



AN INNOVATIVE APPROACH OF STAPLER ANASTOMOSIS FOR MICROVASCULAR RECONSTRUCTION IN MANAGEMENT OF OSTEOSARCOMA OF MANDIBLE - A CASE REPORT

Dr. Agiri Sharanika Nagaja*¹, Dr. Rubin S John², Dr. Murugesan K³

Post Graduate, Saveetha Dental College and Hospital, SIMATS, Chennai, Tamilnadu.

²Reader, Saveetha Dental College and Hospital, SIMATS, Chennai, Tamil Nadu.

³Professor and Head of the Department, Saveetha Dental College and Hospital, SIMATS, Chennai, Tamilnadu.

Email: sharanikaagiri@gmail.com

Abstract:

Osteosarcoma is the most common primary malignant bone tumor, characterized by the formation of osteoid or immature bone by malignant osteoblasts. While it predominantly affects long bones, its occurrence in the mandible is rare and presents unique clinical and surgical challenges. Mandibular osteosarcoma accounts for less than 5% of all osteosarcoma cases and often mimics benign conditions, leading to delayed diagnosis. We present a case of a 49-year-old female with a chondrogenic variant of mandibular osteosarcoma, who reported with a progressively enlarging swelling in the right side of the jaw. Clinical, radiological, and histopathological evaluations confirmed the diagnosis. The patient underwent segmental mandibulectomy with selective neck dissection, followed by immediate microvascular reconstruction using a free fibula flap. A novel approach of stapler-assisted anastomosis was employed for microvascular reconstruction, significantly reducing operative time while maintaining flap viability. This case highlights the challenges in diagnosing and managing mandibular osteosarcoma and emphasizes the efficacy of microvascular free flap reconstruction with stapler anastomosis as an innovative and time-efficient technique. Long-term follow-up is crucial to assess recurrence and prognosis.

Keywords: Mandibular osteosarcoma, chondrogenic osteosarcoma, free fibula flap, microvascular reconstruction, stapler anastomosis, segmental mandibulectomy.

Introduction

Osteosarcoma describes a diverse set of primary malignant tumors that originate in bone-forming or mesenchymal tissues, characterized by histopathological evidence of bone formation. According to the World Health Organization (WHO), these tumors are classified into various types, each differing in their anatomical location, clinical behavior, and level of cellular atypia. Osteosarcoma is the most common primary malignant bone tumor, characterized by the production of osteoid or immature bone by malignant osteoblasts. While osteosarcoma predominantly affects the long bones, particularly around the knee, its occurrence in the mandible is relatively rare. Osteosarcoma of the mandible presents unique clinical and management challenges due to its unusual location and the complex anatomy of the oral and maxillofacial region.

Mandibular osteosarcoma constitutes a small fraction of all osteosarcoma cases, with the vast majority occurring in the long bones. Studies indicate that mandibular osteosarcoma accounts for less than 5% of osteosarcoma cases. The disease most commonly affects adolescents and young adults, and show bimodal distribution. The peak incidence is typically in the second and third decade of life.



The clinical presentation of mandibular osteosarcoma is often insidious and may initially resemble less severe conditions, such as dental abscesses or benign jaw lesions. Patients typically present with a painful swelling or mass in the mandible, which may be accompanied by symptoms such as trismus (restricted mouth opening), tooth mobility, and facial asymmetry. As the tumor progresses, it can lead to significant functional impairment and esthetic concerns. Due to its deep location and aggressive growth, mandibular osteosarcoma can also invade surrounding tissues, leading to complications. Histopathologically, osteosarcoma can be classified based on the predominant cells in the lesion as conventional, telangiectatic, small cell, Epithelioid, osteoblastic, Chondrocytic, fibrohistocytic. In this case report we have discussed about a case of osteosarcoma, chondrouf variant and an innovative management and treatment of the same.

Case report

A 49 years old female patient reported to the department of oral and maxillofacial surgery, with a chief complaint of swelling at right side of jaw, which has been present for past 3 months. The swelling was associated with mild pain, which is dull and intermittent in nature and aggravates in laying on that side and relieves by itself. The size of swelling was insidious in onset and slowly progressed in size to present state. The growth was incised and sent for histopathological examination. Personal history revealed no adverse habits.

Extraoral examination showed swelling was present at anterior mandible (figure 1). Overlying skin appeared normal. Intraorally extending from lower left first premolar to distal aspect right first molar, both buccally and lingually (fig 2). Swelling was bony hard, ill defined and caused obliteration of right lower buccal and lingual vestibule. No regional lymphadenopathy.



Fig 1 intra-oral photograph showing the presence of a diffused swelling involving the right side of mandible



Fig 2 showing lingual extension

An Orthopantomograph revealed altered trabecular pattern in symphysis and right parasymphysis region with mixed radiolucency and radiopacity mass with resorption of 31-46 teeth roots (fig 3). Cone beam computed tomograph (CBCT) revealed radiopacity involving from right parasymphysis to body of mandible antero-posteriorly involving buccal and lingual cortex . differential diagnosis of Fibro-osseous dysplasia, osteosarcoma. (fig 4)



Fig 3 Orthopantomogram (dental panoramic radiograph)

showing an irregular radiolucent lesion interspersed with radiopacity with concomitant marked alveolar bone destruction, resorption of the mesial root of right first molar tooth, second premolar, first premolar, anteriors, left first premolar root and thinning of the lower border of the mandible of the patient in the case report.

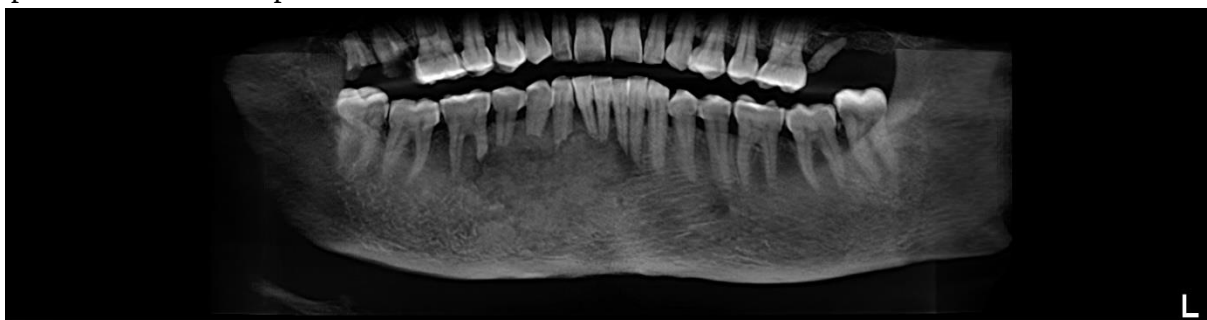


Fig 4: CBCT image.

An incisional biopsy was performed which histopathologically revealed multiple hard tissue bits upon decalcification show interconnecting calcified matrix which is eosinophilic to amphophilic in character and shows multiple lacunae spaces containing mild to moderately pleomorphic cells with clear cytoplasm. At few area, binucleation and mitotic figures are noted. The intervening stroma is



fibro cellular with rich vascularity. Trabeculae of bone are also noted. Histopathological features were suggestive of osteogenic/chondrogenic neoplasm.(figure 5).

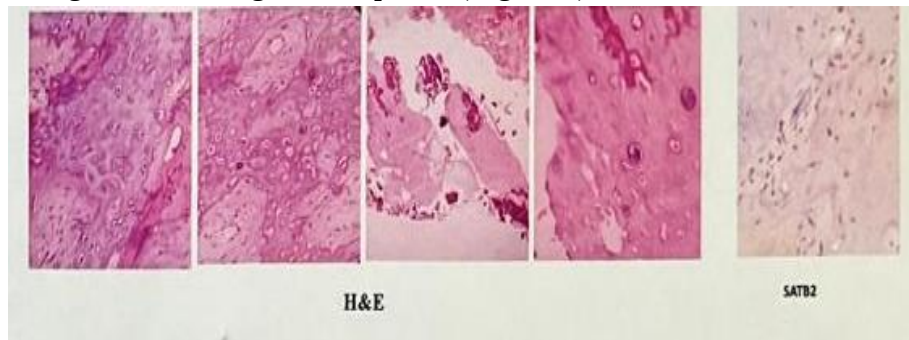


Fig 5. Multiple hard tissue bits upon decalcification show interconnecting calcified matrix which is eosinophilic to amphophilic in character and shows multiple lacunae spaces containing mild to moderately pleomorphic cells with clear cytoplasm. At few areas, binucleation and mitotic figures are noted. the intervening stroma is fibro cellular with rich vascularity , trabeculae of bone are also noted .

A treatment plan of segmental mandibulectomy with selective neck dissection was fabricated. Surgery was performed under general anesthesia with nasotracheal intubation. A segmental mandibulectomy was done from 34 to 48, and the specimen was sent for biopsy. During neck dissection IA and IB lymphnodes were excised ,right side facial artery was preserved for anastomosis. Common facial vein and external jugular vein identified, and internal jugular vein isolated and clamped for venous anastomosis.Tourniquet was applied to the right thigh and right leg was exsanguinated.Pressure raised to 250 mm of mercury above the systolic pressure. Marking were made for the flap. Surface marking on the Peroneus longus and extensor muscles done. Peroneal vessels were also marked.Incision placed and dissection done till the fascia, cutaneous perforator was identified and traced to the main pedicle. Fibula was freed and an osteotomy cut of 15 cm was done. Common peroneal nerve preserved. Osteocutaneous flap was raised(figure 6) . Fibula free flap was secured with Titanium plate ,Pedicle length was measured and remaining pedicle was ligated superiorly.Thigh tourniquet was released. Microvascular anastomosis was done using 200 ligacrips between the donor peroneal artery and the recipient facial artery(figure 7). Venous anastomosis was done using the Sutures between the donor vena comitantes and facial vein, the vena comitantes anterior jugular vein. Blood flow was patent. Fibula fixed to the recipient bone using titanium plates and screws. The flap was sutured using vicryl 3.0. Postoperatively the graft was checked using doppler and scratch test, which showed adequate perfusion indicating anastomosis was well maintained using the stapler approach. There were no post operative complications and patient was discharged on the 6th post operative day. Biopsy report was given as Chondrogenic variant of osteosarcoma.



Fig 6 ; free fibula flap.



Fig 9 – stapler anastomosis.

DISCUSSION

The chondrosarcoma is a neoplasm that may arise in any bone but that shows predilection for pelvic girdle, chest wall and scapula [7]. The peak age of incidence is in the third to fifth decades of life [8]. The usual belief is that chondrosarcoma arises from normal chondroid tissues or from embryonic cartilaginous rest.[9]. Chondrosarcoma of the mandible mostly present as a painless swelling or may appear as mass of long duration with pain, paraesthesia, trismus, and loosening of the teeth, which points toward the progression of the disease. However, the exact origin of this malignant neoplasm in the head and neck region is controversial. It may be induced by irradiation, from pre-existing Paget's disease of bone or in association with Fibrous Dysplasia, or from the vestigial cartilaginous rest.[10] Here, the lesion may have developed from normal chondroid tissue or from the embryonic cartilaginous rest. However, a long- term follow up is required to assess the nature, recurrence, and outcome of chondrosarcoma of mandible as the origin is unknown. The unusual presentation described in this case will help the medical professionals understanding the treatment modality of chondrosarcoma as well as focus the use of stapler anastomosis in microvascular reconstruction.

CONCLUSION:

Chondrosarcomas are radioresistant. Survival rate of chondrosarcomas of jaws appeared to be poor compared to chondrosarcomas of other parts of body. Etiology is still unknown. High grade



chondrosarcomas commonly do spread to regional lymph nodes. PET CT is highly recommended for long term follow to assess the metastasis.

An innovative method of stapler anastomosis gives an advantage of less time consumption as compared to conventional method by maintaining vitality of flap.

REFERENCES:

1. Bertoni F, Bacchini P, Hogendoorn P: Chondrosarcoma. In World Health Organization Classification of Tumors. Pathology and Genetics of Tumors of Soft Tissue and Bone. (ed. I.).Lyon, IARC Press 2002, pp 247-258
2. Izadi K, Lazow SK, Solomon MP, Berger JR. Chondrosarcoma of the anterior mandible. A case report. N Y State Dent J 2000;66:32-4.
3. Trembath DG, Dash R, Major NM, Dodd LG. Cytopathology of mesenchymal chondrosarcomas: A report and comparison of four patients. Cancer 2003;99:211-6.
4. Cheim AP, Queiroz TL, Alencarc WM, Rezende RM, Vencio EF. Mesenchymal chondrosarcoma in the mandible: Report of a case with cytological findings. J Oral Sci 2011;53:245-7.
5. Chowdhury A, Kalsotra P, Bhagat DR, Sharma P, Katoch P. Chondrosarcoma of the maxilla-Recurrent. J.K.Science2008;10:94-6.
6. Chondrosarcoma: Available from: <http://www.macmillan.org.uk>
7. Gallagher TM, Strome M. Chondrosarcomas of the facial region.Laryngoscope 1972;82:978-84.
8. Batsakis JG. Tumors of the head and neck. Baltimore: Williams & Wilkins Co, 1979:383-7.
9. Oliveira RC, Marques KD, Mendonça AR, Mendonça EF, Silva MR, Batista AC, *et al.* Chondrosarcoma of the temporomandibular joint:- A case report in a child. J Orofac Pain 2009;23:275-81.
10. Randall RL, Hunt KJ. Chondrosarcoma of the bone. An ESUN article-Liddy Shriver Sarcoma Initiative, Feb 2006;V3N1.