

Review Article

Reactive Gingival Lesions, Investigations, And Treatment Modalities: Review Article

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ARTICLE

ABSTRACT

INFO

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Background and Objectives: Reactive gingival lesions (RGLs) are benign solitary swellings frequently responding to chronic inflammation of gingiva precipitated by local irritation. The research article was designed to discuss clinical and pathological features, and treatment options of RGLs. These lesions are generally clinically similar but histologically different. Various treatment modalities have been used, including surgical blade excision, laser surgical techniques, electrosurgery and cryosurgery. Laser surgeries present more benefits, especially for the hemorrhagic and vascularized lesions in comparison to others.

Conclusions: The incidence of RGLs are secondary precipitated to tissue damage and local irritating factors which are like benign rather than malignant masses. Clinical and histological investigations are designated to classify the nature of RGLs. Improvement of oral health, besides complete removal of local irritants through professional periodic care and maintaining oral cleaning measures, is necessary to avoid the recurrence of these lesions.

1. INTRODUCTION

Reactive gingival lesions (RGLs) are clinically and pathologically benign, solitary masses which happen due to chronic and recurrent tissue damage, leading to dangerous or excited tissue response. In this research the RGLs are non-neoplastic in nature, and not associated with drug participation. Duration of the lesion is frequently weeks up to months, due to the slow growing and mild manifestation, and less painful, then regularly restricted with satisfactory plaque control [1]. They are characteristically responsive to longstanding inflammation precipitated by numerous forms of low-grade chronic irritational factors to the oral mucosa, especially gingival tissues. However, the lesions are benign, and they tend to reappear due to inadequate excision and failure to remove the local irritational reasons, such as imperfect restorations, plaque retention, minor trauma, calculus, and professional iatrogenic factors [2].

RGLs are commonly classified as follows: (1) pyogenic granuloma (PG), (2) peripheral ossifying fibroma (POF), (3) peripheral fibroma (PF), (4) peripheral giant cell granuloma (PGCG) and (5) localized juvenile spongiotic gingival hyperplasia (LJSGH) [3].

A study on 22,439 gingival tissue biopsies showed that PG = 19.76%, PF = 61.05%, POF = 17.67% and PGCG = 1.52%. The ratio of females to males was 1:1. There was a common incidence of lesions between the third and sixth decades of life for all, corresponding to the fifth to sixth decades for POF and PF, and the third to fourth decades for PG [4]. Another retrospective study by Dutra et al. (2018) on 534 cases demonstrated that most lesions were inflammatory fibrous hyperplasia (peripheral fibromas = 72.09%), PG (11.79%), giant cell fibroma (7.3%), POF (5.24%) and PGCG (3.55%) [5].

The LJSGH is a newly defined gingival overgrowth of young patients that histologically diagnosed a different subtype of gingival hyperplasia which was undiagnosed through previous decades or was purely established as a reactive form of gingivitis called spongiotic gingivitis [6]. The LJSGH lesions are more frequently seen in females, with only the PGCG having no constant sex predilection [4,5].

Regarding management of RGLs, different modalities include surgical excisions only, or are accompanied with laser applications may present significant outcomes with less incidence of recurrence. Whole removal of the lesions will frequently result in an aesthetic or periodontal defect which leaves the area without enough

keratinized gingiva associated with root exposure. Hence, the skill of the surgeon to gain the best result includes management of the mucogingival defect, in addition to whole excision of the lesion. Furthermore, improvement of oral health and plaque control are beneficial factors which decrease the gingival inflammation which is commonly associated with RGLs [3,7-9].

The purpose of this review article is to highlight significant clinical and histological investigations, diagnosis, and treatment modalities for these common RGLs.

2. CLINICAL AND HISTOLOGICAL INVESTIGATIONS

2.1 Pyogenic granuloma (PG)

The PG has numerous names, including benign vascular tumor, vascular epulis and pregnancy tumor. The prevalence of pyogenic granuloma ranged from 19 – 27% [4]. This lesion varies in size from a few millimeters to many centimeters. Characteristically, the lesion is painless, and frequently bleeds easily because it is extremely vascularized. Oral PG show a striking predilection in the gingiva, which accounts for almost 75% to 85% of all patients [10]. These lesions are somewhat more common in the maxillary than mandibular gingiva, anterior regions are more commonly affected than posterior regions, and more commonly on the facial than the lingual aspects. Some lesions extend between the teeth and involve both the facial and lingual gingiva [3]. The main etiologic factors are plaque accumulation, calculus, gingival damage, defective restorations, and pregnancy [11] [Figure 1].



Figure 1: Pyogenic granuloma: Showing of large gingival mass [5].

The histological features were characterized by enormous numbers of endothelium lined vascular spaces infiltrated with many cells: lymphocytes, plasma cells, and neutrophils. There is widespread fibroblastic propagation with a diffuse, often condensed longstanding inflammatory infiltrate. The lesion is covered by a thin commonly ulcerated layer of stratified squamous epithelium. Regarding the name, no pus or pyogenic substances were present in the lesion [3]. Recently, it has been called lobular capillary hemangioma due to the presence of well circumscribed

and distinct lobular arrangement, with central huge vessels and peripheral collections of well-formed blood capillaries [12] [Figure 2].

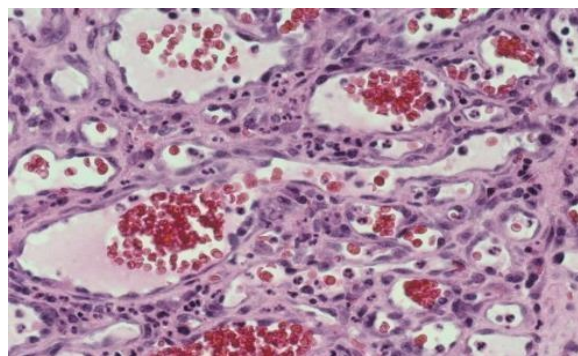


Figure 2: Pyogenic Granuloma: Higher-power view showing capillary blood vessels and scattered inflammation [10].

2.2 Peripheral giant cell granuloma (PGCG)

The PGCG (also called giant cell epulis) accounts for approximately 10% of RGLs. PGCG is the documented terminology; it is recognized to originate from periodontal ligament cells or periosteum of bone, with unknown etiology. Precipitating factors considered are chronic irritational factors, tooth extractions, hormonal changes, and xerostomia [13]. The PGCG occurs entirely on the gingiva or edentulous alveolar ridge, appearing as a red or red-blue nodular gingival overgrowth [14]. The lesions are smaller in size than 2cm in diameter, while bigger ones are seen infrequently. The lesion commonly appears as sessile or pedunculated masses and may be ulcerated. The clinical pronouncement is like more common gingival PG, though the PGCG often is more blue purple associated with the bright red of a typical PG [Figure 3]. The PGCG can mostly grow at any age, particularly during the first to sixth decades of life [10].

Microscopic examination of PGCG displays a propagation of multinucleated giant cells within a background of plump ovoid, and spindle-shaped mesenchymal cells. The giant cells may contain only a few, or up to several dozens of nuclei. Some of these cells may appear to have large, vesicular nuclei, while other cells demonstrate pyknotic, small nuclei. Profuse hemorrhage is typically found throughout the tissue mass, and often results in deposits of hemosiderin pigment, especially at the periphery of the lesion. The overlying mucosal surface is commonly ulcerated in about 50% of cases. Furthermore, a zone of compressed fibrous connective tissue typically separates the giant cell proliferation from the mucosal surface [10,14][Figure 4].



Figure 3: Peripheral Giant Cell Granuloma. Nodular blue purple mass of the mandibular gingiva [10].

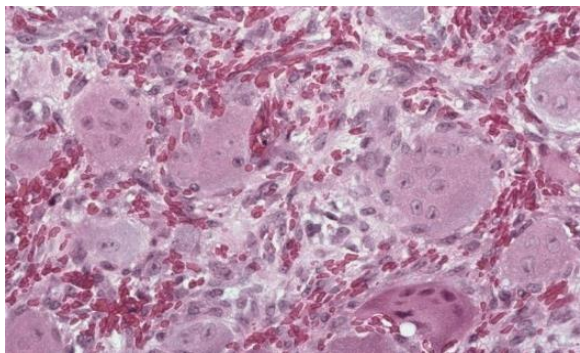


Figure 4: High-power view showing scattered multinucleated giant cells within a hemorrhagic background of ovoid and spindle-shaped mesenchymal cells [10].

2.3 Peripheral ossifying fibroma (POF)

The POF (calcifying fibroblastic granuloma, ossifying fibroid epulis, peripheral fibroma with calcification) is a common gingival growth that is reactive rather than neoplastic in nature. The pathogenesis of this lesion is undefined; because of their clinical and histopathologic similarities with others, some investigators believe that some POF develop firstly as PG that undergo fibrous maturation and consequent calcification. Though not all POFs may progress in this way [15].

The calcified product possibly has its source in cells of the periodontal ligament or periosteum. It looks like a nodular gingival tissue mass, moreover sessile or pedunculated, that generally originates from the gingival interdental papilla [10].

The color ranges from pink to red, and the epithelial surface is not always ulcerated. The growth possibly initiates as an ulcerated lesion; older lesions are more likely to reveal healing of the ulcer and leave an intact surface. The red ulcerated lesions often are mistaken for PGs; the pink nonulcerated ones are clinically like irritational fibromas. Most lesions are smaller in size than 2cm, while larger ones rarely occur [16]. The POF often has been current for many weeks or months before the diagnosis is finished. The POF is mostly a lesion of teenagers and young adults, with high prevalence between the ages of 10 and 19 years. Virtually two-thirds of all cases occur within females, by prevalence (10 - 18%) [4] [Figure 5].



Figure 5: Peripheral Ossifying Fibroma. This red, ulcerated mass of the maxillary gingiva [10].

The basic histologic feature of the POF is characterized

by fibrous propagation associated with formation of mineralized tissues. The deeper fibroblastic component frequently is cellular, especially in areas of calcification. In some tissue biopsies, the fibroblastic multiplying and associated calcification is only a small constituent of a larger mass that looks like a fibroma or PG. The mineralized tissue is variable in structure and may involve cementum-like material, bone, or dystrophic calcifications. Regularly, the bone formation is trabecular and in woven type, though older lesions may exhibit lamellar bone maturation. Multiple granules, tiny globules, or large, irregular masses of basophilic mineralized material consider dystrophic calcifications. Such dystrophic calcifications are common in early-stage, ulcerated lesions; older, nonulcerated examples are further likely to reveal well-formed cementum or bone. In some tissue biopsies, multinucleated giant cells may find commonly in association with the mineralized tissues [17, 18] [Figure 6].

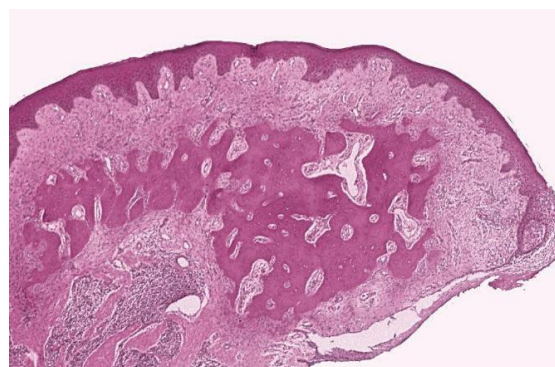


Figure 6: Peripheral Ossifying Fibroma. A, Nonulcerated fibrous mass of the gingiva showing central bone formation [10].

2.4 Peripheral fibroma (PF)

The PF (traumatic fibroma; irritation fibroma; fibrous nodule; focal fibrous hyperplasia) is the most common RGL, often precipitated due to trauma or local irritating factors [19]. The lesion characteristically appears as a smooth surface of nodular gingival overgrowth that is similar in color to the adjacent oral mucosa. Commonly, fibromas appear in a sessile more than pedunculated form. The lesions ranged in size from several millimeters to centimeters, though most fibromas are 1.5cm or less in dimension. The PF frequently produces no symptoms unless consequent traumatic ulceration of the surface has occurred. These lesions are mostly prevalent between the fourth and sixth decades and are more in female in contrast to male by ratio almost 1:2 for investigated tissues biopsies [20] [Figure 7].

Microscopic structures of the PF show a nodular bulk of fibrous connective tissue covered by stratified squamous epithelium. The connective tissue is usually dense and with collagen maturation, though in some tissue biopsies has been looser in nature. The lesion is commonly encapsulated, and the fibrous tissue progresses slowly into the adjacent connective tissues. The affected collagen bundles might be organized in a circular, radiating, or haphazard manner. The epithelium regularly exhibits



Figure 7:*Fibroma. Smooth-surfaced, pink nodular mass of the palatal gingiva between the cuspid and first bicuspid [10].*

atrophy of the rete ridges due to presence of the underlying fibrous mass. The covered epithelium may display hyperkeratosis due to presence of secondary trauma. Persistent inflammation may be seen in a scattered pattern, mostly beneath the covered epithelial. The exhibited inflammation is regularly chronic in nature and commonly consists of plasma cells lymphocytes [Figure 8].

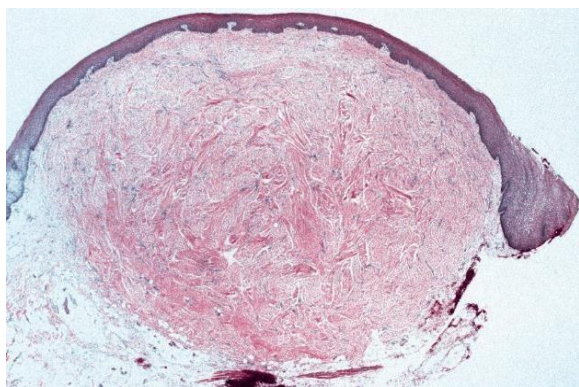


Figure 8:*Fibroma. Low-power view showing an exophytic nodular mass of dense fibrous connective tissue [10].*

2.5 Localized juvenile spongiotic gingival hyperplasia (LJSGH)

The LJSGH, previously called “juvenile spongiotic gingivitis”, is considered a characteristic form of inflammatory gingival hyperplasia which appears in young patients. It is predominant in females and generally arises in the maxillary anterior region [21]. Investigation of a larger tissue biopsies sample size by Chang et al. (2008) advised that the most appropriate term was LJSGH and was recognized in a retrospective study covering 20 decades and recently classified as a distinct lesion [6]. It looks like a bright red mass as gingival overgrowth with a fine granular or papillary surface. The size of lesion is commonly small, average 6 mm in diameter, a solitary and easily bleeding gingival overgrowth. Furthermore, clinical finding of this lesion resembles PG and is commonly seen in association with orthodontic appliances [22] [Figure 9].

The histologic appearance is an exophytic lesion with a fine papillary soft tissue mass composed of communicating bands of epithelial hyperplasia. The histological features are associated by protuberant intercellular oedema “spongiosis” and neutrophilic exocytosis. Occurrence of highly vascular connective tissue centers is seen, containing mostly acute, with some

chronic, inflammatory cells [Figure 10]. It shows as a gingival overgrowth rather than a pure inflammatory course with minimal to no gingival tissue enlargement. It has unknown etiology; difficulty responding to periodontal therapy displays a lack of association with plaque retention calculus and deposition [21].



Figure 9:*Localized juvenile spongiotic gingival hyperplasia [21].*

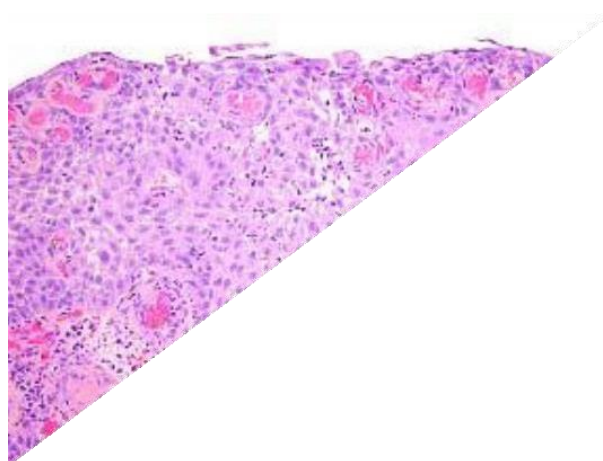


Figure 10:*LJSGH lesion showing proliferation of sulcular epithelium with exocytosis and dilated blood vessels within connective tissue cores (10 X power) [3].*

3. TREATMENT MODALITIES

The treatment of RGLs includes surgical excision by scalpel, laser techniques, electrosurgery and cryosurgery. The management must also comprise removal of the precipitating irritating factors through curettage of tooth deposits, elimination of traumatic habits, and replacement of defective restorations. Maintenance of dental hygiene measures associated with regular professional care might reduce the incidence of recurrence for most types of RGLs [3].

Surgical excision by scalpel is considered the basic standard for treatment of RGLs; in some cases, there is a periodontal defect such as gingival recession, so that the clinician must modify the surgical excision with periodontal flap surgery to resolve the problems of aesthetic and root exposures [3,12]. Regarding pyogenic granuloma “pregnancy tumors”, the lesion is surgically

excised in the second trimester or preferred after delivery, especially in large lesions under plaque control [23,6,12]. Gingival grafting by subepithelial connective tissue and a split-thickness pouch technique were used for surgical management of PCCG, which is affected by the presence of gingival dehiscence. The results reported that it successfully eliminated the gingival defect [24].

Recent laser applications (CO₂ laser, diode laser, ND: YAG laser) are commonly used to manage reactive gingival lesions, especially the vascularized tissue masses. The advantages of laser techniques include surgical visibility, minor vessels cauterizing with the laser ablation and sterilizing of the field during surgery. Use of laser leaves a layer of carbonization “char” over the wound which provides a biologic dressing that seals the surface for additional postsurgical comfort, without the need for suture and without placement of comforting dressing materials [25]. Carbon dioxide laser (CO₂ laser) energy is also highly absorbed in water and leads to cellular breakdown through vaporization of the cellular fluids. It may reduce the rate of recurrence finished by destruction of the cells implicated in the development of the PG. Rate of recurrence ranged from 16 – 21%, as described for PG with conventional excision techniques [26]. Rate et al. (2019) presented an effective management of PGCG and POF using diode laser, and the follow-up at one year showed no recurrence in both cases [27]. Use of Nd:YAG laser in management of PG was studied by Yadav et al. (2018), who reported that the laser was a useful method for excisional surgeries; it is effective, safe and decreases the time of treatment as well as time of healing [28] [Figures 11-14].



Figure 11:Preoperative view of the lesion [28].



Figure 12:Excision of the lesion by using Nd:YAG laser [28]



Figure 13:Postoperative view just after the removal of lesion [28].



Figure 14:Follow-up after 6 months [28].

Improvement of oral health by plaque control and periodic professional periodontal therapy may be beneficial in management of RGLs. Zhu et al. (2016) studied the effect of “initial periodontal therapy for the treatment of gingival pregnancy tumor” in 31 patients. They found that initial periodontal therapy shared with maintained oral hygiene measures is successful in management of gingival pregnancy tumors in patients with normal hormonal levels, which can possibly serve as a choice to avoid surgery. Another study by Kaur et al. (2014) evaluated the intensive oral hygiene and IL-1 β and TNF- α in GCF and recorded the pregnancy outcomes at birthing time. They concluded that “intensive plaque control instructions and non-surgical periodontal therapy provided during 8 weeks at early pregnancy resulted in decreased gingival inflammation and a generalized improvement in periodontal health” [29]. Regarding previous studies, the improvement of gingival health is more effective in prevention of irritational reactive factors and development of RGLs during pregnancy.

4. DISCUSSION

The RGLs are often responsive to chronic inflammation produced by a variety of low-grade irritating factors to the gingiva as sharp boundaries of grossly carious lesions, plaque and calculus accumulation, faulty dental restorations, ill-fitting dental or oral appliances, and food impactions. Separately from local chronic irritations, these lesions rise to be etiologically associated with systemic factors such as sex hormonal changes [30]. The RGLs include enormous capillaries with endothelial cells combined with chronic inflammatory cells and later are

replaced with fibroblastic propagation which manifests as a gingival overgrowth called reactive hyperplasia. Exact diagnosis of RGLs becomes significant for appropriate treatment and to prevent recurrences and additional complications [12]. On recurrence of RGLs, Babu and Hallikeri (2017) [12] investigated a retrospective study of oral reactive lesions, and they reported the recurrence of irritational fibroma (IF 3.3%) (PG 15.6%), inflammatory fibrous hyperplasia (IFH 8.9%), (POF 14.81%), (PGCG 18.18%) and fibroma (FIB 7.04 %).

The most appropriate treatment modalities were surgical excision and laser applications, but according to several studies the use of laser techniques was preferred, especially with highly vascularized lesions such as PG and PGCG (8,15,25,27,28). The greatest benefits of laser techniques result in less post-operative oedema and swelling, reduced pain, less damage to surrounding soft tissues, fewer wound contractions, or scar formations due to minimal connective tissue response, as well as reduced risk of post-operative infection, and possibly less recurrence of the managed lesion [25,31].

Concerning the etiological factors of RGLs, the enhancement of oral health by maintaining oral hygiene instructions and professional management decrease the chance of development and reduce the inflammation and in some cases completely resolve these gingival benign masses [9,29]. For recommendation, a widespread culture of oral health and maintaining oral hygiene measures are very obligatory issues; in addition, the oral surgeons, especially the periodontists, are more advised to select the appropriate methods to manage the RGLs and are aware of repairing the aesthetic and gingival dehiscence during surgical sessions.

5. CONCLUSION

The present review article concludes the followings:

- (1). The RGLs designated in the present research frequently have a similar clinical appearance and more predilection for females. The patients were sharing complaints of gingival overgrowth, bleeding on fine provocation, and usually gingival discomfort.
- (2). Similarities of all RGLs display changes in age, type, duration, site, and histopathologic features. Complete removal of local irrational factors, for example faulty restorations, plaque retention, calculus, and trauma, is mandatory in management of these lesions.
- (3). Successful treatment includes precise diagnosis by histopathologic examination, full excision of the gingival lesion, and controlling the local irritants, in addition to improvement of oral health through maintaining oral hygiene measures to avoid or manage the recurrence of lesions.

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