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Giant Cell Granuloma of Mandible: Surgical Management of a Rare Entity

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Abstract **Case Report**

Background: Central giant cell granuloma (CGCG) is a benign intraosseous lesion of the jaws that commonly presents in children and young adults. It is classified into aggressive and non-aggressive subtypes. Aggressive lesions are relatively rare but may show rapid progression and cause significant morbidity due to bone destruction and displacement of teeth. ***Case Presentation:*** We report a case of a 7-year-old girl who presented with swelling on the right side of the lower jaw for one month, associated with gradual increase in size and loosening of teeth. Diagnosis of central giant cell granuloma was established using imaging and histopathological examination. The patient initially underwent incisional biopsy, followed by denosumab injections. Subsequently, she underwent wide local excision of the mandibular lesion with reconstruction using a free fibula flap. Conclusion This case highlights the importance of considering central giant cell granuloma in the differential diagnosis of rapidly progressive mandibular lesions in the paediatric age group. Early diagnosis and multidisciplinary management can significantly improve long-term functional and cosmetic outcomes.
Keywords: Central giant cell granuloma; mandible; fibula flap reconstruction; paediatric age group; denosumab.

INTRODUCTION

Central giant cell granuloma (CGCG) is defined by the World Health Organization (WHO) as an intraosseous lesion composed of cellular fibrous tissue containing multiple foci of haemorrhage, clusters of multinucleated giant cells, and occasional trabeculae of woven bone [1].

CGCG occurs more frequently in females and is seen more commonly in the mandible than the maxilla [2]. Most cases occur between the second and third decades of life, although it may also present in younger children.

Based on clinical and radiological behaviour, CGCG has been classified into non-aggressive and aggressive variants. Aggressive lesions may demonstrate rapid growth, cortical perforation, root resorption, and a higher recurrence rate following treatment [3]. Because of its variable behaviour and relatively low incidence, the optimal management strategy remains controversial.

We report a rare case of aggressive CGCG in a 7-year-old child, managed with denosumab injections followed by wide local excision and reconstruction using a free fibular flap.

CASE REPORT

A 7-year-old female child presented with complaints of painless swelling over the right lower jaw for one month, associated with loosening of teeth on the same side.

On examination, a non-tender, hard swelling measuring approximately 5 × 5 cm was present over the right mandible with loosening of adjacent teeth. The overlying skin was normal and uninvolved. Mandibular movements were restricted. There was no significant past medical or surgical history, and routine laboratory investigations were within normal limits.

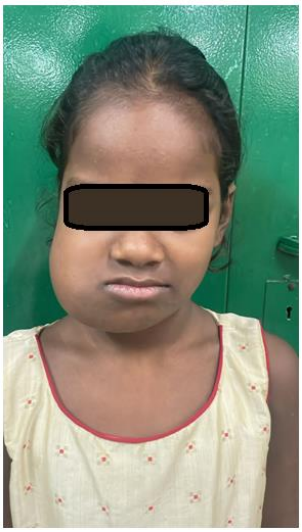

Fig 1a.

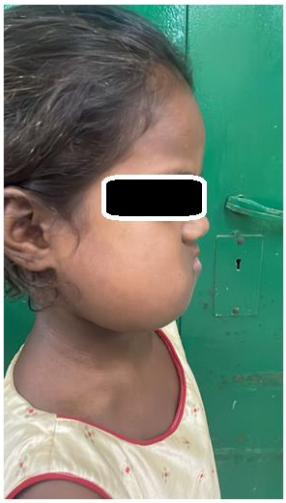

Fig 1b.

Figure 1a–b: Preoperative clinical photographs showing facial asymmetry with swelling over the right mandible.

Computed Tomography and MR imaging revealed a well-defined multiloculated lytic lesion involving the ramus, coronoid process, angle, and right half of the mandibular body extending up to the parasymphyseal region. The lesion showed thinning, ballooning, and multifocal areas of cortical discontinuity of the involved mandible.

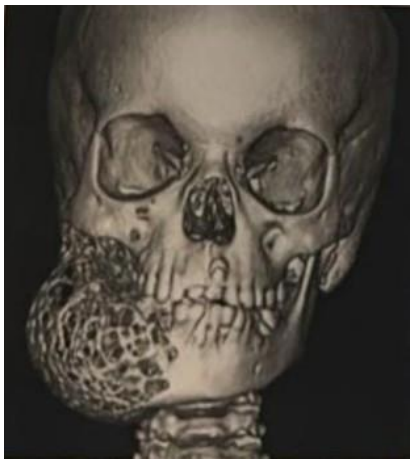

Figure 2: 3D reconstructed CT images showing expansile mandibular lesion.

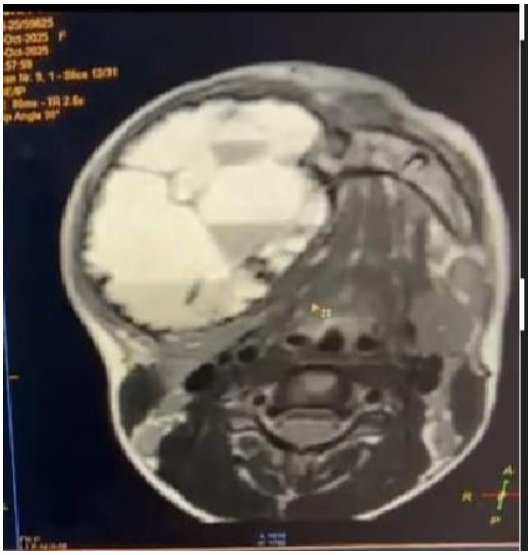

Figure 3a

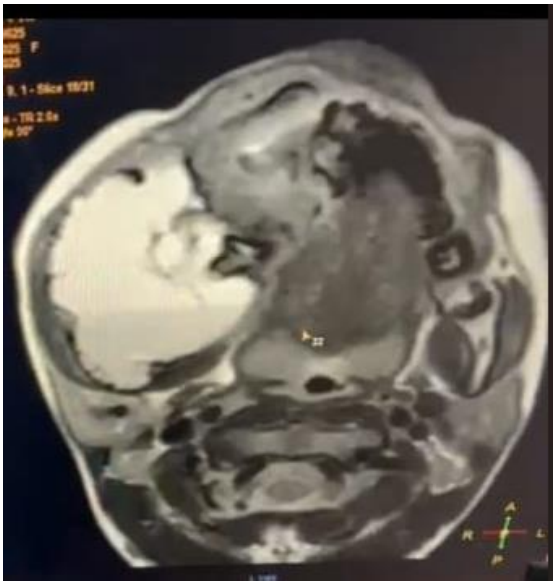

Figure 3b

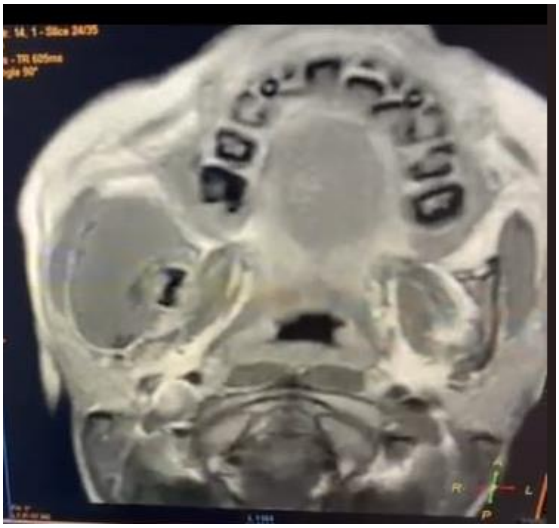

Figure 3c

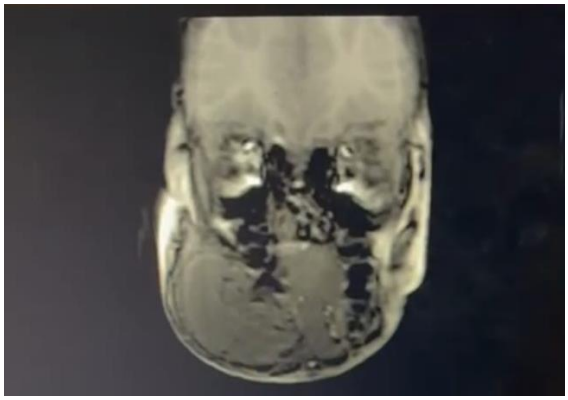

Figure 3d

Figure 3a-d: MR Images

An intraoral incisional biopsy was performed. Histopathological examination demonstrated submucosal fibrosis with numerous osteoclast-like multinucleated giant cells and mononuclear stromal cells. The stroma showed focal vascular proliferation and areas of haemorrhage, consistent with giant cell granuloma.

After consultation with the Oncology team, the patient received four weekly injections of denosumab.

Subsequently, a multidisciplinary surgical approach involving paediatric surgeons, oncosurgeons, plastic surgeons and anaesthesiologists was planned.

The patient underwent wide local excision of the right mandibular lesion with reconstruction using a free fibular flap, along with tracheostomy.

Postoperatively, the patient was shifted to the intensive care unit, where she was gradually weaned off mechanical ventilation. Enteral nutrition was initiated through a Ryle's tube on post operative day 3, followed by gradual transition to oral feeding.

On postoperative day 14, the patient developed an orocutaneous fistula, which was managed successfully with surgical excision and repair.

Final histopathological examination demonstrated sheets of osteoclastic giant cells with areas of haemorrhage and no nuclear atypia. Tooth structures were not involved, and lymph nodes showed reactive changes. The final diagnosis of central giant cell granuloma associated with fibrous dysplasia was confirmed.

Figure 4: Gross specimen of excised lesion.

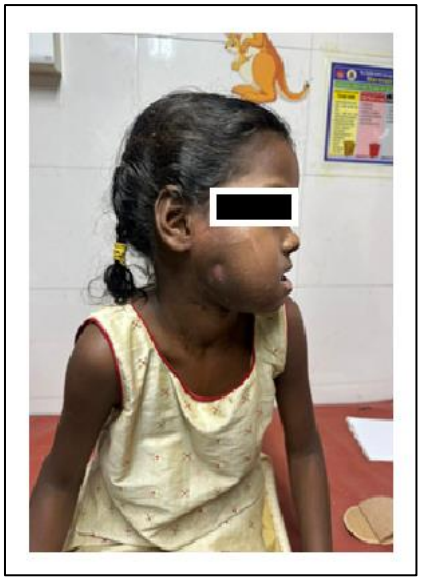

Figure 5a

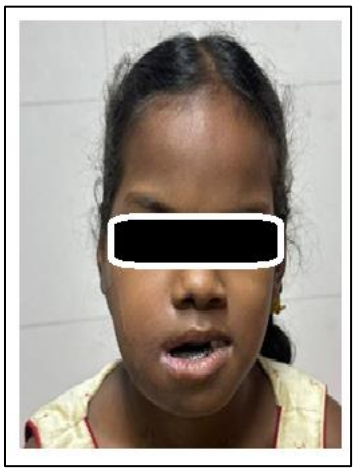

Figure 5b

Figure 5a, b: Postoperative clinical photographs

DISCUSSION

Central giant cell granuloma (CGCG) is an uncommon benign osteolytic lesion of the jaws characterized by the presence of multinucleated giant cells within a fibrovascular stroma. First described by Jaffe in 1953, it was initially termed a "giant cell reparative granuloma" and is now recognized as a distinct clinicopathological entity with variable biological behaviour [1].

CGCG accounts for approximately 5–7% of benign tumours of the jaws, with a predilection for the mandible and a female predominance [4]. Most cases occur in individuals between 10 and 25 years of age, although cases in younger children have been reported [2]. The occurrence of CGCG in our 7-year-old patient highlights the need to consider this entity in the differential diagnosis of paediatric mandibular lesions.

Clinically, CGCG commonly presents as a painless swelling of the jaw, often associated with tooth mobility, cortical expansion, and facial asymmetry [5]. Radiologically, lesions may appear as unilocular or multilocular radiolucencies with cortical thinning or expansion. Aggressive variants may demonstrate rapid growth, cortical perforation, and root resorption [3]. In our patient, CT imaging revealed a multiloculated lytic lesion with cortical thinning and discontinuity, consistent with aggressive behaviour.

Histologically, CGCG is characterized by multinucleated osteoclast-like giant cells scattered within a fibrovascular connective tissue stroma composed of spindle-shaped mesenchymal cells, often with areas of haemorrhage and hemosiderin deposition [6]. These features were consistent with the histopathological findings observed in our case.

Management of CGCG remains controversial because of its variable biological behaviour and potential for recurrence. Traditionally, curettage or enucleation has been the primary treatment modality; however,

recurrence rates of 15–20% have been reported following simple curettage, particularly in aggressive lesions [4].

Several non-surgical therapies have also been proposed, including intralesional corticosteroids, calcitonin therapy, interferon-α, and monoclonal antibody therapy such as denosumab [7]. Denosumab acts by inhibiting the RANK–RANKL signalling pathway, thereby reducing osteoclast-mediated bone resorption and tumour activity [8,9].

In our case, a combined therapeutic strategy was adopted. The patient initially received denosumab therapy, followed by wide surgical excision of the lesion. Due to the large mandibular defect created following tumour removal, reconstruction using a free fibular flap was performed. Microvascular free fibula flap reconstruction is considered the gold standard for mandibular reconstruction due to its adequate bone length, reliable vascular pedicle, and potential for future dental rehabilitation [11].

Although several reports describe either medical therapy or surgical management alone, the use of a combined approach involving denosumab therapy followed by definitive surgical excision and microvascular reconstruction is relatively uncommon in the paediatric population. Our case demonstrates that such a multidisciplinary strategy can achieve effective tumour control while restoring mandibular continuity and function.

Conclusion

Central giant cell granuloma of the mandible is an uncommon but potentially aggressive lesion that can present with rapid progression and significant bone destruction, particularly in the paediatric population. Early recognition with appropriate radiological and histopathological evaluation is essential for accurate diagnosis and treatment planning.

Our case highlights the effectiveness of a multidisciplinary treatment strategy combining targeted medical therapy with denosumab followed by definitive surgical excision and microvascular reconstruction. Reconstruction with a vascularised free fibula flap not only restores mandibular continuity but also provides excellent functional and aesthetic outcomes.

This case emphasises that aggressive mandibular CGCG in children can be successfully managed with a combined medical–surgical approach, allowing complete tumour control while preserving long-term facial growth, function, and cosmesis.

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