

MINIMALLY INVASIVE MANAGEMENT OF CENTRAL GIANT CELL GRANULOMA: AN 8-YEAR FOLLOW-UP CASE REPORT AND LITERATURE REVIEW

ABORDAGEM MINIMAMENTE INVASIVA DO GRANULOMA CENTRAL DE CÉLULAS GIGANTES: RELATO DE CASO COM ACOMPANHAMENTO DE 8 ANOS E REVISÃO DA LITERATURA

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ABSTRACT

Central giant cell granuloma (CGCG) is an uncommon benign intraosseous lesion characterized by proliferation of multinucleated giant cells within a fibrous stroma, containing hemorrhagic areas and immature bone trabeculae, that predominantly affects the jaws, children and young adults, with a higher incidence in women. Its clinical behavior is variable and often poses a therapeutic challenge due to the potential for both functional and esthetic impairment. This study reports the case of a 36-year-old female patient presenting with a radiolucent lesion in the anterior mandible, incidentally, identified during routine panoramic radiography. The diagnosis of CGCG was confirmed by fine-needle aspiration (FNA). Treatment consisted of intralesional corticosteroid injections, which led to complete resolution. Considering the importance of minimally invasive techniques in the management of maxillofacial lesions, a literature review was performed in PubMed/MEDLINE, Embase, Scopus, and Web of Science, which identified only three comparable reports. These findings reinforce the diagnostic value of FNA and the therapeutic potential of corticosteroids for CGCG, particularly in esthetically sensitive or high-risk anatomical sites.

KEYWORDS: Central giant cell granuloma; Corticosteroid; Fine needle aspiration; Intralesional injections; Triamcinolone.

RESUMO

O granuloma central de células gigantes (GCCG) é uma lesão

intraóssea benigna e incomum, caracterizada pela proliferação de células gigantes multinucleadas em um estroma fibroso contendo áreas hemorrágicas e trabéculas ósseas imaturas; a lesão acomete predominantemente os maxilares, crianças e adultos jovens, com maior incidência em mulheres. Seu comportamento clínico é variável e frequentemente representa um desafio terapêutico devido ao potencial de comprometimento funcional e estético. Este estudo relata o caso de uma paciente de 36 anos com uma lesão radiolúcida na região anterior da mandíbula, identificada incidentalmente durante uma radiografia panorâmica de rotina. O diagnóstico de GCCG foi confirmado por meio de punção aspirativa por agulha fina (PAAF). O tratamento consistiu em injeções intralesionais de corticosteroides, resultando em resolução completa. Considerando a importância de técnicas minimamente invasivas no manejo de lesões maxilofaciais, realizou-se uma revisão da literatura nas bases de dados PubMed/MEDLINE, Embase, Scopus e Web of Science, identificando-se apenas três relatos comparáveis. Esses achados reforçam o valor diagnóstico da PAAF e o potencial terapêutico dos corticosteroides para o GCCG, particularmente em locais anatômicos esteticamente sensíveis ou de alto risco.

PALAVRAS-CHAVE: Granuloma central de células gigantes; Corticosteroide; Punção aspirativa por agulha fina; Injeções intralesionais; Triamcinolona.

1. INTRODUCTION

Central giant cell granuloma (CGCG) accounts for approximately 5-10% of all benign jaw tumors¹⁻³. It

occurs predominantly in young patients, with a preponderance among females⁴. This intraosseous lesion can exhibit aggressive behavior, characterized by features such as size greater than 5 cm, rapid growth, root resorption, cortical bone perforation, and recurrence after treatment⁵⁻⁷. The mandible is more frequently affected than the maxilla^{8,9}, although other sites such as the temporal bone, nasal cavity, and paranasal sinuses may also be involved¹⁰⁻¹².

According to the World Health Organization classification¹³, CGCG is defined as a non-neoplastic intraosseous lesion composed of fibrous and cellular connective tissue containing clusters of multinucleated giant cells, occasionally interspersed with foci resembling immature trabeculae bone^{4,7}. Radiographically, CGCG may appear as a unilocular or multilocular radiolucency, often exhibiting thin internal septations and ill-defined or irregular margins^{14,15}. Reported recurrence rates range from 11% to 49% and are closely correlated with the biologic aggressiveness of the lesion^{8,16,17}.

The diagnosis of CGCG is most often established by means of incisional biopsy, although, less invasive methods, such as fine-needle aspiration (FNA), may also contribute to the diagnostic rendering of this lesion. The standard treatment is surgical excision¹⁸. Nevertheless, this approach may lead to significant functional impairment, especially when the lesion is in anatomically sensitive or esthetically important regions¹⁹. During the treatment phase, conservative approaches may be considered, with pharmacological management representing an effective and less invasive alternative to surgery^{20, 21}.

Considering the importance of minimally invasive techniques in the management of maxillofacial lesions, the aim of the present article was to report a case of CGCG diagnosed through FNA and managed with intralesional corticosteroid therapy, emphasizing the effectiveness of this conservative approach in preserving mandibular function and esthetics. In addition to its novelty, this case contributes a remarkable 8-year follow-up period with sustained remission. Furthermore, it highlights a successful, entirely minimally invasive diagnostic and therapeutic strategy that bypassed surgical intervention. This approach was further discussed considering the literature review, given the limited number of comparable reports.

2. CASE REPORT

A 36-year-old female patient with no significant medical history was referred to the oral medicine clinic at the School of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil, for evaluation of a radiolucent lesion. Extraoral examination revealed no facial asymmetry, swelling, or lymphadenopathy. Palpation at the lesion site of the vestibular and lingual cortical plates showed intact bone with mild expansion but no crepitation, fissuring, or perforation. Intraorally, a diastema was noted between teeth #31, #32, and #33.

A panoramic radiograph revealed a well-defined radiolucent area in the region of teeth #32 and #33, measuring 10 × 15 mm (Figure 1). Pulp sensibility testing with cold and electrical pulp tests were performed, and all teeth in the region responded positively.



Figure 1. Panoramic radiograph showing a well-defined radiolucent area in the region of teeth #32 and #33, measuring 10 × 15 mm.

Given the differential diagnoses of lateral periodontal cyst, odontogenic keratocyst, adenomatoid odontogenic tumor, ameloblastoma, and CGCG, FNA was performed under local anesthesia. An 18-gauge needle attached to a 20-mL syringe was employed to aspirate the lesion (Figure 2A), and the collected material was transferred onto slides for cytopathological evaluation. The aspirated material was preserved in 70% alcohol (Figure 2B) and processed using the cellblock technique²².

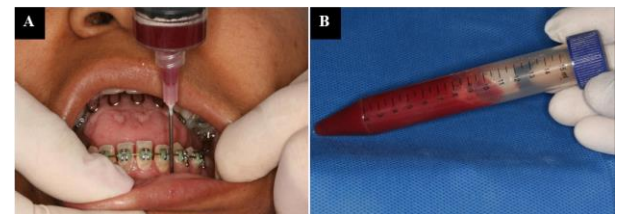


Figure 2. (A) Fine-needle aspiration performed with an 18-gauge needle attached to a 20- mL syringe. (B) Aspirated material with reddish coloration, processed using the cell-block technique.

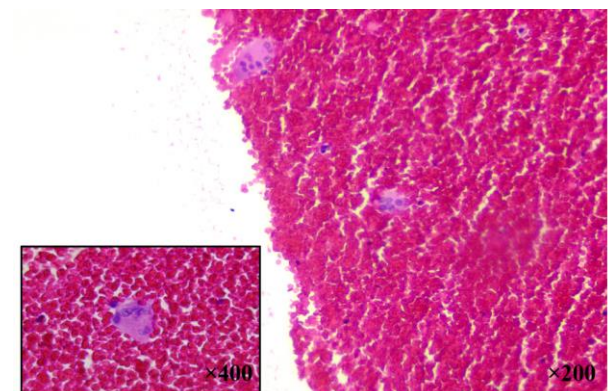


Figure 3. Histopathological features of central giant cell granuloma in the fine-needle aspiration specimen showing multinucleated giant cells distributed in a background of red blood cells (hematoxylin and eosin; original magnification ×200 and inset ×400).

Microscopic examination of hematoxylin and eosin (H&E)-stained sections revealed multinucleated giant

cells scattered in a hemorrhagic background, with no evidence of atypia or abnormal mitoses (Figure 3). The final diagnosis was CGCG. Blood biochemical analyses (phosphorus: 4.0 mg/dL, alkaline phosphatase: 73 U/L, ionized calcium: 1.24 mmol/L, osteocalcin: 15 ng/mL, calcitonin: 2.0 pg/mL) were within normal limits, thus excluding a brown tumor associated with hyperparathyroidism.

The therapeutic plan consisted of weekly intralesional injections of triamcinolone hexacetonide 5 mg/mL, administered over four sessions. Following the protocol described by Terry and Jacoway²³, 2 mL of triamcinolone hexacetonide (Triancil®) 10 mg/mL was diluted 1:1 with lidocaine with epinephrine (1:100,000) for each application. In total, approximately 8 mL of medication was administered. During the third session, extravasation of about 1 mL of the solution occurred due to increased resistance during infiltration, likely related to tissue repair from previous applications; however, no local or systemic complications were observed, and this event did not interfere with treatment progression or outcome.

Follow-up radiographs demonstrated progressive bone neoformation. The patient was monitored through annual clinical and radiographic evaluations, during which no complications or signs of recurrence were observed and after eight years, a panoramic radiograph revealed no abnormalities in the previously affected region (Figure 4). Thus, complete resolution was defined by the absence of the previously observed radiolucent lesion, restoration of normal trabecular bone pattern, and no radiographic signs of residual or recurrent disease. The patient was advised to maintain annual follow-up evaluations to ensure long-term stability.



Figure 4. Panoramic radiograph obtained 8 years after treatment showed no recurrence and complete bone regeneration.

3. DISCUSSION

A literature review was conducted to identify articles addressing the treatment of CGCG with corticosteroids and diagnosed using FNA. The searches were performed in May 2025. The initial search was conducted in PubMed/MEDLINE using the following terms: “giant cell granuloma” OR “central giant cell granuloma” OR “giant cell reparative granuloma” OR “central giant cell lesion” OR CGCL OR CGCG AND “triamcinolone acetate” OR “triamcinolone

hexacetonide” OR Cinonide OR Tricort OR Azmacort OR Kenacort OR Kenalog OR Volon AND cytology OR “cell block” OR “fine-needle aspiration biopsy” OR “fine needle aspiration” OR “aspiration biopsy” OR smear OR FNAC OR FNAB. No restrictions on language or publication date were applied. Embase, Scopus, and Web of Science were also searched. The search terms were initially combined using PubMed/MEDLINE syntax and subsequently adapted to the rules of each database. Studies were excluded if they did not specify the type of biopsy performed, were unrelated to the study objectives or if the diagnosis was not made by FNA and treated with corticosteroids. Additionally, literature reviews, expert opinions, textbooks, conference abstracts, and laboratory-based studies were excluded.

At the end of the search, three articles were identified that met the inclusion criteria^{15,24,25} (Table 1). It is important to note that the present review was intentionally restricted to cases combining FNA-based diagnosis and corticosteroid therapy, in order to specifically address the diagnostic-therapeutic approach explored in this case report. Furthermore, it should also be considered that the limited number of identified studies may reflect both the scarcity of reports addressing this combined approach and the inherent challenges in identifying such specific cases through database searches.

Table 1. Literature review on central giant cell granuloma of the jaws diagnosed using fine-needle aspiration and treated with corticosteroids.

Study (author, year, and country)	Platt <i>et al.</i> , 1993, USA ²⁵	Abdo <i>et al.</i> , 2005, Brazil ¹⁵	Fonseca <i>et al.</i> , 2013, Brazil ²⁴
Sample (age/sex)	14/F	14/F	15/M
Anatomical site	Right mandible	Anterior mandible	Anterior mandible
Size (mm)	NR	NR	NR
Radiographic aspect	Radiographically extending from the mid-ramus on the right to the mesial of tooth #30	Well-delineated, unilocular radiolucent area extending from the left central incisor to the left second premolar	Well-circumscribed radiolucent lesion
Cytologic findings	Sheets of fibroblasts and numerous giant cells	Multinucleated giant cells	Multinucleated giant cells in a hemorrhagic background with scattered neutrophils
Corticosteroid type	NR	NR	Triamcinolone
Clinical cure	No (surgical curettage)	Yes	No (surgical curettage)
Recurrence	No	No	No
Follow-up (months)	NR	18 months	30 months

Note: F, female; M, male; NR, not reported.

4. DISCUSSION

The diagnostic approach to CGCG has evolved over the years²³⁻²⁶. Current methods for the evaluation of oral and maxillofacial lesions include incisional or excisional biopsy as well as FNA^{20,24}. In the present case, FNA proved to be a safe, reliable, and accurate technique for intralesional tissue sampling, with diagnostic confirmation achieved through cell-block analysis^{22,27}. Even though FNA presents inherent sampling limitations compared to incisional biopsy, particularly due to reduced cellularity and lack of architectural context, diagnostic confidence in the present case was achieved through correlation of cytological findings with clinical, radiographic, and laboratory data.

FNA can be performed in an outpatient setting and offers advantages for less experienced clinicians. Compared with biopsies, FNA is simpler to perform, practical, cost-effective, and reduces the morbidity inherent to surgical procedures, especially in esthetically sensitive cases or in pediatric patients. When combined with clinical, radiographic, and laboratory findings, this technique provides reliable diagnostic accuracy for intraosseous lesions^{15,24,28}. Therefore, the practicality of its use and the precision of its results support the integration of FNA into minimally invasive treatment protocols, prioritizing conservative approaches.

Studies have reported the use of FNA in the diagnosis of benign processes, such as odontogenic cysts and tumors, salivary gland neoplasms, inflammatory conditions, and malignant processes, with remarkable accuracy^{28,29}. In the preoperative evaluation of salivary gland tumors in adults, current clinical guidelines universally recommend FNA as the first-line diagnostic test for the assessment of malignancies^{30,31}. According to the present literature review, only three studies have specifically reported the use of FNA in cases of CGCG of the jaws managed with corticosteroids. Platt *et al.*²⁵ described a mandibular case diagnosed cytologically but ultimately treated with surgical curettage. Abdo *et al.*¹⁵ reported a mandibular case in which FNA confirmed the diagnosis and intralesional corticosteroids achieved complete resolution without recurrence after 18 months. Similarly, Fonseca *et al.*²⁴ documented a cytologically confirmed case treated with intralesional triamcinolone, but surgical curettage was eventually required, indicating that outcomes may vary depending on lesion characteristics.

Heterogeneity in lesion size and inherent biological behavior is responsible for this variation in outcomes. The extent of bone involvement described in these cases suggests that larger lesions may exhibit a reduced response to conservative approaches. Additionally, on histopathological examination, aggressive CGCGs, usually linked to a fast clinical progression, cortical expansion or perforation, and an increased number of multinucleated giant cells may show a more prominent

osteolytic activity and, as a result, a higher risk of persistence or recurrence. The impact of lesion biology on treatment results is further supported by the fact that slow-growing lesions seem to react better to intralesional corticosteroid therapy.

The use of intralesional corticosteroid injections for the treatment of CGCG began to be explored in the 1980s. Rajeevan *et al.*³² demonstrated that dexamethasone inhibits osteoclast-like cells in bone marrow cultures, supporting the potential of intralesional corticosteroids as a conservative approach for the management of CGCG. Flanagan *et al.*³³ provided key evidence by demonstrating that the multinucleated giant cells found in jaw granulomas are osteoclasts, thereby establishing a biological rationale for targeting these cells therapeutically.

Besides corticosteroids, alternative drugs include interferon alpha which impedes lesion progression by inhibiting angiogenesis and cellular proliferation, thereby disrupting the vascular supply essential for tumor expansion. Calcitonin exerts its effect by directly binding to receptors on osteoclast-like giant cells, thereby suppressing their resorptive activity, and denosumab (a monoclonal antibody) neutralizes RANKL, which prevents osteoclast differentiation and activation¹⁸. The latter appears to be promising for the treatment of CGCG of the jaws, achieving a 78% efficacy rate; however, adverse events (e.g., hypophosphatemia, hypercalcemia) remain a drawback³⁴.

The therapeutic effect of corticosteroids in CGCG involves the inhibition of lysosomal protease production and the induction of apoptosis in osteoclast-like cells⁸. Additionally, corticosteroids suppress the activity of transcription factors involved in cell proliferation and exert antiangiogenic effects on endothelial cells. These combined mechanisms contribute to the interruption of the bone resorption process characteristic of CGCG³⁵. While intralesional corticosteroids effectively preserve teeth, gingivae, and vital structures surrounding the lesion, their efficacy is reduced in multilocular or aggressive cases^{8,24}. However, even in extensive lesions, corticosteroids may still play a valuable role in pre-surgical reduction of tumor size, thereby facilitating fewer invasive resections and preserving anatomical structures^{20,36}.

According to Chuong *et al.*⁷, aggressive lesions are defined by criteria such as size greater than 5 cm, rapid growth, root resorption, tooth displacement, cortical damage, or recurrence after treatment. In contrast, the present case did not meet these criteria, and a conservative approach resulted in complete bone regeneration, fully preserving the patient's masticatory function and facial harmony while avoiding extensive surgical intervention. In this context, surgical resection is preferred in aggressive cases with soft tissue involvement, cortical perforation, persistent pain, or contraindications to corticosteroid therapy. Recurrence rates vary according to treatment modality, i.e., while surgical excision alone shows considerable recurrence

in aggressive cases, adjuvant pharmacological therapy (e.g., corticosteroids or denosumab) may reduce this risk^{17, 26}.

Regarding imaging, computed tomography (CT) scan was not obtained, which is acknowledged as a limitation for a detailed affected cortical analysis. While CT is considered a useful tool in intraosseous lesions to assess the extent of bone destruction, cortical expansion, and perforation, its use must be weighed against clinical necessity. Thus, in our case, the decision was based on the principle of radiation dose optimization, as the conventional radiographs provided sufficient information for the diagnosis and the therapeutic approach. The long-term success of the treatment, with no recurrence over eight years, suggests that the initial imaging, albeit limited, was adequate for the clinical management of this lesion.

The treatment of choice for CGCG of the jaws is directly related to lesion size, location, recurrence, and aggressiveness^{1,4}. We believe that a minimally invasive protocol combining FNA-guided diagnosis and intralesional corticosteroid therapy represents a viable alternative to surgery for less aggressive CGCG and may be considered in cases presenting features of non-aggressive behavior, such as small lesion size, absence of cortical perforation, slow growth, and lack of symptoms. Future studies should focus on standardizing drug concentrations, injection intervals, and long-term outcomes to optimize conservative management.

5. CONCLUSION

Conservative treatment of CGCG of the jaws with intralesional corticosteroids is an effective alternative, capable of inducing lesion remission and subsequent bone regeneration at the affected site. Minimally invasive therapy can preserve anatomical structures and reduce the need for more aggressive surgical interventions. FNA plays a fundamental role in accurate diagnosis, as it is a safe, practical, minimally invasive, and highly reliable technique. The combination of these approaches resulted in complete bone regeneration and preservation of maxillofacial function, thereby demonstrating the feasibility of conservative protocols in the management of such lesions.

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All authors contributed to data collection and

interpretation, critically reviewed the manuscript, and approved the final version.

Ethical approval was not required for this study as it is a single-patient case report with no experimental intervention, and all identifying details were removed to ensure patient anonymity. This case study was conducted in accordance with the ethical standards of the Declaration of Helsinki, and written informed consent was obtained from the patient.

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