Pyogenic granuloma of oral cavity: Case series and clinicopathologic correlation

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Abstract
Background: Pyogenic granuloma is an inflammatory hyperplasia occasionally observed in the oral cavity. The term pyogenic granuloma is a misnomer because it neither contains pus nor it is a granuloma histologically. Most commonly occurs in the second decade of life and females are more commonly affected. Trauma, calculus, pregnancy, hormonal factors are the common etiological factors associated. It appears as smooth or lobulated exophytic lesion, mostly pedunculated and bleeds on slight probing. The diagnosis of pyogenic granuloma should be confirmed by histopathology and treatment of choice is surgical excision. Recurrence is not uncommon and mainly occurs due to incomplete excision and persisting etiology.

Aim: This article presents four cases of oral pyogenic granuloma with literature review summarizing the existing knowledge of etiopathogenesis, diagnosis and management of this non neoplastic lesion.

Conclusion: Pyogenic granuloma occurs as mostly painless benign growth but causes great discomfort and fear of malignancy to the patient. Surgical excision and removal of etiological factors are the mainstay treatment.

Clinical Significance: This article reiterates importance of correct diagnosis and treatment planning in common oral lesions such as pyogenic granuloma. Histopathological examination of the excised lesion can help in definitive diagnosis. Pyogenic granuloma bleeds profusely and hence adequate hemostatic measures should be employed during and after the surgery.

Keywords
Capillary hemangioma, gingival enlargement, inflammatory hyperplasia, pyogenic granuloma

Introduction
Gingival enlargements are often encountered in clinical practice and demands adequate attention and knowledge for diagnosis and management. Most of these lesions present with overlapping clinical features and hence are difficult to differentiate from each other. The most common gingival enlargements are of inflammatory or reactive type which occurs due to local irritants, hormonal factors, or certain medications.[1]

Pyogenic granuloma is one of the inflammatory hyperplasias occasionally observed in the oral cavity. The term pyogenic granuloma is a misnomer as infection is not considered as an etiological factor. Pyogenic granuloma has been associated with chronic low-grade stimuli such as local irritation, trauma, poor oral hygiene, hormonal imbalance, and pregnancy. It is predominantly seen in the second decade of life with a predilection to the females.

The lesion responds well to surgical management; however, high recurrence has been reported from the remnant lesion or due to existing irritant.[2]

We describe series of four cases of pyogenic granuloma in oral cavity, reiterating etiopathogenesis of the lesion, differential diagnosis, and various treatment modalities available. Informed consent was obtained from all individual participants included in the study.

Case Series
Case 1
A 45-year-old female was referred to our center with the chief complaint of soft growth on the left side lower back jaw region for the past 1 year. On examination, a soft tissue growth was observed on left mandibular alveolar ridge extending in 37 and 38 region both on the buccal and lingual aspects, measuring approximately 3 cm × 1 cm [Figure 1]. The growth was pedunculated, mobile, bled profusely on probing, and non-tender. The oral hygiene was poor with moderate calculus and stains. 36 and 37 were Grade II mobile, while 38 was found to be
Grade III mobile. No lymph nodes were palpable. The patient was an occasional pan chewer and was using charcoal powder for brushing. Based on the clinical examination, the provisional diagnosis of pyogenic granuloma was established. The lesion was excised completely, and 38 was extracted under local anesthesia. Deep scaling and root planing were performed postoperatively. The hemorrhage was controlled with thermal cauterization and pressure dressing. The histopathological examination of the specimen revealed a stratified squamous parakeratinized epithelium which was hyperplastic and focally ulcerated. The connective tissue stroma showed numerous endothelial lined blood vessels with proliferating plump endothelial cells and budding capillaries in the connective tissue stroma. Dense bundles of collagen fibers could be seen arranged haphazardly in the stroma in conglomeration with intense inflammatory infiltrate comprising of plasma cells, lymphocytes, and few neutrophils. Areas of hemorrhage were also noted [Figures 2 and 3]. The lesion was diagnosed as pyogenic granuloma and was histopathologically confirmed.

Case 2
A 25-year-old female reported with the complaint of profuse bleeding and enlarged growth in the mandibular region. On examining, solitary soft tissue growth was observed in the left mandibular lingual aspect extending from lateral incisor to first molar region, measuring 4 cm × 3 cm. The color varies from pinkish red and the surface overlying was smooth. The growth was pedunculated and bled profusely on probing [Figure 4]. Moderate calculus and plaque collection was observed around the dentition. Excisional biopsy was performed followed by scaling and curettage. Histopathological analysis confirmed the growth to be pyogenic granuloma. No recurrence was observed in 2-year follow-up.

Case 3
A 22-year-old female reported with the complaint of growth in the right mandibular region. On examining, solitary soft tissue growth was observed in right mandibular buccal aspect in relation to the second premolar, measuring 1 cm × 1 cm [Figure 5]. The growth was lobulated and bled profusely. Excisional biopsy was performed followed by scaling and curettage. Histopathological analysis confirmed the diagnosis of pyogenic granuloma. No recurrence was observed in 1-year follow-up.

Case 4
A 16-year-old male reported with the complaint of growth in the left maxillary region. On examination, solitary, pedunculated growth was observed in left maxilla encircling the erupting canine. The color of the growth was pink with some areas of reddish hue. It measured 1 cm × 1.5 cm, bleeding profusely on probing [Figure 6] Calculus and plaque deposit was found in moderate amount. Excisional biopsy was performed followed by scaling and curettage. Histopathological analysis revealed pyogenic granuloma. No recurrence was observed in 1-year follow-up.

Discussion
Pyogenic granuloma is a soft tissue growth of varying sizes. The lesion was first reported by Hullihen in 1844, while Hartzell in 1904 coined the term "pyogenic granuloma" or "granuloma pyogenicum." Pyogenic granuloma is commonly found in skin and oral cavity and very rarely in gastrointestinal tract. Intraorally, gingiva is the most common site which accounts for almost 75% of all cases followed by buccal mucosa, tongue, and lips. The lesion occurring on gingiva is observed in approximately 5% of gravid females mostly in second or third trimester where it is referred as "pregnancy tumor" or "granuloma gravidarum."

Clinically, pyogenic granuloma is presented as a smooth or lobulated exophytic growth which manifest as small, red eritematous papules with pedunculated or sometimes sessile base, which usually bleeds on slight probing due to high vascularity. The surface ranges from pink to red to purple,
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depending on the age of the lesion.\(^5\) The major etiological factors in the development of pyogenic granuloma are low-grade trauma, poor oral hygiene, faulty restorations, calculus, eruption trauma, pregnancy, and hormonal. Interestingly, cyclosporine, dental implants, and allogenic materials have been found associated with pyogenic granuloma.\(^2,6\) Few authors have suggested infection as one of the causes of pyogenic granuloma, but majority of literature concludes that although infection can be present in some cases, it cannot be considered as a causative factor for pyogenic granuloma.\(^2,7\)

A study by Yuan et al. reported a significant correlation between female steroid hormones which can increase the expression of angiogenic factor in inflamed tissues and reduce the apoptotic activity of granuloma cells to extend angiogenic effect.\(^8\)

A clinical diagnosis should always be confirmed by a histopathological analysis before reaching a definitive diagnosis of pyogenic granuloma. Histopathologically, it has been differentiated into lobular capillary hemangioma (LCH) and the non-lobular type (non-LCH). The LCH type has been reported to be more aggressive than non-LCH due to more proliferative activity.\(^9\) Proliferating blood vessels with small luminal diameter organized in lobular aggregates are characteristic features of LCH type, whereas the non-LCH type reveals the high amount of vascular proliferation resembling granulation tissue. The perivascular mesenchymal cells found in the central area of non-LCH type are significantly non-reactive for \(\alpha\)-smooth muscle actin, whereas the positive reaction is noted in the lobular area of LCH PG.\(^10\) Females have shown a predilection toward non-LCH type.\(^11\)

Furthermore, due to its etiopathogenesis and histological presentation, the terms capillary hemangioma, granuloma type, angiogranuloma, hemangiomatous granuloma, and granuloma telangiectacticum to replace pyogenic granuloma have been considered in scientific literature.\(^1,7\)

\[\text{Figure 3: Photomicrograph of H and E stained specimen under } \times 40 \text{ magnification}\]

\[\text{Figure 4: Clinical presentation of case 2}\]

\[\text{Figure 5: Clinical presentation of case 3}\]

\[\text{Figure 6: Clinical presentation of case 4}\]
Differential diagnosis of pyogenic granuloma includes peripheral giant cell granuloma, hemangioma, peripheral ossifying fibroma, malignancy, and others. The increased vascularity and inflammatory cells are differentiating features of pyogenic granuloma as compared to the ossifying fibroma or giant cell granuloma. The peripheral giant cell granuloma has characteristic presence of multinucleated giant cells. Hemangioma has an affinity to extragingival locations and does not present any inflammatory components. Sometimes, pyogenic granuloma can be mistaken as Kaposi’s sarcoma which can be differentiated from the latter by the absence of atypical cells and haphazardly placed blood vessels.

The pyogenic granuloma has been differentiated into three clinical stages of phases. The “early phase” is presented with compact cellular stroma and very less lumen formation. In “capillary phase”, the lesion is matured and highly vascular lobules with high number of intraluminal red blood cells can be seen. The last phase is referred as “involutionary phase” which reveals intra- and perilobular fibrosis. The involutionary phase is also referred as healing phase of this lesion. Clinically younger lesions appear red to purple due to high vascularity, while older lesions are collagenized and tend to appear pink.

Although many treatment modalities are there for pyogenic granuloma, the most commonly preferred modality is complete excision and removal of causative irritants. In cases with suspicion of malignancy or large lesions, incisional biopsy is indicated. Laser excision with Nd: YAG or CO\textsubscript{2} has shown better coagulation, hemostasis, and no adverse effects. Maintenance of oral hygiene, removal of irritants, and follow-up without any surgical intervention of small lesions have also shown regression, especially in gravid patients where it is popularly termed as pregnancy tumor; however, termination of pregnancy due to uncontrollable eclampsia has been documented. Other reported treatment modalities are cryosurgery, injection of absolute ethanol, sclerotherapy, and intralvesional corticosteroids.

Recurrence in excised pyogenic granuloma has been reported to as high as 16%, and hence, complete excision and long-term follow-up are recommended. Gingival cases exhibit higher recurrence as compared to other sites. Recurrent pyogenic granuloma with satellite lesions is also known as Warner and Wilson-Jones syndrome. Needless to say, it is very important to identify and remove the causative factor or irritant in such lesions.

Conclusion

Pyogenic granuloma is a non-neoplastic growth, which is mostly painless, but causes a great discomfort and fear of malignancy to the patient. Hence, proper diagnosis and complete excision along with the removal of irritants are the major line of treatment.

References