

Central Giant cell Granuloma of the Jaws: A Clinical and Radiologic Study

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Abstract

Purpose: The purpose of this study is to present the clinical and radiological features of 27 cases of central giant cell granuloma (CGCG) of the jaws.

Materials and Methods: This study was carried out on 27 cases diagnosed as CGCG, ranging in age from 8 to 70 years. The patient's age, sex, location of the lesion, expansion caused by the lesion, and greatest diameter were evaluated. Radiographs and radiological descriptions were studied for the features of border definition, radiopacity, locularity, root resorption, tooth displacement, and tooth association. Data were analyzed with Chi square test, Fisher's exact test, Mann Whitney U-test, and the Student t-test.

Results: It was determined 89% of CGCG occurred prior to the age of 40. Seventy-eight percent of the cases were females. In addition, it was observed that these lesions occurred primarily in the mandible mostly anterior to the molar region. It was determined most of the lesions were multilocular. Unilocular lesions averaged 23.75 mm and multilocular lesions were 53.00 mm. In 24 (89%) cases regular borders were seen, and in three cases diffuse borders were observed. There was bone expansion in 44% of the cases. The cases with bone expansion were 60.00 mm in average size, and the cases without bone expansion were 24.00 mm in average size. Seventy-eight percent of lesions were associated with teeth, and there was tooth displacement in 43% of these lesions. The lesions with tooth displacement were 18.33 mm in average size, and the lesions without tooth displacement were 44.00 mm in average size.

Conclusions: It was determined there is a significant correlation between the locularity, tooth displacement, and bone expansion with the size of the CGCG.

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Introduction

Central giant cell granuloma (CGCG) is an uncommon, benign, and proliferative lesion whose etiology is not defined.^{1,2} It was Jaffe who first introduced the term central giant cell reparative granuloma to distinguish this lesion from the giant cell tumor of long bones. However, since a reparative response was quite rare and most of these lesions were found out to be destructive rather than reparative, the word 'reparative' was omitted from that term.^{3,4}



Though CGCG may be seen in every age group, it is much more common in the young, especially those under 30 years of age.¹⁻⁷ An asymptomatic lesion on the whole, CGCG may lead to an expansion in the cortex so long as it grows up.⁷ It has been reported the enlarged size of the lesion has caused tooth mobility, tooth displacement, and root resorption.^{1,3,5,6} The borders of the lesions may be regular or diffuse.^{3,7}

Since CGCG possesses such different features, some researchers^{4,8-10} have defined the lesion into two types, referring to its clinical and radiographic features. The first type of lesion is non-aggressive, grows slowly, does not show root perforation in teeth affected by the lesion or cortical perforation, and often shows new bone formation; the other lesion is the aggressive type that grows quickly, shows pain, cortical perforation, and root resorption.

On the other hand, although the clinical, radiologic, and histologic features of CGCG have been extensively evaluated, the dimensional features of these lesions have not been clearly

defined. The purpose of this study is to present the dimensional features as well as the clinical and radiological features of 27 CGCG cases.

Materials and Methods

This study was carried out on 27 cases diagnosed with CGCG and well-documented at our clinic; ranging in age from 8 to 70 years. All of the lesions were treated with curettage followed by removal of the peripheral bony margins.

The patient's age, sex, location of the lesion, expansion caused by the lesion, and its largest diameter were evaluated.

Radiographs and radiologic descriptions were studied for the features of border definition, radiopacity, locularity, root resorption, tooth displacement, and tooth association. All



radiographic images were evaluated by two investigators. Before the assessments were done, the observers agreed on how to define the evaluated features.

The clinical and radiologic data were analyzed with Chi square test, Fisher's exact test, Mann Whitney U-test, and Student t-test.

Results

There were six (22%) male patients and 21 (78%) female patients in this study. They ranged in age from 8 to 70 years at the time of diagnosis (average \pm SD, 31.33 \pm 16.31 years), and 88.9% (24 cases) of the patients were under the age of 40.

Twelve (44%) of these patients had come to our clinic because of an expansion in their jaws, three (11%) because of a slightly painful lesion that appeared over two weeks, and twelve (44.5%) were diagnosed by chance during the radiographic examinations.

The distribution of CGCG in the mandible and maxilla is shown in Table 1. Lesions were located in the mandible in 15 (56%) cases and in the maxilla in 12 (44%) cases; 18 (67%) of these entities were located in the incisors-premolars area, three (11%) in the premolars-molars area, and six (22%) in the molars area (Figure 1).

Table 1. Distribution of CGCG in the mandible and maxilla.

Location	Mandible	Maxilla	Total
	n (%)	n (%)	n (%)
Incisor and premolar	12 (67)	6 (33)	18 (67)
Premolar and molar	3 (100)	-	3 (11)
Molar	-	6 (100)	6 (22)
Total	15 (56)	12 (44)	27 (100)

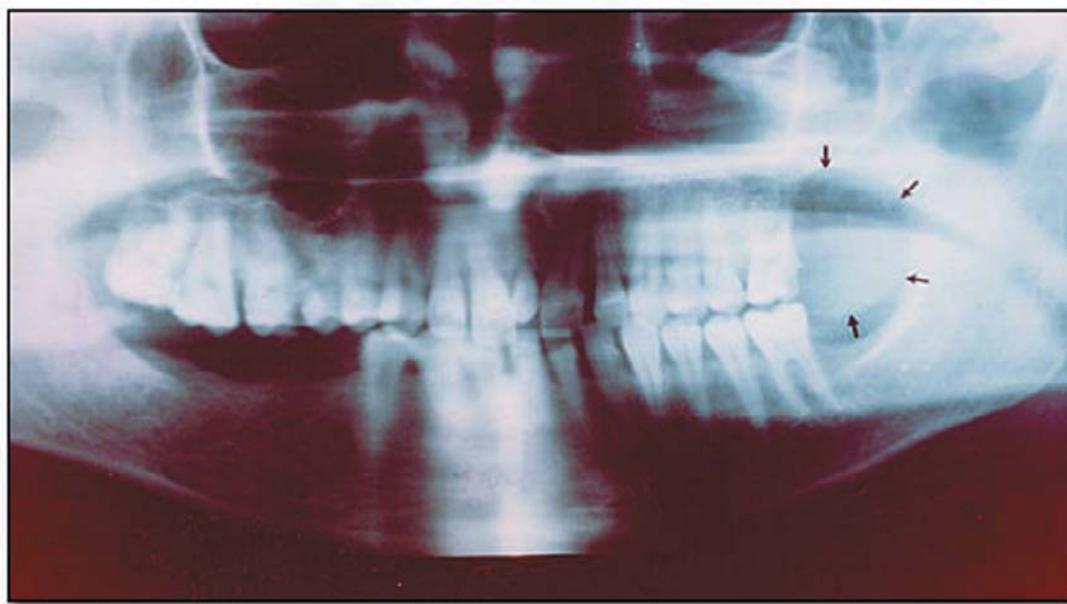


Figure 1. Panoramic radiography of CGCG localized in the maxillary molar area.

We determined there was no significant etiologic factor in 56% of the cases. However, it was determined there were improper dental prosthesis used for a very long time in 33% (9 cases) of the cases and advanced periodontal problems in 11% (3 cases) of them.

The clinic and radiographic features of CGCG cases are shown in Tables 2 and 3. It was determined 56% (15 cases) of the lesions were multilocular, 44% (12 cases) were unilocular, 80% (12 cases) of the multilocular lesions were in the mandible, 75% (9 cases) of the unilocular

lesions were in the maxilla, and there was correlation between distribution in jaws of CGCG with locularity ($\chi^2=8.168$, $P<0.01$), (Table 2). In addition, in the measurements on the panoramic radiographs, it was determined the average size of the lesions was $40.00(\pm 20.92)$ mm, unilocular

lesions were $23.75(\pm 14.00)$ mm, and multilocular lesions were $53.00(\pm 15.85)$ mm. There was statistically a significant difference between the sizes of unilocular and multilocular lesions ($P<0.001$) (Table 3).

Table 2. The clinical and radiographic features of CGCG cases.

Feature	Mandible	Maxilla	Total	χ^2	P
	n (%)	n (%)	n (%)		
Locularity*					
Unilocular	3 (25)	9 (75)	12 (44)	8.168	0.004
Multilocular	12 (80)	3 (20)	15 (56)		
Border definition**					
Well-defined	15 (56)	12 (44)	27 (100)	4.219	0.075
Diffused	0 (0.0)	3 (100)	3 (11)		
Expansion*					
Expansion	9 (75)	3 (25)	12 (44)	3.307	0.069
Not expansion	6 (40)	9 (60)	15 (56)		
Displacement*					
Tooth displacement	6 (67)	3 (33)	9 (43)	3.646	0.056
Not tooth displacement	3 (25)	9 (75)	13 (37)		

*Chi square test, **Fishers exact test

Table 3. The mean size and a statistical comparison of CGCG cases in regards to their locularity, bone expansion, and tooth displacement.

Feature	n	Size (mm)	
		Mean \pm SD	Significant Level
Locularity*			
Unilocular	12	23.75 ± 14.00	$t=5.014$, $P=0.001$
Multilocular	15	53.00 ± 15.85	
Border definition**			
Well-defined	24	40.00 ± 0.00	$U=36.0$, $P>0.05$
Diffused	3	40.00 ± 0.00	
Expansion*			
Expansion	12	60.00 ± 9.66	$t=8.885$, $P=0.001$
Not expansion	15	24.00 ± 11.05	
Displacement*			
Tooth displacement	9	18.33 ± 9.01	$t=4.460$, $P=0.001$
Not tooth displacement	12	44.00 ± 15.33	

*Student t test, **Mann Whitney U test

In twenty-four (89%) cases regular borders were seen and in three cases diffuse borders were seen. It was observed three lesions appearing to be diffused had a high potential for growth. However, it was determined 62.5% (15 cases) of well-defined lesions were in the mandible and three cases with diffused borders were in the maxilla. There was no correlation between distribution of CGCG in the jaws with border definition ($\chi^2=4.219$, $P>0.05$) (Table 2). Also, there was not statistically a significant difference between the sizes of well-defined and diffused lesions ($P>0.05$) (Table 3).

There was bone expansion in 12 (44%) cases. (Figure 2) The cases with bone expansion were $60.00(\pm 9.66)$ mm in average size, and the cases without bone expansion were $24.00(\pm 11.05)$ mm in average size. There was statistically

a significant difference between the sizes of the lesions with and without bone expansion ($P<0.001$) (Table 3).

Six (22%) patients with CGCG were totally edentulous; in 21 (78%) cases lesions were associated with teeth. There was tooth displacement in nine (43%) cases of lesions associated with teeth (Table 2) (Figure 3). The lesions with tooth displacement were $18.33(\pm 9.01)$ mm in average size and 12 (57%) lesions without tooth displacement were $44.00(\pm 15.33)$ mm in average size. There was statistically a significant difference between the sizes of the lesions having tooth displacement and that of the lesions not having tooth displacement ($P<0.001$) (Table 3), however, none of the cases observed root resorption.

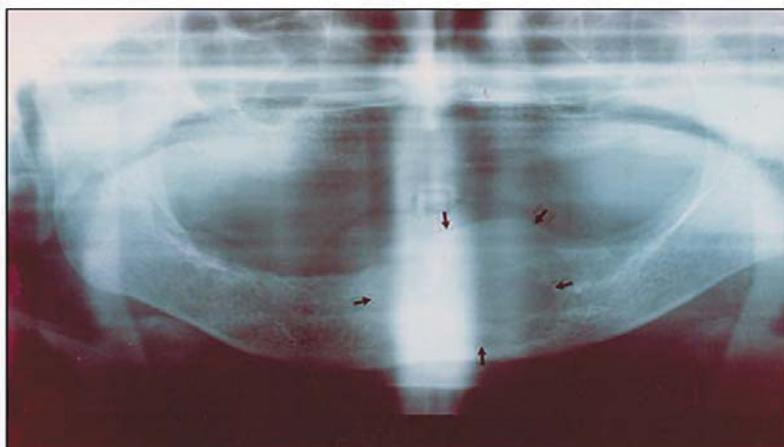


Figure 2. Panoramic radiography of CGCG in an edentulous area showing cortical expansion in the mandibular incisor-premolar area.

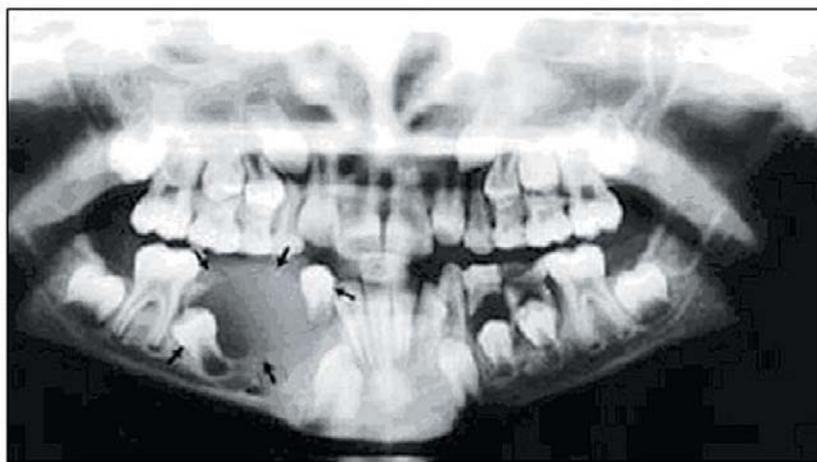


Figure 3. Panoramic radiography of CGCG causing tooth displacement in the mandibular incisor-premolar area.

Discussion

CGCG primarily occurs in the jaws and facial bones, though it also appears in other areas of the body.¹ It is an asymptomatic lesion and usually diagnosed during routine radiographic examinations or when the painless expansion of the affected bone is realized by the patient or his/her parents.^{1,3,4} These lesions usually grow slowly, though they occasionally present a high rate of growth and cause some doubts about malignancy.⁵ The developing lesions are usually painless and do not cause paresthesia.^{1,5,11} However, it has been reported that occasionally lesions may cause pain.^{2,4,5}

In our study, 44.5% of the cases presented because of the expansion in the jaws and 11% because of a slightly painful lesion that grew over a two-week period; the other cases were randomly diagnosed during the radiographic examinations. Kaffe et al.¹² reported in their study that clinically there was an expansion in 75% of the cases, some pain in 5%, and no symptoms whatsoever in 20%. Whitaker and Waldron¹⁰ stated there was pain and paresthesia in 6% of the CGCG cases.

CGCG is reported to affect the individuals under the age of 30 to the largest extent though it can be seen in every age. Kaffe et al.¹² determined CGCG is seen at the mean age of 29.8 years and 60% of these lesions occur before the age of 30. Similarly, Whitaker and Waldron¹⁰ reported the mean age for CGCG was 23 and 64% of the cases were under 30; Eisenbud et al.¹³ determined 89% of the cases were under the age of 50. In our study, it was determined the mean age of patients was 31.³³ and 89% of the cases were under the age of 40.

On the other hand, previous studies reported CGCG to be predominant in females and its percentage to be between 56% and 64%.^{6,10,12-14} We, however, observed this percentage to be 78%.

Cohen and Hertzanu¹⁴ reported 84% of the lesions were seen in the mandible. Andersen et al.⁶, Whitaker and Waldron¹⁰, and Kaffe et al.¹² reported this percentage to be 72%, while Eisenbud et al.¹³ reported it to be 68%. In this study, it was determined 56% of CGCGs were

located in the mandible and 44% in the maxilla. Also, 22% of these entities were located in the area of molars, 67% in the incisors-premolars area, and 11% in the premolars-molars area. Consequently, our results support the previous reports that CGCG involves the mandible more often than the maxilla and tends to occur in the anterior part of the molars.

Although this lesion is thought to be possibly caused by local trauma and bleeding, its etiology has not been clearly established.² Scully et al.¹¹, reported the story of an uncomplicated extraction because of pericoronitis in the area of the lesion and claimed the local changes in the blood flow throughout the bone and local bone dysplasia could be probable etiologic factors. Andersen et al.⁶ carried out a study on this subject, determined a story of trauma before the development of the lesion in only 1 of the 32 CGCG cases. In our study, it was observed there were no significant etiologic factors in 56% of the cases, an improper dental prosthesis used for a very long time in 33% of the cases, and advanced periodontal problems in 11% of the cases.

The radiographic appearance of CGCG is not pathognomonic and specific.^{3,5} It changes with the size of the lesion. Small lesions usually appear to be unilocular radiolucent and deprived of internal bone septa.^{1,5} However, large lesions usually appear to be multilocular radiolucent and like wispy bony septae in this area.^{1,5} Kaffe et al.¹² found in their study on 80 cases that 51% of the lesions were multilocular, 44% were unilocular, 5% were not loculated, and 68% of the multilocular lesions were in the mandible. They also determined unilocular lesions had a mean size of 4.05 cm, while multilocular lesions' mean size was 7.38 cm. They established a statistically significant correlation between the locularity of lesions and their size. Whitaker and Waldron¹⁰ similarly found that 61% of the lesions diagnosed as CGCG were multilocular and 39% were unilocular. On the other hand, Cohen and Hertzanu¹⁴ determined that 50% of the cases were multilocular. Our study also showed that 56% of the lesions were multilocular and 44% were unilocular. However, it was observed that 80% of the multilocular lesions were in the mandible, 75% of the unilocular lesions were in the maxilla, and there was correlation between

distributions in jaws of CGCG with locularity. In addition, it was determined the average size of the unilocular lesions was 23.75 mm and multilocular lesions were 53.00 mm. There was statistically a significant difference between the sizes of unilocular and multilocular lesions. Our results are consistent with the findings of Whitaker and Waldron¹⁰ and Cohen and Hertzanu.¹⁴

It has also been reported the larger CGCGs grow in size, the more probability there will be tooth displacement and expansion in bones.^{14,15} We found the average size of the cases having bone expansion was 60 mm, while that of the cases not having any expansion was 24 mm which showed statistically a significant difference between the bone expansion and size of lesions.

Although Whitaker and Waldron¹⁰ reported tooth displacement in 36% of the lesions and root resorption in 43%, a lot of researchers^{6,7,12,14} remarked that tooth displacement would be seen more frequently in CGCGs than root resorption. In our study, no lesion-related root resorption

was found in the cases although there was tooth displacement in 43% of the tooth-associated lesion. There was statistically a significant difference between the size of the lesions with and without tooth displacement.

On the other hand, in 89% of the cases regular borders were seen and in 11% of the cases diffuse borders were seen. It was observed the lesions appearing to be diffused have a high potential for growth. However, it was determined 62.5% of well-defined lesions were in the mandible, the cases with diffuse borders were in the maxilla, and there was no correlation between distribution in jaws of CGCG with border definition. In addition, there was not a statistically significant difference between the sizes of well-defined and diffuse lesions.

Conclusion

As a result of our findings, it was determined there was a significant correlation between locularity, tooth displacement, and bone expansion with the size of CGCG of the jaws.

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