic condition that increases the risk of developing cancer. The tumors develop within the bone or on its surface and are classified into three groups: *conventional intramedullary* osteosarcoma and its histological subtypes (osteoblastic, chondroblastic, and fibroblastic); *low-grade central* osteosarcoma; *and* parosteal, periosteal, and superficial *high-grade* osteosarcomas [6]. Surgical resection should be extensive with negative margins; each case should be considered individually. In some cases, adjuvant treatments such as radiation therapy and chemotherapy are administered. Although multimodal therapeutic approaches have been shown to improve survival rates in OSJ, they are reserved for patients with advanced-stage tumors or aggressive forms of the disease [7, 8]. Sun Xin and Guo Wei (2020, p.7) [10] conducted a meta-analysis on prognostic factors in osteosarcomas and found that there are significant correlations between gender, age at the time of diagnosis, tumor size, tumor location, chemotherapy response, and surgery and overall survival of patients with osteosarcoma.

Case Report

25-year-old male, native and resident of Mexico City: with no family history of bone cancer, the patient reported smoking 6 cigarettes a day for a period of five years, in conjunction with alcoholism. He presented to the outpatient clinic at the CMN S: XXI Oncology Hospital in Mexico City. On examination, a mass was noted extending from the left third molar, with thickening and perforation of the mandibular vestibular bone plate, infiltrating the floor of the mouth, and causing ulceration of the buccal mucosa. The patient had previously undergone an incisional biopsy, with a histological report indicating osteoblastic mandibular osteosarcoma. Once the initial care protocol was completed, the patient underwent surgery under general anesthesia with orotracheal intubation, during which a left hemimandibulectomy was performed, along with radical neck dissection and submandibular gland enucleation (Fig. 1-5). The Plastic and Reconstructive Surgery Department performed surgical marking for reconstruction during the second surgical procedure. The patient received adjuvant

therapy consisting of 30 sessions of radiation therapy at 2 Gy each and 5 cycles of chemotherapy with cisplatin and doxorubicin over 6 weeks. The tumor was staged as T1N0M0.



Fig 1: Shows the approach and linear neck incision

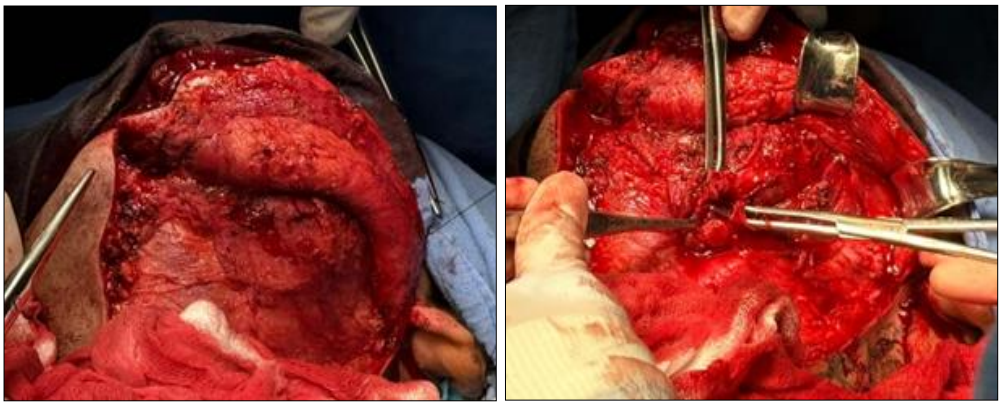


Fig 2: Shows Flap elevation and lymph node dissection

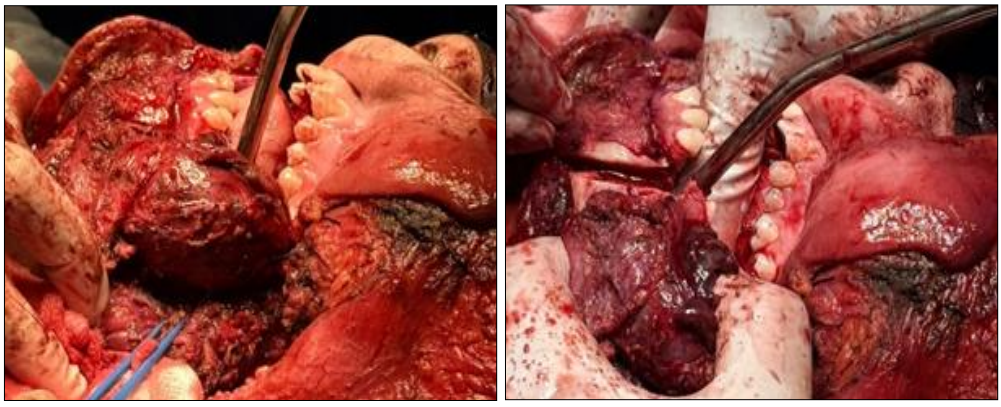


Fig 3: Exposure and resection of the tumor

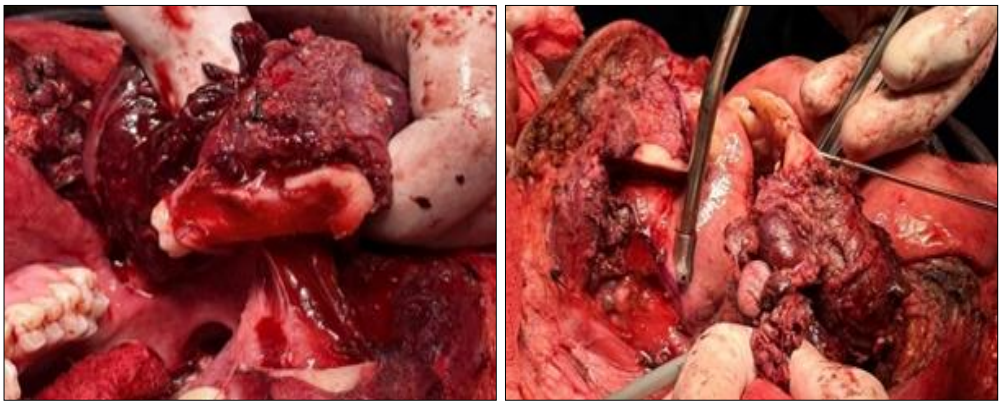


Fig 4: Shows osteotomies being performed to complete the hemimandibulectomy tumor

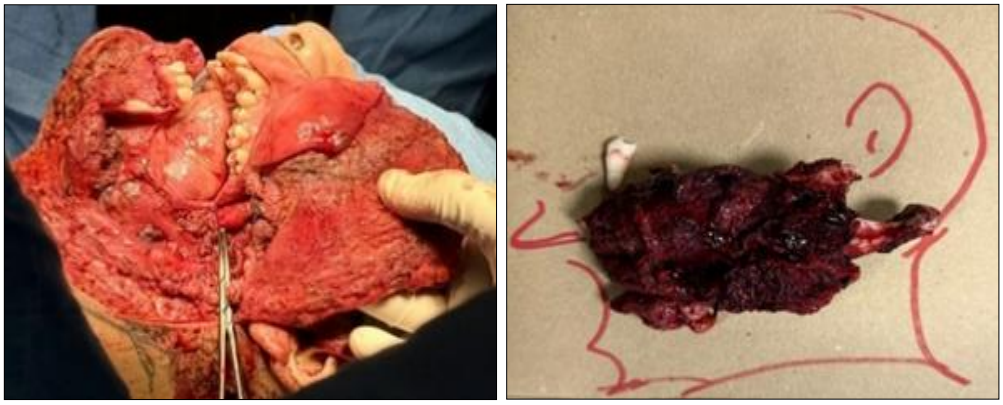


Fig 5: Shows the complete resection and macroscopic surgical specimen

Discussion

Stage is the primary prognostic factor influencing the development of metastases and survival. The diagnosis is made through biopsies, the procedure for which is well-established. The quality of surgical treatment is the primary factor in local control of sarcomas. The issue of local control is particularly significant in head and neck sarcomas due to their proximity to vital anatomical structures. The entire treatment strategy should focus on the possibilities for extensive surgery, prioritizing reconstructions using free flaps and evaluating the usefulness of chemotherapy or even radiation therapy

Conclusions

Osteosarcoma commonly occurs in the bones of the extremities and, less frequently, in the head and neck, affecting the mandible and maxilla. Treatment should be approached in a multimodal and multidisciplinary manner to improve patient survival and quality of life.

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