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**Unusual clinical presentation of oral pyogenic granuloma with severe alveolar bone loss: Case reports**

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**Abstract**

**BACKGROUND**

Pyogenic granuloma (PG) is a localized, reddish and vascularized hyperplastic lesion of the connective tissue which occurs in the oral cavity. In most cases, the presence of this lesion does not show alveolar bone resorption. The pathology is diagnosed clinically with some caution. However, the diagnosis and treatment are usually corroborated with histopathological evidence.

**CASE SUMMARY**

Three clinical cases of PG associated with bone loss were described in this study. The three patients presented tumor-like growth which bled on touch, and were associated with local irritant factors. Radiographs showed bone loss. All cases were treated with conservative surgical excision. The scarring was satisfactory, and there was no case of recurrence. The diagnoses were based on clinical findings, and were confirmed histopathologically.

**CONCLUSION**

The occurrence of oral PG with bone loss is unusual. Therefore, clinical and radiographic evaluations are important for the diagnosis.

## **INTRODUCTION**

Pyogenic granuloma (PG) is a soft tissue tumor of the oral cavity [1-3]. The etiology of the tumor is unknown, although it is thought that it probably originates from exacerbated response of the connective tissue to trauma, local irritation or hormonal imbalances [1-3]. Pyogenic granuloma has also been considered an "infectious" entity, due to the presence of botryomycosis [1].

PG presents clinically as a smooth mass with a lobular architecture which is usually pedunculated, although some lesions are sessile [5,6]. Radiographic evaluation of this mass has not been considered as a diagnostic strategy. However, the characteristic bone loss associated with PG has been reported only in few clinical cases in India [7-9]. In this study, we report three cases of female patients who presented PG associated with bone loss.

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## **CASE PRESENTATION**

### ***Chief complaints***

**Case 1:** A 32-year-old woman presented with a lump on the palate that bled frequently and interfered with chewing.

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**Case 2:** A 42-year-old woman presented with a bulge near the upper lip. The patient complained of pain when chewing and mobility of the central incisor.

**Case 3:** A 38-year-old woman had two enlargements which bled frequently and interfered with chewing.

### ***History of present illness***

**Case 1:** The patient stated that the lesion appeared approximately 3 mo prior to the clinical diagnosis.

**Case 2:** In the course of anamnesis, it was revealed that the lesion had 5 mo of evolution. It bled on touch, and it had a firmer consistency than before.

**Case 3:** The patient said that the lesion had 6-month evolution period, during which it grew until chewing became an uncomfortable exercise.

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### *History of past illness*

**Case 1:** The patient did not have any history of systemic disease. Thus, the medical record was not relevant.

**Case 2:** The medical record was not relevant, since the patient denied any pathology or systemic disease.

**Case 3:** The patient did not mention presence of any systemic disease, and she was not undergoing any medical treatment.

### *Personal and family history*

**Case 1:** None

**Case 2:** Father was diagnosed with Type 2 Diabetes Mellitus 5 years earlier.

**Case 3:** Mother was diagnosed with high blood pressure in 2017.

### *Physical examination*

**Case 1:** Oral examination revealed a localized exophytic lesion manifested as a 25 x 12 mm erythematous mass with smooth consistency which bled on provocation. The lesion was pedicled and attached to the marginal gingiva of dental organ 22, and it extended to the middle third of palatal surface of dental organs 21 and 23 (Figure 1a). In addition, dental organ 22 presented grade-three mobility and extensive caries along the palatine surface.

**Case 2:** During the oral examination, a semi-ovoid 16 x 10 mm formation of gingival mucosa was found. The surface was smooth and reddish in color. The growth was pedicled and attached to the marginal gingiva of dental organ 21 (Figure 2a). This dental organ presented grade-three mobility, supra- and sub-gingival calculus, and probing depth of 8 mm.

**Case 3:** During the clinical examination, two reddish exophytic lesions with smooth surfaces were identified. The lesions were about 20 x 15 and 10 x 12 mm in size. They were pedicled and attached to the interproximal zone of dental organs 46 and 47 (Figure 3a). Supra- and sub-gingival calculus were identified in the two dental organs.

#### *Laboratory examinations*

**Case 1:** Hemoglobin level was slightly low (11.8 g/dL). The other results were within normal limits.

**Case 2:** Neutrophil count was slightly high (72%). However, the levels of the other white cells were within normal limits [platelet level ( $309 \times 10^3/\mu\text{L}$ ) was normal, and hemoglobin level (14.5 g/dL) was normal].

**Case 3:** Hemoglobin, neutrophil and platelet levels were within normal limits.

#### *Imaging examinations*

**Case 1:** Periapical radiography showed horizontal bone loss up to the middle third region of dental organ 22 (Figure 1b).

**Case 2:** Panoramic radiography showed generalized alveolar bone loss in both arches (Figure 2b).

**Case 3:** Periapical radiography showed interproximal bone loss between dental organs 47 and 48 (Figure 3b); and between dental organs 46 and 47 (Figure 3c).

#### **MULTIDISCIPLINARY EXPERT CONSULTATION**

**Case 1:** Based on all the information obtained from anamnesis, and from radiographic imaging, clinical features of lesion such as ulcerated surface, bleeding on provocation, as well as the adjacent local irritants, a presumptive diagnosis of pyogenic granuloma was made.

**Case 2:** The information obtained from the clinical, radiographic examination, and the history of evolution of the lesion led to a presumptive diagnosis of pyogenic granuloma.

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**Case 3:** Based on all the information obtained during the clinical and radiographic examinations, as well as the clinical features of the lesion, and the adjacent local irritants, the presumptive diagnosis was pyogenic granuloma.

### FINAL DIAGNOSIS

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**Case 1:** Microscopic examination revealed a segment of buccal mucosa with fibrous stroma and a diffuse lymphoplasmacytic-type inflammatory infiltrate. There was evidence of old and recent stromal hemorrhages around newly-formed, congested blood vessels having irregular contours and varied diameters, with hyperplastic endothelial cells covered by epithelium with extensive areas of erosion. This histological examination confirmed the diagnosis of PG (Figures 1e and 1f).

**Case 2:** Histological analysis revealed a segment of mucosal stratified squamous epithelium with underlying fibrovascular stroma and a dense infiltrate of chronic inflammatory cells, stromal hemorrhage, large number of budding capillaries, fibroblasts, and areas of extravasated blood. Therefore, the diagnosis of PG with gingival hyperplasia was confirmed (Figure 2e). Along with this final diagnosis, and based on the results of intraoral clinical examination, periodontal chart, and X-ray, a stage III grade generalized periodontitis was also diagnosed.

**Case 3:** On microscopic examination, sections showed stratified squamous epithelium with non-neoplastic endothelial cell proliferation, formation of new blood cells, as well as acute and chronic inflammatory cell infiltration in a collagenous matrix around the newly formed, congested blood vessels with irregular contours and varied diameters. The blood vessels were covered by epithelium with extensive areas of erosion. These features corroborated the presumptive diagnosis of PG (Figures 3e and 3f).

### TREATMENT

**Case 1:** The exophytic lesion was removed with excisional biopsy (Figure 1c). The procedure was performed under local infiltrated anesthesia [2 % mepivacaine with epinephrine (10 µg/mL)]. The incision was made with a 15C scalpel blade on the base

of the pediculated lesion. The gingival tissues were remodeled with LaGrange scissors. Due to the extent of bone loss, degree of mobility, and the extensive caries in dental organ 22, a decision was made to remove it (Figure 1d). Oral prophylaxis was performed with an ultrasonic device and Gracey 1-2 curettes in order to remove the local irritants on the adjacent teeth. After the procedures, 500-mg amoxicillin tablets were prescribed for the patient, to be taken 3 times daily for 5 days, and post-surgery indications were given.

**Case 2:** The exophytic mass was removed through an excisional biopsy (Figure 2c), along with the extraction of dental organ 21. The extraction was performed without complications (Figure 2d). The procedure was performed under local infiltrated anesthesia [2 % mepivacaine with epinephrine (10 µg/mL)]. The incision was made with a 15C scalpel blade on the base of the pediculated lesion. Oral prophylaxis was also performed with ultrasonic device and McCall 13-14 and 17-18 curettes. After the procedures, amoxicillin tablets (500 mg) were administered to the patient 3 times daily for 5 days, and post-surgery indications were given.

**Case 3:** An excisional biopsy was performed under local infiltrated anesthesia [2 % mepivacaine with epinephrine (10 µg/mL)]. The incision was made with a 15C scalpel blade on the based of the lesion. The incision <sup>1</sup>was extended to the periosteum, and a 2-mm margin was included from the adjacent soft tissues (Figure 3d). Oral prophylaxis was performed with an ultrasonic device and McCall 17-18 curettes in order to remove the calculus on dental organs 46, 47 and 48. Post-surgery indications were given, and the patient was placed on 500 mg tablets of amoxicillin 3 times daily for 5 days.

### **OUTCOME AND FOLLOW-UP**

**Case 1:** After three months of follow-up, the scarring was satisfactory, and there was no recurrence.

**Case 2:** The scarring was satisfactory after three months of follow up, and there was no recurrence. Additional therapy was started for the periodontitis.



**Case 3:** After three months of follow-up, the scarring was satisfactory, and there was no recurrence

## DISCUSSION

PG is a localized, reddish and vascularized gingival hyperplastic lesion [10,11,12]. It has been reported that oral PG accounts for an incidence of 52.71% among all non-neoplastic lesions [13]. It occurs more frequently in women than in men, and the major site of predilection is the gingiva [14]. Other lesion sites are the buccal mucosa, upper lip, lower lip, tongue, paladar and labial mucosa [9-12].

PG is considered a reactive self-limited pathology that presents as an exuberant proliferation of connective tissue in response to stimulation by some local irritant factor. Tripathi *et al.*, [8] and Verma *et al.*, [9] concluded, in their clinical case reports, that poor oral hygiene leading to abundant biofilm and dental calculus accumulation causes chronic irritation and contributes to the development of oral PG, similar to the cases presented. In the third case the presence of supra and sub gingival calculus was identified in the dental organs, which could be associated with the appearance of PG, and the periapical radiograph showed interproximal bone loss. However, in the first clinical case, we reported the presence and extent of dental caries in dental organ 12. Dental caries is caused by etiologic agents, such as *Staphylococci* and *Streptococcus* which produce colonies with fungal characteristics [15]. Chronic trauma provides a pathway for invasion of these microorganisms that induce proliferation of vascular connective tissue. Thus, it can be inferred that these pathogens also act as stimuli that favour the formation and growth of pyogenic granuloma [1,16].

In the oral cavity, PG appears <sup>5</sup> a smooth or lobulated exophytic and red erythematous papule on a pedunculated or sessile base, and it is usually hemorrhagic and compressible [1,2,16]. The surface of PG is characteristically ulcerated [24], and its color varies from red, reddish purple to pink, depending on the degree of vascularity and the



age of the lesion [16-17]. Newly -formed lesions are highly vascular, and appear more reddish in color, relative to old lesions. In contrast, mature lesions are pink in color and firm in consistency due to presence of high level of collagen fibers [3,17].

Most researchers have reported that radiographic evaluation of pyogenic granuloma does not show relevant features because the lesion arises from soft tissues [1,18,19,20]. However, pyogenic granuloma is a benign inflammatory lesion that expresses significantly more vascular endothelial growth factors and basic fibroblast growth factors than healthy gingiva and periodontitis [21]. In all three clinical cases described, bone tissue loss is observed and, although infrequent, PG can cause significant bone loss on rare occasions, as reported by Mastammanavar *et al.*, [7], Tripathi *et al.*, [8] and Verna *et al.*, [9]. Growth factors such as fibroblast growth factor-2, growth arrest-specific gene 6, and tumor necrosis factor- $\alpha$  stimulate mature osteoclast function and survival through signal-regulated kinase ERK activation, resulting in degradation or resorption of organic and inorganic bone components [22]. We may reasonably hypothesize that the severe alveolar bone loss in the three clinical cases presented was due to the activation of ERK signal pathway. Therefore, we suggest that bone loss should be considered as a possible diagnostic feature of pyogenic granuloma, notwithstanding the fact that the lesion arises from soft tissues.

In all clinical cases evaluated, the recommended management of this pathology involves surgical excision. However, different treatment modalities have been applied. These comprise Nd : YAG laser [23], CO<sub>2</sub> laser [24], flashlamp pulsed dye lasers [25], cryotherapy [26,27] and intra-lesional steroids [28,29]. The rate of recurrence of GP is 16%. This is due to incomplete excision of lesion and failure to remove local etiologic factors such as plaque, calculus and source of trauma [30,31]. For the latter, we recommend oral prophylaxis and elimination of local irritant factors, in addition to simultaneous resection of the lesion. It is essential to continuously implement complete dental evaluation involving preventive measures consisting of elimination of local irritant factors (dental biofilm, dental calculus, over contoured restorations, *etc.*) and meticulous oral hygiene care [brushing after eating (at least twice a day), using

toothpaste on a soft-bristled toothbrush, and daily flossing]. These strategies decrease the possibility of appearance and development of pyogenic granuloma.

### **CONCLUSION**

We presented three cases of oral PG with an unusual feature i.e., alveolar bone loss. The clinical cases showed various etiological factors such calculus and periodontitis, which generate or contribute to the formation of PG. This hyperplastic lesion may occur as a single entity, or it may be associated with a non-neoplastic reactive proliferative process such as gingival hyperplasia. Surgical excision, oral prophylaxis and the elimination of local irritant factors are procedures that may be effectively implemented to minimize the recurrence of this lesion. Likewise, diagnosis, treatment plan and continuous dental evaluation are very essential. These case reports indicate that the clinical diagnosis of PG is a complex process. Therefore, it is important to know the clinical characteristics of the lesion at various locations.

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