

Surgical management of Angio granuloma: A case series

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Abstract

Oral health is often neglected during pregnancy. This may lead to development of hyperplastic reactive oral lesions such as angiogranuloma / pregnancy tumor. Angiogranuloma is an isolated, exaggerated response of the gingiva, modified by elevated hormonal levels. It may be large, painful, profusely bleeding, unaesthetic, interfere with function like occlusion, mastication and speech and may lead to adverse pregnancy outcomes. This lesion usually resolves spontaneously after post-partum, if small and asymptomatic and if adequate oral hygiene is maintained. However, large lesion causing functional discomfort or persisting even after post-partum, have to be managed by meticulous scaling, root planing and surgical excision.

In this case series, three pregnant females with Angio granuloma were treated by scaling and root planing, surgical excision and regular post-surgical periodontal maintenance. Biopsy reports confirmed the diagnosis of the same. A marked improvement in the gingival health with no recurrence was observed at each follow-up visit in all three cases. Hence, oral health should be emphasized as an important aspect of prenatal care.

Keywords: Angio granuloma, pregnancy, gingival growth, estrogen, progesterone

Introduction

Pregnancy is a unique golden phase of a women’s life. Female sex hormones are known to play a significant role in oral health. The periodontium shows an exaggerated inflammatory response to minimal amount of plaque, modified by elevated female sex hormones

during puberty, pregnancy, in women taking oral contraceptives and at the postmenopausal stage. The association between pregnancy and periodontal disease has been known for many years. During pregnancy, estrogen and progesterone reaches levels of 30 times and 10 times higher than during reproductive cycle respectively. Pregnancy gingivitis is typically seen in 30% to 100% of pregnant women. Periodontal disease alters the systemic health of the mother and fetus and can increase the risk of pre-eclampsia, preterm birth and low-birth-weight. Physiologic variations like dietary habits, eating frequency, nausea, vomiting compromises oral hygiene, often leading to development of hyperplastic, reactive oral lesions[1,2].

Pyogenic granuloma (PG) is an over-exuberant, non-neoplastic, inflammatory hyperplasia of the skin and oral mucosa, that occurs in response to various stimuli such as hormonal factors, physical trauma, bacteria, viruses, certain drugs and chronic low grade traumatic injury such as plaque and calculus, poor fitting dentures, tooth brush trauma and food impaction. The term of PG is a misnomer as it is not associated with pus and histologically resembles an angiomatous lesion. It is typically seen in young females in the second decade of life [2]. Pyogenic granuloma arising during pregnancy, is known as Angio granuloma, granuloma gravidarium or pregnancy tumor. It is commonly seen during the second trimester of pregnancy with a prevalence rate of 0.2–9.6% [2]. It is clinically and histologically indistinguishable from PG that occurs in non-pregnant patients [3].

It commonly occurs on the gingiva (anterior interproximal sites) in approximately 70% of cases; followed by the tongue, lips, buccal mucosa, and palate and is classically associated with poor oral hygiene. It is

clinically manifested as an exophytic, solitary or bilobular, sessile or pedunculated, painless, erythematous or purplish red to deep blue (depending on the vascularity and venous stasis), having a smooth, lobulated, nodular or warty surface, with a yellow fibrinous membrane covering or ulcerations due to secondary trauma. It usually bleeds profusely on a slight provocation. This lesion grows rapidly, measuring few millimeters to few centimeters in size and usually resolve spontaneously after post-partum with the stabilization of hormones and adequate oral hygiene maintenance. However, angiogranuloma which is large, painful, profusely bleeding, unaesthetic and interfere with occlusion, mastication, speech or persist even after post-partum require surgical excision [4]. Various treatment modalities have been documented for surgical excision of this lesion. However, meticulous oral hygiene and regular follow-ups are mandatory following excision to prevent recurrence [5].

Case Series

The present case series describes three cases of angiogranuloma which had reported to the Department of Periodontics. Prior to excision, consult from the obstetrician and written informed consent from the patient was obtained. Successful gingival healing with no recurrence was observed after meticulous scaling and root planing, complete surgical excision using scalpel and balde technique and regular periodontal maintenance in all three cases.

Case 1

A 28-year-old systemically healthy pregnant female (8 months) presented with a complaint of progressively increasing swollen gums in her left upper front teeth since 2 months. Patient was apparently asymptomatic prior to 2 months when she started noticing a small, bead like enlargement of gingiva which gradually increased to

the present size. As the enlargement was painless, the patient neglected the same until 15 days prior when she started noticing increased spacing between the left front teeth, spontaneous bleeding, purulent discharge, halitosis and rapid increase in the size of the growth that interfered with normal occlusion and mastication with resultant chronic trauma from opposing teeth leading to oral soreness.

On extra oral examination, no abnormalities were detected. Intraoral examination revealed a solitary, irregular shaped, pedunculated, reddish blue, palatal gingival growth arising from the interdental papilla of the left maxillary lateral incisor (22) and canine (23) and measuring approximately 2cm x 1 cm in dimension (Figure:1a). The growth was tender, bled on slightest provocation, soft and oedematous with a lobulated shiny surface and ulceration of the superior surface approaching the occlusal aspect of maxillary premolar (24). There was generalised poor oral hygiene with heavy plaque and calculus deposits and food lodgment in the growth region. Radiographically, there were no visible abnormalities in the alveolar bone. Routine hemogram was found to be normal. Based on the patient's history and clinical features, provisional diagnosis of pregnancy-induced granuloma was established. The differential diagnosis included peripheral ossifying fibroma, peripheral giant cell granuloma, hemangioma and fibroma. Patient was educated about the influence of elevated hormonal levels and plaque and calculus on the periodontium and consented for the excision.

Meticulous supragingival and subgingival scaling and root planing (SRP) was done and oral hygiene instructions were given. Under aseptic conditions, complete excision of the growth with the attachment of the peduncle up to and including the periosteum was

carried out under local anaesthesia with 1:80,000 adrenaline, using conventional scalpel technique (Figure:1b). After tissue excision, residual plaque and calculus were removed and root planing and curettage was done (Figure: 1c). The bleeding was controlled using continuous firm pressure for 15 minutes with moist gauze pack and the surgical area was covered with periodontal dressing (Coepak, GC, USA). The excised tissue [Figure:1d] was sent for histopathologic examination to the Department of Oral & Maxillofacial Pathology.

Analgesics (paracetamol 500 mg), 0.2% chlorhexidine mouthwash and warm saline rinses were prescribed. Patient was also advised to avoid brushing or chewing on the affected side for 7 days. Healing was uneventful. One week postoperative view showed presence of slight slough in the operated site indicating healing process (Figure:2a). Histopathology showed a highly proliferative, stratified squamous parakeratinized epithelium with a vascular underlying connective tissue stroma containing dilated and engorged blood vessels, extravasated red blood cells, angiogenesis, few inflammatory cells and bundles of collagen fibers, suggestive of pyogenic granuloma [Figure:2b]. Clinically, complete healing along with gradual reduction in oral soreness and improved occlusion and mastication and no recurrence was observed after 3- and 6-months follow-up visits (Figure:2c & 2d). Oral hygiene was reinforced at each follow-up visit.

Case 2

A 32-year-old systemically healthy pregnant female (6 months) presented with a complaint of rapidly increasing swelling of the gums in relation to the left upper back teeth since 15 days. This made the patient extremely apprehensive as it was associated with spontaneous

bleeding, difficulty in chewing, brushing and was associated with halitosis.

Intra oral examination revealed pedunculated, bilobular (buccal and palatal) gingival overgrowths arising from the interdental papilla between the left maxillary first (26) and second (27) permanent molars (Figure:3a). The gingival overgrowths were circular shaped with well-defined margins, measuring approximately 13 x 10 mm (palatally) and 7 x 4 mm (buccally), reddish pink in color with a smooth and shiny surface buccally and hemorrhagic spots on the palatal surface. The growths were soft to firm in consistency, non-tender and bled on slightest provocation. Plaque and subgingival calculus were present around the involved teeth. 26 and 27 were grade I mobile. Routine blood investigations were within reference range. Radiograph revealed normal bone topography. Based on the patient's history and clinical features, provisional diagnosis of pregnancy induced granuloma was established.

After routine scaling and root planning (SRP) and oral hygiene instructions, complete excision of the bi-lobular growths up to the periosteum was done using surgical scalpel under local Anaesthesia (Figure:3b,&c) and sent for histopathological examination (Figure:3e). Palatal recession of 2mm on 26 and 3mm on 27 was noted. The gingival margins were reshaped to attain a physiologic contour. The surgical area was covered with periodontal dressing (Figure:3d) and post-operative instructions were given. Histopathological analysis confirmed the diagnosis of pregnancy granuloma (Figure:4c). Postoperative wound healing was uneventful. No recurrence was observed at 15 days (Figure:4a&b) and 6 months (3 months after postpartum) follow-up (Figure:4d&e)

Case 3

A 34-year-old systemically healthy pregnant female (5 months) complained of a painful swelling of the gums in relation to the left upper front tooth since 7 days. The swelling was associated with spontaneous bleeding and discomfort during occlusion and mastication. Intraoral examination revealed generalised poor oral hygiene and a bi-lobular, pedunculated, purplish red gingival growth arising from the interdental gingiva and approaching the incisal and occlusal aspect of the left maxillary canine (23) and first premolar (24) respectively. The growth was irregularly shaped palatally and triangular shaped buccally with a lobulated surface; soft and oedematous, tender and bled on slightest provocation. There was a metal ceramic bridge from maxillary central incisor (21) to canine (23) with missing lateral incisor (22) (Figure:5a&b). Scaling and root planing and oral hygiene instructions, followed by complete excision of the gingival growth with the peduncle was performed up to the periosteum using surgical scalpel technique (Figure:5c&d) and the growths (Figure:6a) were sent for histopathological analysis. The post operative healing was uneventful. The patient was put on a regular periodontal maintenance. Histopathological analysis confirmed the diagnosis of pregnancy granuloma (Figure:6b). No recurrence was noticed at 3 months post-partum (Figure:6c &d).

Discussion

Angio granuloma is a hyperplastic, non-specific conditional gingival enlargement that occurs mainly in response to elevated hormonal levels during pregnancy. Elevated hormonal levels alter the gingival physiology, since they have receptors on the gingiva, which enhance the tissue response to local irritants [2].

In addition to the elevated hormones, plaque and calculus due to poor oral hygiene are probable etiologic

factors that have triggered a hyperplastic inflammatory response in all three pregnant patients. The elevated ovarian hormones (estrogen and progesterone) stimulate the release of prostaglandins especially prostaglandin E₂, a potent mediator of inflammation and osteoclastic activity. Elevated progesterone levels also produce dilation and tortuosity of the gingival microvasculature, circulatory stasis, perivascular fluid leakage and increased susceptibility to mechanical irritation [6]. Bacterial plaque and gingival inflammation are necessary for subclinical hormone alteration to lead to gingivitis. The selective growth of subgingival pathogenic microflora like *Prevotella intermedia* (2.2% to 10.1%), *Bacteroides melaninogenicus*, *Porphyromonas gingivalis* and *Tannerella forsythia* affect the gingival fibroblast and keratinocytes thus causing an exaggerated inflammatory response. The ovarian hormones substitute for menadione (vitamin K), an essential growth factor for these species [7]. There is an imbalance in the angiogenesis enhancers and inhibitors that may lead to the overproduction of fibroblast growth factor (FGF) and vascular endothelial growth factor (VEGF) and decreased amounts of angiostatin, thrombospondin-1 that also contribute to the development of this lesion. Vascular morphogenesis factors like human endothelial receptor tyrosine kinase Tie-2, angiopoietin 2, ephrin B2 and ephrin are also found to be up-regulated in oral pyogenic granulomas [5, 8]. In addition, the suppressed maternal immune system induced by progesterone increases the susceptibility to develop hyperplastic inflammatory response.

All three patients complained of rapidly increasing, profusely bleeding gingival overgrowths that interfered with normal function. The gradual increase in estrogen and progesterone levels influence the gradual increase in the size of the lesion [1]. According to Ainamo,

recurrent trauma occurring during tooth brushing or function due to the size and position of the lesion, releases various endogenous and angiogenic factors contributing to the increased vascularity and size of the lesion [8, 9].

Histologically, all three cases showed the presence of hyperplastic epithelium with a highly vascular connective tissue stroma. Estrogen regulates cellular proliferation, differentiation and keratinisation and thus stimulating matrix synthesis. Along with progesterone, enhances the localized production of inflammatory mediators. Progesterone reduces fibroblast proliferation, alters the pattern of collagen production and reduces the level of plasminogen activator inhibitor type 2, an important inhibitor of tissue proteolysis, thus compromising tissue homeostasis. This results in the accumulation of collagen within the connective tissue, thereby, providing a possible additional mechanism for the gingival enlargement of pregnancy granuloma. Histopathologically, pyogenic granulomas are classified as the lobular capillary haemangioma (LCH) type and the non-lobular capillary haemangioma (non-LCH) type. The LCH type has proliferating blood vessels organized in lobular aggregates with no specific changes like edema, capillary dilation or inflammatory granulation. The non-LCH type has a vascular core simulating granulation tissue with foci of fibrous tissue [1, 2, 10]. No change in the alveolar topography was seen in all three patients. Radiographic findings are usually not present in pregnancy tumors. However, Angelopoulos reported that in some cases, long standing pyogenic granulomas may induce localized alveolar bone resorption [11].

Management of pregnancy granuloma is based on the severity of the symptoms. Spontaneous regression usually occurs after parturition through a negative

feedback mechanism. The decline of the elevated hormonal levels and the absence of VEGF, angiopoietin-2 (Ang-2) cause regression of blood vessels and reduce inflammatory cytokines [1]. If the lesion is small, non-tender and free of bleeding, oral hygiene maintenance and frequent observation is advised. Excision of such lesions is delayed after post-partum. Lesions that are large, tender, bleeding, interfering with function and affecting daily activities and persistent even after parturition will require surgical excision [2]. The standard treatment consists of the removal of the local irritants followed by complete excision. A thorough medical history and consultation with the patient's obstetrician is required to discuss the medical status, periodontal or dental needs, and the proposed treatment plan before the excision [5]. The second trimester is safest phase for dental treatment. A consensus report of Joint European Workshop of Periodontology and American Academy of Periodontology Workshop emphasized that oral preventive, diagnostic and therapeutic intervention can be safely performed throughout pregnancy [12]. However, since the fetus is highly susceptible to environmental influences, the appointments should be short and performed in a semi-reclined or left lateral position to prevent supine hypotensive syndrome [2].

In the present case series, the lesions were surgically excised using conventional scalpel technique. Procedures like surgical scalpel technique, laser therapy, electrocautery, cryosurgery using liquid nitrogen, sclerotherapy with sodium tetra decyl sulfate and monoethanolamineoleate and use of intra lesional steroids have been well documented for the excision of this vascular lesion. Among these, laser therapy is a safe and acceptable treatment modality. The scalpel technique increases the risk for bleeding and

postoperative morbidity. However, being a low-cost technique, with relative ease of implementation and providing satisfactory results, which leads to cure, it is the most commonly used technique for excision of these lesions [1, 5, 13].

All three patients were regularly recalled for 3 to 6 months after parturition. No recurrence was observed in any of the patients. Recurrence of PG after excision is a known complication but can be prevented. Taira et al., have shown a recurrence rate of 16% post excision. Incomplete excision, presence of multiple deep satellite lesions surrounding the original excised lesion, failure to eliminate the local irritants and repeated trauma to the affected area contributes to recurrence of these lesions [14]. Neville et al., have shown that the recurrence rate was higher when the granuloma is removed during pregnancy. Therefore, treatment should generally be delayed, unless there are significant aesthetic and functional problems [15].

It is imperative that the dentist should educate pregnant women and women of childbearing age, especially those trying to conceive, about the possible impact of inflammation on the fetus, nutritional counselling and motivate them to care for their periodontal health, through regular tooth brushing with a soft bristle brush, flossing and routine dental visits to screen for periodontal disease. Hence, proper oral hygiene measures and frequent dental visits during the gestational period are highly effective in preventing most oral lesions encountered in pregnancy. Frequent post excision periodontal maintenance is also necessary to prevent recurrence following excision.

Conclusion

Oral health should be emphasized as an important aspect of prenatal care. Large symptomatic pregnancy tumors, interfering with normal function can be successfully

managed by thorough removal of local irritants along with complete excision of lesion below the periosteum. However, oral hygiene maintenance and frequent post-surgical periodontal maintenance is mandatory to prevent recurrence.

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Figure Legends

Figure 1 (Case 1)

- a) Pre-operative view (Case 1)
- b) Intra-operative view (Case 1)
- c) Immediate post-operative view (Case 1)
- d) Excised gingival growth (Case 1)

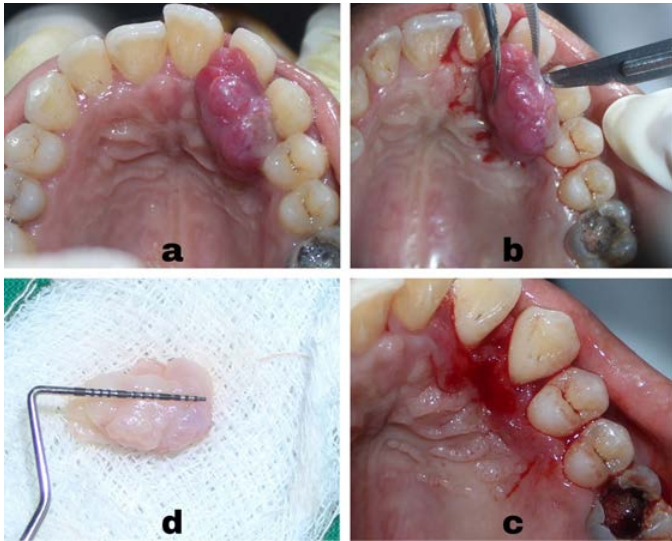


Figure 2 (Case 1)

- a) 7 days post-operative view (Case 1)
- b) Histopathological view (Case 1)
- c) 3 month post-operative view (Case 1)
- d) 6 month post-operative view (Case 1)

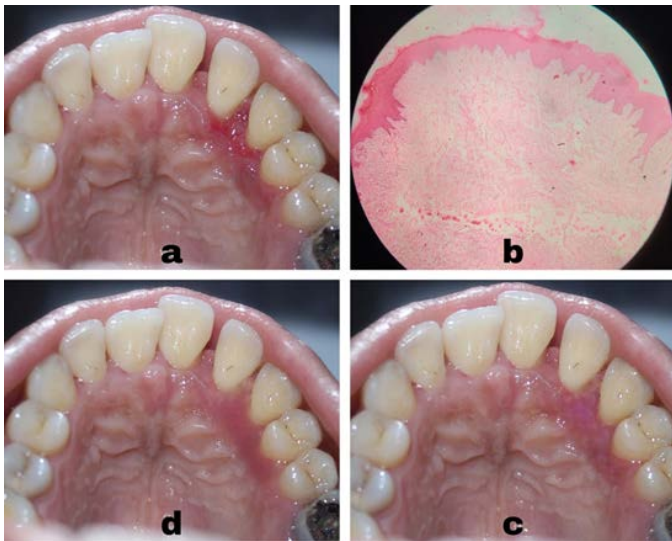


Figure 3 (Case 2)

- a) Pre-operative view (Case 2)
- b) Immediate post-operative view (palatal) (Case 2)

- c) Immediate post-operative view (buccal) (Case 2)
- d) Periodontal dressing placed (Case 2)
- e) Excised gingival growths (Case 2)

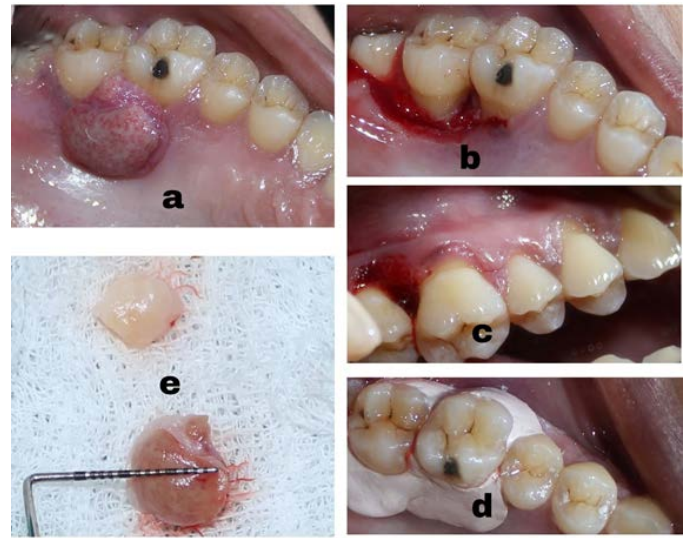


Figure 4 (Case 2)

- a) 15 days post-operative view (palatal) (Case 2)
- b) 15 days post-operative view (buccal) (Case 2)
- c) Histopathological view (Case 2)
- d) 6 months post-operative view (buccal) (Case 2)
- e) 6 months post-operative view (palatal) (Case 2)

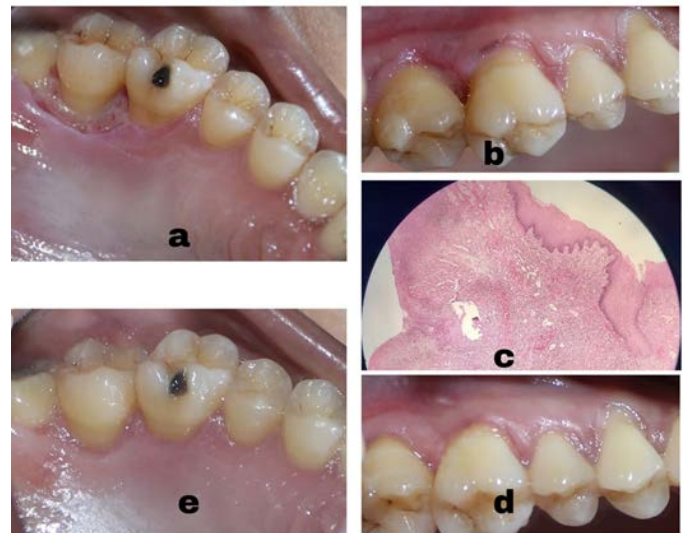


Figure 5 (Case 3)

- a) Pre-operative view (palatal) (Case 3)
- b) Pre-operative view (buccal) (Case 3)
- c) Immediate post-operative view (buccal) (Case 3)
- d) Immediate post-operative view (palatal) (Case 3)



Figure 6 (Case 3)

- a) Excised gingival growths (Case 3)
- b) Histopathological view (Case 3)
- c) 3 months post-operative view (buccal) (Case 3)
- d) 3 months post-operative view (palatal) (Case 3)

