Case Report

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Chondrosarcoma of the Mandible: A Clinicopathological Case Report based Insight

Abstract: Chondrosarcoma is a malignant mesenchymal tumourcharacterized by the production of cartilaginous matrix. Its occurrence within the maxillofacial region is uncommon and frequently presents a diagnostic dilemma because its clinical and radiographic features can resemble other primary bone malignancies. A 70-year-old male presented with a gradually enlarging and painful swelling involving the left side of the mandible over a period of approximately six months. Clinical examination revealed a diffuse extraoral swelling along with an intraoral exophytic and ulcerated lesion in the posterior alveolar region. Imaging studies demonstrated irregular radiopaque areas associated with cortical destruction and a characteristic sunburst-type periosteal reaction. Histopathological examination showed atypical chondrocytes embedded within a chondroid matrix, along with areas of calcification and cellular pleomorphism, confirming the diagnosis of chondrosarcoma.This case highlights the aggressive nature of mandibular chondrosarcoma and emphasizes the importance of correlating clinical, radiographic, and histopathological findings to arrive at a definitive diagnosis and guide appropriate treatment.

Key-words: Atypical chondrocytes, Chondrosarcoma, Mandible, Oral malignancy, Sunburst appearance.

Introduction:

Chondrosarcoma is a malignant neoplasm of mesenchymal origin in which the tumour cells produce cartilaginous matrix. It is considered one of the more common primary malignant tumours of bone after osteosarcoma, although its occurrence in the head and neck region remains relatively rare [1,2]. Within this region, involvement of the mandible is particularly uncommon, making each reported case clinically significant.
The biological behaviour of chondrosarcoma is known to be variable. While some lesions may demonstrate slow and indolent growth, others behave aggressively, with rapid expansion and local tissue destruction [3]. In the maxillofacial complex, patients typically present with swelling that may or may not be associated with pain, depending on the stage and aggressiveness of the lesion [4].

Radiographic presentation is often heterogeneous, with lesions showing a combination of radiolucent and radiopaque components along with cortical expansion and destruction. In more aggressive cases, a periosteal reaction resembling a "sunburst" pattern may be observed, which can mimic osteosarcoma and complicate the diagnostic process [5].

Given this overlap in clinical and imaging features, histopathological examination remains essential for establishing a definitive diagnosis. The presence of atypical chondrocytes within a chondroid matrix, often accompanied by cellular pleomorphism and calcification, forms the cornerstone of diagnosis [6]. Recent classifications, including the WHO 2020 update, further emphasize histological grading and molecular features in diagnosis and prognostication [7].

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2. Case Report

A 70-year-old male patient reported with a complaint of pain and swelling on the left side of the lower jaw that had been progressively increasing over a period of five to six months. The patient noted that the swelling had enlarged relatively rapidly in recent months and was associated with discomfort, particularly during mastication. The patient's medical histories were non-contributory, and he did not possess any deleterious oral habits. The haematological assays (Total count-TC, Differential count-DC, Bleeding time-BT, Clotting time-CT, Erythrocyte sedimentation rate- ESR, Platelet, Hb%, International normalized ratio-INR) were within normal limits.

On extraoral examination, a diffuse swelling was evident over the left lower third of the face, extending across the mandibular body region and resulting in noticeable facial asymmetry (Fig. 1A). The swelling was firm on palpation and elicited tenderness, along with a mild increase in local temperature. Importantly, the overlying skin appeared uninvolved and was not fixed to the underlying lesion.

Intraoral examination revealed a prominent exophytic mass measuring approximately 2 × 2 cm in the left posterior alveolar ridge, extending into the adjacent buccal mucosa and vestibule (Fig. 1B). The lesion had a bosselated surface, with focal areas of telangiectasia. An ulcerated region was present along the anterior margin, covered with slough and showing areas of haemorrhage. On palpation, the lesion was firm and exhibited bleeding on minimal provocation near the ulcerated regions.

Radiographic evaluation provided further insight into the nature of the lesion. The orthopantomogram demonstrated irregular, spike-like radiopaque projections in the left mandibular body, suggestive of an aggressive process (Fig. 1C). The occlusal radiograph revealed intramedullary radiolucencies associated with cortical expansion and destruction, producing a pattern reminiscent of a sunburst appearance (Fig. 1E). This finding was further corroborated by axial CT imaging, which showed a tumour mass with radiating bony spicules extending from the mandibular cortex (Fig. 1D).

Histopathological examination of the incisional biopsy specimen revealed a surface lining of parakeratinized stratified squamous epithelium with underlying fibrovascular connective tissue. Within the connective tissue stroma, numerous atypical chondrocytes were seen embedded in a chondroid matrix. Areas of calcification and ossification were also evident. In addition, there were regions showing pleomorphic, hyperchromatic spindle-shaped tumour cells along with a background of chronic inflammatory infiltrate (Fig. 1F). On higher magnification, the chondrocytes exhibited clear nuclear atypia and pleomorphism within the matrix (Fig. 1G). These features were diagnostic of chondrosarcoma. The surgically removed tissue from the representative site showed a fleshy mass with intermittent hard areas and occasionally gritty areas (Fig 1H).

Following diagnosis, the patient was referred for definitive surgical management and advised regular follow-up.

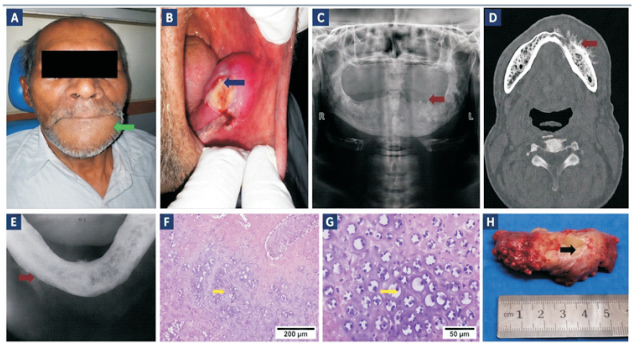

Figure 1. Clinico-radiographic and histopathological features of mandibular chondrosarcoma.

Figure Legends

(A) Extraoral photograph of the patient showing diffuse swelling involving the left lower third of the face, extending over the mandibular body region. (Green arrow)

(B) Intraoral view demonstrating a relatively large (approximately 2 × 2 cm), exophytic, bosselated swelling involving the left posterior alveolar ridge with extension into the buccal mucosa and vestibule; focal ulceration with slough and haemorrhagic areas is evident at the anterior margin. (Blue arrow)

(C) Orthopantomogram revealing irregular, spike-like radiopaque areas involving the left body of the mandible in the premolar–molar region, suggestive of an aggressive osseous lesion. (Brown arrow)

(D) Axial computed tomography image showing a tumour mass involving the left mandibular body with radiating bony spicules producing a characteristic "sunburst" periosteal reaction. (Brown arrow)

(E) Lower occlusal radiograph demonstrating irregular intramedullary radiolucencies with cortical expansion and destruction, contributing to the sunburst pattern in the left posterior mandibular alveolar ridge. (Brown arrow)

(F) Photomicrograph (haematoxylin and eosin stain, ×10 magnification) showing atypical chondrocytes embedded within a chondroid matrix with focal areas of calcification/ossification, along with pleomorphic spindle-shaped tumour cells and chronic inflammatory infiltrate. (Yellow arrow)

(G) Photomicrograph (haematoxylin and eosin stain, ×40 magnification) demonstrating high-power view of atypical neoplastic chondrocytes with nuclear pleomorphism within a chondroid matrix. (Yellow arrow)

(H) Gross specimen appearance of the lesion showing a fleshy mass with intermittent hard and gritty areas (Black arrow)

3. Discussion

Chondrosarcoma of the mandible remains an uncommon entity, and its diagnosis is often delayed due to its variable clinical presentation and resemblance to other benign and malignant lesions. Recent studies emphasize that these tumours may initially present as subtle swellings before

progressing to aggressive lesions, which aligns with the rapid enlargement observed in the present case [2].

The age of the patient in this case is consistent with current epidemiological data suggesting a predilection for older adults, typically in the fifth to seventh decades of life [3,8].Furthermore, the presence of pain and rapid growth, although not universally observed, has been associated with higher-grade or more aggressive variants of chondrosarcoma [4].

Radiographically, the lesion exhibited a "sunburst" pattern, a feature more traditionally associated with osteosarcoma. However, contemporary literature has reported that aggressive chondrosarcomas can demonstrate similar periosteal reactions due to rapid tumour growth and cortical breach [5,9]. This overlap underscores the limitation of radiographic findings alone in establishing a definitive diagnosis and highlights the necessity of histopathological confirmation.

The histopathological features in the present case, particularly the presence of atypical chondrocytes within a chondroid matrix along with pleomorphic spindle cells, are characteristic of chondrosarcoma and help distinguish it from other entities such as chondroblastic osteosarcoma [6,10]. The identification of cellular atypia and matrix production remains crucial in differentiating malignant cartilaginous tumours from benign lesions, which may exhibit similar architectural patterns but lack significant cytological atypia.

From a biological standpoint, chondrosarcomas are known for their relative resistance to radiotherapy and chemotherapy, largely due to their low mitotic activity and poor vascularity [11,12]. Consequently, wide surgical excision with clear margins remains the cornerstone of treatment [11]. Recent surgical series have demonstrated favourable outcomes with radical resection, emphasizing the importance of early diagnosis and adequate surgical planning [1].

The aggressive radiographic and histopathological features observed in this case justify the need for prompt intervention, as delayed treatment is associated with increased risk of local recurrence and poorer prognosis [3]. Additionally, the anatomical complexity of the mandibular region necessitates careful surgical management to achieve oncologic clearance while preserving function [13].

Recent advances in molecular pathology have significantly improved the understanding of chondrosarcoma pathogenesis. Mutations in IDH1 and IDH2 genes have been identified in a substantial proportion of central chondrosarcomas, leading to abnormal metabolic pathways and oncogenesis [14]. Additionally, alterations in COL2A1, a gene encoding type II collagen, have been implicated in cartilage matrix abnormalities and tumour development [15].

Thus, the present case highlights the critical importance of integrating clinical progression, radiographic interpretation, and histopathological findings in arriving at an accurate diagnosis. The convergence of these features strongly supports the diagnosis of chondrosarcoma and underscores its aggressive potential in the maxillofacial region.

Ethical approval:

This case report was exempt from Institutional ethical approval. However, patient consent was obtained.

Conflict of interest- Nil

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