Growth potential of peripheral giant cell granuloma

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Purpose. The purpose of this study was to investigate the association of selected demographic, systemic health, and oral health characteristics of patients with large (>2 cm) peripheral giant cell granuloma and to assess its growth potential and the possible underlying causes.
Methods. A series of 79 cases including 15 subjects with lesions 2 to 5 cm in the largest diameter is presented. Age, sex, site, size, systemic health, oral hygiene, and report of oral dryness of subjects with large lesions were compared with those of subjects with small lesions (<2 cm).
Results. No differences were found in mean age between the small lesion group (mean age = 31 ± 6 years) and the large lesion group (mean age 53 ± 24.2 years). Female predilection (male/female ratio 1:1.5, 1:2.75.) was more significant in patients with large lesions. No statistically significant differences were found in systemic health score (mean American Society of Anesthesiology score 1.39, 1.53). Oral hygiene score (percent calculus 78% ± 3.1%, 95% ± 2.7%, percent gingival bleeding 58% ± 3.6%, 73% ± 5.4%, percent deep pocket 30% ± 2.8%, 42% ± 3.1) was better among the patients with small lesions. The percentage of patients with a report of oral dryness was significantly higher (3.1%, 27%) among patients with large lesions.
Conclusions. Findings from this study suggest that patients with large (>2 cm) peripheral giant cell granuloma lesions are more likely to be women with lower oral hygiene scores and xerostomia. Further studies are required to measure the relative risk of these factors.
(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997;83:548-51)

The peripheral giant cell granuloma (PGCG) is a reactive exophytic lesion occurring on the gingiva and alveolar ridge usually as a result of local irritating factors such as tooth extraction, poor dental restorations, food impaction, ill-fitting dentures, plaque, and calculus.[1-8]

The clinical appearance of PGCG is a small, well-demarcated, dark red focal mass on the gingiva with a sessile or pedunculated base usually originating from either the periodontal ligament or mucoperiosteum.[6, 7, 9] On histologic evaluation the lesion is a noncapsulated mass of tissue containing a large number of young connective tissue cells and multinucleated giant cells in an architectural pattern of focal nodules of giant cells separated by fibrous septa. Hemorrhage, hemosiderin, inflammatory cells, and newly formed bone or calcified material may also be seen throughout the cellular connective tissue.[7-9]

The PGCG may occur at any age but exhibits a peak incidence between 40 and 60 years of age. The average age at diagnosis is approximately 38 to 42 years, with women being affected more than men.[6, 7, 9]

The size of the lesion is usually between 0.5 and 1.5 cm in the largest diameter.[6, 9] The maximum capability of PGCG to expand is unknown. The association of large PGCG to oral or systemic factors is also unclear.

The purpose of this study was to investigate the association of selected demographic, systemic health, and oral health characteristics of patients with large (>2 cm) PGCG and to assess its growth potential and the possible underlying causes.

MATERIAL AND METHODS

The clinical details and radiographs of 79 consecutive cases diagnosed as PGCG of the jaws were recovered from the files of the Departments of Otolaryngology—Head and Neck Surgery and Oral and Maxillofacial Surgery, Soroka Medical Center, Ben-Gurion University during the years 1980 through 1995. Fifteen cases were considered large lesions, because the largest diameter was greater than 2 cm. The rest of the cases were considered small lesions, because the largest diameter was smaller than 2 cm. All cases had a histopathologic diagnosis of PGCG. Age, sex, site, size, systemic health, oral hygiene, and a report of oral dryness were recorded for all 79 cases in the study. The American Society of Anesthesiology status (Table I) abstracted from each patient's record

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Received for publication Jan. 24, 1996; revised March 1, 1996; accepted Sept. 24, 1996.

1079-2104/97/$5.00 + 0 **7/14/78909**

was used to evaluate systemic health.[10] Oral hygiene was determined by the presence of calculus and gingival bleeding and by pocket depth probing. Patients were scored for calculus accumulation of all the tooth surfaces with clinical evaluation for the supragingival calculus and with radiography for the subgingival calculus. Gingival bleeding and probing pocket depth ≥4 mm were recorded with a Michigan O probe at six reference loci on the buccal and lingual sides of each tooth.[11]

RESULTS

The age and sex of the patients, site, size, and duration of the large lesions are shown in Table II. The ages ranged between 8 to 85 years (average 53 years). The male/female ratio was 1:2.75. Eleven (73%) PGCG occurred in the mandible, and four (27%) occurred in the maxilla. The size of the lesion in its largest dimension ranged between 2 and 5 cm (average 3.2 cm). The site of the lesion was within the teethbearing area even among the edentulous patients. The posterior (premolar and molar) region of the jaw was the most common site of occurrence. Radiographic findings were generally unremarkable; however, in some cases radiographs revealed an irritating factor such as subgingival calculus. The duration of the lesions was between 3 months and 4 years (average 1.35 years).

The age, sex, site, size, systemic health score, oral hygiene score, and report of oral dryness for the patients with small and large lesions are shown in Table III. The mean age of the small size group was 31 (±6) years, and the mean age of the large lesion group was 53 (±24.2) years. This difference was not statistically significant. The male/female ratio for the small and large lesions was 1:1.5 and 1:2.8, respectively. This difference was significant ($p < 0.05$). The site predilection of the lesions was the mandible in both the small and large lesions. The systemic health score as determined by the American Society of Anesthesiology status was better among the small lesion population compared with the large lesion population (Table IV); however, the difference was not statistically significant.

Oral hygiene scores were better among patients with small lesions than those with large lesions (Table III). The percentage of patients with calculus was 78% (±3.1%) and 95% (±2.7%), with gingival bleeding was 58% (±3.6%) and 73% (±5.4%), and with probing pocket depth was 30% (±2.8%) and 42% (±3.1%) for the small and large lesions, respectively. This difference was significant ($p < 0.05$). Percentage of patients with complaint of oral dryness in the small lesion group was 3.1%, whereas in the large lesion group it was 27%. This difference was significant ($p < 0.001$).

Table I. American Society of Anesthesiology physical status classification

ASA class
1. No organic disease.
2. Mild to moderate systemic disease without functional impairment.
3. Organic disease with definite functional impairment.
4. Severe disease that is life-threatening.
5. A moribund patient not expected to survive.

DISCUSSION

The high frequency of reactive focal overgrowth in the gingiva is likely to be a result of the irritational factors in the oral cavity in conjunction with the unique anatomy of the gingival attachment. The PGCG is unique to the gingival mucosa. There are no reported cases occurring in extra gingival sites.[7-9] This may be related to the anatomic nature of the gingiva and the irritational factors at this site.[8, 12] It has been suggested that the lesion originates from the periodontal ligament or the mucoperiosteum as a response to an intense irritation of the periosteum.[9, 12] Histopathologic features of PGCG may be consistent with periodontal ligament or periosteum derivation. The fibrocellular response is similar to that of other reactive lesions such as fibrous hyperplasia and peripheral ossifying fibroma.[6, 13] The calcified tissue found in some of the lesions may be either woven bone or lamellar bone produced by the mononuclear stromal cells, which resemble latent proliferative osteoblasts or osteoprogenitor cells.[3, 8] The microscopic appearance of PGCG is unique mainly because of the large number of multinucleated giant cells dispersed in the connective tissue stroma. The precise origin of the giant cells has never been established. Different views have been proposed by a number of authors based on light and electron microscopy, and the possible sources are osteoblasts, phagocytes, endothelial cells, and spindle cells.[9, 12, 14]

The mean age of the group with large lesions seemed to be higher than the mean age of the group with small lesions; however, the difference was not significant, probably because of the wide age range of the large lesion group in this study.

Site predilection in this study for both the small and large PGCG is the mandible anterior to the molars. The maxilla is less affected. There is also a sex predilection; women are affected more frequently than men.[2, 7, 9] This sex predilection is more significant among patients with large PGCG. The radiographic findings are usually unremarkable, because the le-

Table II. Clinical features of (>2 cm) peripheral giant cell granuloma of the jaws

	Age (yr)	*Sex*	*Jaw*	*Site*	*Size (cm)*	*Duration (yr)*
1	8	M	Mandible	Posterior	3,3	0.5
2	10	M	Mandible	Posterior	2.5	0.25
3	11	M	Mandible	Posterior	2.2	0.3
4	38	F	Mandible	Posterior	5.0	1.0
5	45	F	Maxilla	Posterior	2.3	0.6
6	55	F	Mandible	Posterior	5.0	3.0
7	60	F	Mandible	Posterior	2.4	1.5
8	65	F	Mandible	Posterior	3.8	1.75
9	66	F	Mandible	Posterior	2.2	1.25
10	66	F	Maxilla	Posterior	2.0	0.9
11	66	F	Mandible	Posterior	2.5	1.0
12	70	F	Mandible	Anterior	5.0	4.0
13	71	M	Maxilla	Anterior	2.8	2.0
14	76	F	Maxilla	Anterior	3.0	1.2
15	85	F	Mandible	Posterior	4.0	1.0
	Mean: 53		Mean = 3.2			Mean: 1.35

M, Male; *F*, Female; M:F = 1:2.75; Maxilla:Mandible = 1:2.75; Anterior:Posterior = 1:4.

Table III. Clinical characteristics of small (<2 cm) and large (>2 cm) peripheral giant cell granuloma

	Small lesions (<2 cm) (N = 64)	*Large lesions (>2 cm) (N = 15)*	*Statistical analysis*
Age (yr)	31 (±6)	53 (±24.2)	NS*
Sex (M:F)	1:1.5	1:2.75	$p < 0.05$*
Site (mandible: maxilla)	2:1	2.75:1	NS*
Systemic health (ASA) score	1.39	1.53	NS*
Oral hygiene score:			
Calculus assessment (% of patients)	78 (±3.1)	95 (±2.7)	$p < 0.05$*
Gingival bleeding (% of patients)	58 (±3.6)	73 (±5.4)	$p < 0.05$*
Probing pocket depth (% of patients with ≥4 mm pocket)	30 (±2.8)	42 (±3.1)	$p < 0.05$*
Oral dryness (%)	3.1	27	$p < 0.001$*

*Chi-square analysis. *NS*, not significant when $p \geq 0.05$; *ASA*, American Society of Anesthesiology.

Table IV. Systemic health characteristic of sample

	Small lesions (<2 cm) (N = 64)	*Large lesions (>2 cm) (N = 15)*
ASA status		
ASA 1	40 (63%)	8 (53%)
ASA 2	23 (36%)	6 (40%)
ASA 3	1 (1%)	1 (7%)
Mean ASA score	1.39	1.53

ASA, American Society of Anesthesiology.

sion is a soft tissue mass. However, in some cases it may point toward the possible irritational factor. This is in contrast to the central giant cell granuloma, where radiography is an important diagnostic tool.[15, 16]

At present, the maximum capability of PGCG to expand is unknown. Kfir et al.[6] reported PGCG ranging in size from 0.1 to 3.0 cm, and 94% of the lesions were smaller than 1.5 cm. This study demonstrates that the lesion can grow up to 5 cm in largest diameter. It is likely that expansion of the PGCG is a relatively slow process and that most lesions are diagnosed and surgically removed before they reach their full growth potential. A similar observation was also reported on peripheral ossifying fibroma.[13]

The systemic health was somewhat better among the small lesion group compared with the large lesion group, but the difference was not significant, indicating that systemic health alone is not a contributing cause for large PGCG.

The state of oral hygiene was significantly worse among the large lesions compared with the small lesions. This result may indicate the important role of

oral hygiene in the development and growth of PGCG.

The most important finding of this study was the significantly higher percentage of reports of oral dryness among the large lesion group. A reduced salivary flow rate associated with changes in salivary composition leads to altered physiologic functions of saliva such as lubrication and protection of oral mucosa, mechanical cleansing of the mucosa, and promotion of wound healing.[17-20] It is therefore possible that the lack of saliva exposed the lesion more aggressively to the irritational factors of mastication. Ill-fitting dentures were also a contributing factor to the local irritation of the gingiva.[21]

This study, in which the lesions were up to 5 cm at the largest diameter, may point toward the growth potential. PGCG can become a sizeable lesions unless surgical intervention is carried out at an early stage. Patients with poor oral hygiene or with xerostomia are more susceptible to have large PGCG and should be periodically examined as a preventive measure.

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