CASE REPORTS

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Localized gingival enlargements: clinical, histopathological and surgical evaluation in five cases

BILGE CANSU UZUN SAYLAN[1)], AYÇA MUHTEREM[1)], SÜLEN SARIOĞLU[2,3)]

[1)]*Department of Periodontology, Faculty of Dentistry, Dokuz Eylul University, Izmir, Türkiye*
[2)]*Department of Pathology, Faculty of Medicine, Izmir University of Economics, Izmir, Türkiye*
[3)]*Department of Pathology, Medipol University Hospital, Istanbul, Türkiye*

Abstract

Background: Localized gingival enlargements (GEs) are frequently encountered reactive lesions with various etiologies, including chronic irritation, trauma, systemic conditions, hormonal influences, and medication use. Despite their benign nature, these lesions can significantly affect oral function and aesthetics and may occasionally mimic neoplastic processes. This case series aims to present the clinical and histopathological (HP) features of five patients with localized GEs, describe different surgical approaches including scalpel and diode laser excision, and report short-term clinical outcomes. *Case presentations*: Five patients with gingival overgrowths of varying etiology were evaluated. All underwent thorough periodontal debridement and oral hygiene instruction prior to surgical intervention. HP evaluation followed surgical excision. Patients were monitored for recurrence for at least three months. Lesions included inflammatory epithelial hyperplasia, cavernous hemangioma, and squamous cell papilloma. One case revealed immunoglobulin G4 (IgG4)-positive plasma cells and was referred to Rheumatology Department. A suspected vascular lesion was successfully managed with laser excision to minimize bleeding. One patient exhibited recurrence of a papillomatous lesion, prompting referral to infectious disease. No major complications occurred during the follow-up period. *Conclusions*: Localized GEs can present diverse HP profiles. Biopsy remains essential for definitive diagnosis, especially when clinical features are ambiguous. Laser surgery proved beneficial in vascular lesions by reducing intraoperative bleeding and enhancing patient comfort. Identifying and managing underlying systemic or local factors is crucial to prevent recurrence.

Keywords: gingival enlargement, biopsy, reactive lesion, laser surgery, squamous papilloma, IgG4-related disease.

Introduction

A wide array of pathological entities may be encountered within the oral cavity, with a notable subset arising from gingival structures [1]. Gingival health is influenced by the interplay of numerous local and systemic factors, including local irritants, hormonal fluctuations, systemic diseases, and the use of various medications [2–4]. Among these, localized gingival enlargements (GEs) are frequently encountered in clinical practice and are commonly considered reactive pathological entities [3].

The development of localized gingival overgrowths is primarily associated with chronic irritation caused by subgingival plaque and calculus, persistent low-grade trauma, tobacco use, sharp edges of carious or fractured teeth, and poorly fitting prosthetic or restorative appliances [5, 6]. These factors may induce minor tissue trauma, triggering an inflammatory response. Likewise, poor oral hygiene, food impaction, and mouth breathing, along with hormonal changes, can contribute to the onset of GEs. In particular, hormonal fluctuations during pregnancy especially increases in estrogen and progesterone levels are associated with a higher prevalence of such lesions in women [7]. In addition, certain systemically administered drugs have been identified as potential causes of gingival overgrowth [5, 8].

These include anticonvulsants such as Phenytoin, immunosuppressants such as Cyclosporine, and calcium channel blockers such as Nifedipine and Amlodipine [8]. It is estimated that approximately 50% of adults treated with Phenytoin, 30% with Cyclosporine, and 20% with Nifedipine may experience drug-induced GE [5]. These agents stimulate the activation and proliferation of gingival fibroblasts, leading to increased production of glycosaminoglycans (GAGs) and accumulation of connective tissue due to disrupted matrix metalloproteinase activity and subsequent collagenase deficiency [9]. Although the severity of drug-induced GE varies among individuals, it is influenced not only by the dosage and individual sensitivity to the drug but also by oral hygiene status and genetic predisposition [10].

Clinically, these lesions may present as pale pink or erythematous nodular masses of varying size and morphology – either pedunculated or sessile – located in areas such as the interdental papillae, marginal gingiva, attached gingiva, or palate [11, 12]. While drug-induced or genetically associated overgrowths tend to be more fibrotic, firm, and normally colored, those associated with inflammatory or hormonal factors are typically redder, edematous, and more prone to bleeding [13].

GEs may adversely affect fundamental oral functions, including speech, mastication, and tooth eruption, while also leading to aesthetic and psychological concerns [1]. The difficulty in maintaining oral hygiene and the resulting plaque accumulation further increase microbial load, thereby exacerbating the risk of periodontal disease [14]. It has been reported that inflamed gingival tissue exhibits elevated levels of the proinflammatory cytokine interleukin

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(IL)-1β, while IL-6 contributes to fibroblast proliferation and enhances the synthesis of collagen and GAGs [15].

Reactive gingival overgrowths commonly include lesions such as pyogenic granuloma, peripheral ossifying fibroma, fibrous hyperplasia, and peripheral giant cell granuloma [16]. However, in some cases, benign or malignant neoplasms or secondary manifestations of systemic diseases should also be considered in the differential diagnosis [17].

The clinical similarity of these lesions often complicates the differential diagnosis, necessitating a comprehensive clinical evaluation and, when indicated, histopathological (HP) analysis [18]. In this context, accurate identification of the clinical and HP characteristics of localized GEs, along with the determination of underlying systemic factors, not only facilitates effective treatment planning but also helps minimize the risk of recurrence.

Aim

This study aimed to comprehensively evaluate the clinical and HP diagnoses of patients presenting with localized GE, the different surgical approaches used for their treatment, and three-month follow-up period.

Case presentations

This retrospective study includes the presentation of patients who presented to our Clinic with localized GE between 2023 and 2024 and were referred to the Department of Periodontology, Faculty of Dentistry, Dokuz Eylul University, Izmir, Türkiye. Written informed consent was obtained from each participant prior to data collection. Comprehensive medical histories were recorded for each patient, followed by clinical and radiographic examinations. Phase I periodontal therapy was completed prior to surgery, and oral hygiene instructions were provided. Local anesthesia was administered using either 1:100 000 adrenaline or 3% adrenaline-containing anesthetic solutions. The localized GEs were excised *via* excisional biopsy and submitted for histological evaluation in 10% neutral buffered formalin solution. Postoperatively, patients were advised to use an analgesic (Paracetamol) in case of pain. A mouthwash containing 0.2% Chlorhexidine gluconate and 0.15% Benzydamine hydrochloride was prescribed for use twice daily for 15 days. To support plaque control, the use of an ultrasoft postoperative toothbrush on the surgical site was recommended twice daily for one month.

Case No. 1

A 48-year-old male patient was diagnosed with a fibrotic, pedunculated localized GE in the interdental papilla of the maxillary central region, as observed through clinical and radiographic examination (Figure 1, A and B). The patient reported that the lesion had developed four months ago due to food trauma and that he had been taking Tegretol 200 mg for epilepsy. The lesion, measuring 7×5×3 mm, was excised using conventional surgical techniques (Figure 1C). During the biopsy procedure, while removing the gingiva, dental caries and enamel loss were observed on the mesial surface of tooth 21, and a restoration was performed in that area one week postoperatively. At the three-month follow-up, satisfactory healing of the lesion site was observed (Figure 1D).

HP evaluation revealed epithelial hyperplasia and immunoglobulin G4 (IgG4)-positive plasma cells (Figure 1, E and F). Despite the IgG4/IgG+ cell ratio being less than 40%, the presence of more than 80 IgG4-positive cells per high-power field and the observation of storiform fibrosis led to the recommendation for evaluation for IgG4-related disease (IgG4-RD).



Figure 1 – ***(A) Localized gingival enlargement between the central incisors; (B) Periapical radiograph; (C) Excisional biopsy; (D) Postoperative third month; (E) Ulceration and granulation tissue in the mucosa; (F) Numerous IgG4-positive plasma cells under magnification. HE staining: (E) ×40. Anti-IgG4 antibody immunomarking: (F) ×200. HE: Hematoxylin–Eosin; IgG4: Immunoglobulin G4.***

The patient consulted the Rheumatology Department, and following the evaluation, no diagnostic criteria for IgG4-RD were identified; the infiltrate beneath the hyperplastic epithelium was interpreted as reactive inflammation.

Case No. 2

A 60-year-old female patient presented with a 10×20 mm hemorrhagic, partially fibrotic, hyperplastic lesion on the buccal surface of tooth 47 (Figure 2, A and B). The patient's medical history revealed hypertension, for which she was taking Amlodipine. The antihypertensive medication containing Amlodipine was changed in consultation with her cardiologist. An excisional biopsy was performed using conventional methods (Figure 2C). Follow-up at three months showed satisfactory healing (Figure 2D).

HP examination revealed active granulation tissue, and epithelial hyperplasia was observed (Figure 2E). Cluster of differentiation (CD)3, CD20, kappa++, and lambda++ were found to be positive, and the infiltrate was determined to exhibit a reactive pattern.



Figure 2 – ***(A) Localized gingival enlargement on the buccal surface of tooth 47; (B) Periapical radiograph; (C) Excisional biopsy; (D) Postoperative third month; (E) Granulation tissue and polypoid growth. HE staining: (E) ×40.***

Case No. 3

A 43-year-old female patient presented with a localized, pedunculated, non-hemorrhagic GE measuring 4×5 mm in the area between teeth 32 and 33 (Figure 3, A and B). Excisional biopsy was performed using conventional

methods (Figure 3C). Follow-up at three months revealed good healing (Figure 3D).

HP evaluation revealed epithelial hyperplasia, fibrosis, and chronic inflammation (Figure 3, E and F).



Figure 3 – *(A) Lesion on the buccal surface of tooth 33; (B) Periapical radiograph; (C) Excisional biopsy; (D) Postoperative third month; (E) Positivity only in the basal layer of the epithelium (Ki67); (F) Epithelial hyperplasia and chronic inflammation. Anti-Ki67 antibody immunomarking: (E) ×40. HE staining: (F) ×40.*

Case No. 4

A 28-year-old female patient presented with a 9×10 mm pedunculated hemorrhagic lesion on the buccal surface of teeth 42 and 43, which was reported to have developed post-pregnancy (Figure 4, A and B). The lesion, suspected to be a pyogenic granuloma, was excised using a diode laser (SiroLaser Blue, 445 nm wavelength, Dentsply Sirona) (Figure 4C).

Follow-up at three months showed satisfactory healing (Figure 4D). HP examination revealed cavernous hemangioma, with epithelial hyperplasia (Figure 4E).



Figure 4 – *(A) Lesion on the buccal surface of teeth 42 and 43; (B) Periapical radiograph; (C) Laser biopsy; (D) Postoperative third month; (E) Large vascular structures beneath the epithelium. HE staining: (E) ×40.*

Case No. 5

A 30-year-old female patient presented with localized GE in the form of a 5×6 mm lesion on the buccal papilla between teeth 21 and 22 and a 10×7 mm pedunculated lesion on the palatal surface (Figure 5, A–C). The patient reported that the palatal lesion had developed during infancy (at 5–6 months of age), with subsequent progression toward the buccal region. Despite undergoing two surgeries for the buccal lesion, recurrence occurred. The GEs on both the buccal and palatal sides were excised using conventional methods. Three-month follow-up revealed satisfactory healing (Figure 5, D and E), although recurrence was noted in the interdental papilla of the buccal region at the fifth month postoperative (Figure 5F).

HP examination revealed a squamous cell papilloma (SCP) (Figure 5G).



Figure 5 – *(A) Lesion on the buccal papilla of teeth 21 and 22; (B) Lesion on the palatal surface; (C) Periapical radiograph; (D) Postoperative third month, buccal; (E) Postoperative third month, palatal; (F) Postoperative fifth month; (G) Squamous cell papilloma. HE staining: (G) ×40.*

Discussions

In all treated cases, the probing pocket depths (Williams' probe) at the localized GE sites were on average 3.96±1.49 mm at baseline, whereas at the three-month post-operative follow-up, they had reduced to 1.88±0.50 mm.

The majority of localized GEs are reactive and non-neoplastic lesions [2, 19]. They may occur as isolated, regional, or generalized lesions, typically as a response to chronic local irritation, trauma, systemic diseases, medications, or hormonal fluctuations [12]. In the differential diagnosis and management of GEs, it is essential to obtain a comprehensive dental and medical history, evaluate the type and size of the lesion, and identify any potential etiological or predisposing factors [20].

In cases where GEs cannot be conclusively diagnosed through clinical and radiographic examinations, biopsy followed by HP analysis remains the "gold standard" for establishing an accurate diagnosis and determining the prognosis of the lesion [21].

Conventional surgical excision remains the most common therapeutic approach; however, soft tissue lasers have been increasingly utilized in the treatment of such lesions [1]. Laser surgery offers several advantages, including minimal damage to surrounding tissues and improved visualization due to reduced intraoperative bleeding. It has been reported to provide more precise, faster, less painful excisions with minimal scarring when compared to conventional methods [22]. Moreover, it is often preferred for patient comfort and the establishment of a bloodless surgical field during and after the procedure [23].

In a retrospective study by Kurgan *et al.*, inflammatory fibrous hyperplasia was identified as the most frequent reactive hyperplastic lesion affecting periodontal tissues [23]. These lesions typically appear as firm, painless, smooth-surfaced nodular masses and may be triggered by periodontal inflammation. While they most commonly occur on the gingiva, they may also present on the lips, tongue, or oral mucosa [24, 25].

The head and neck region is the second most commonly affected anatomical site in IgG4-RD; however, involvement of the oral cavity remains rare. In its early stages, IgG4-RD poses a diagnostic challenge due to its ability to clinically and histologically mimic malignancies, infections, and other immune-mediated conditions [26].

The disease is further complicated by its heterogeneous pattern of organ involvement, which can hinder early detection and accurate diagnosis [27]. In Case No. 1, the

presence of IgG4-positive plasma cells identified in the biopsy specimen led to referral of the patient to the Rheumatology Department for further systemic evaluation. Rheumatology, based on the biopsy results and detailed analyses, did not detect any underlying systemic condition.

Hemangiomas are benign vascular tumors most commonly observed in the head and neck region; however, their occurrence in the oral cavity, particularly on the tongue, is relatively rare. A pronounced female predominance has been observed, with a female-to-male ratio of approximately 3:1 [28]. These lesions are characterized by endothelial cell proliferation, demonstrating rapid growth during the proliferative phase followed by gradual involution, and are generally associated with a low risk of recurrence [29]. In the oral mucosa, hemangiomas may appear as flat or raised lesions, often multinodular, and are typically bright red, bluish, or purplish in color [30]. The treatment of hemangiomas in the oral mucosa depends on several factors, including the patient's age, lesion size, location, and clinical characteristics [30]. Bleeding control is particularly crucial during the management of these lesions. In Case No. 4, due to the lesion's clinical appearance suggesting a vascular structure and the anticipated risk of bleeding, excisional treatment with laser was preferred.

SCP is a commonly encountered neoplasm that primarily affects the soft palate and tongue, although it may involve any site within the oral cavity [31]. It arises from the proliferation of squamous epithelium, forming papillary or exophytic masses [32]. The pathogenesis SCP is most commonly associated with human papillomavirus particularly subtypes 6 and 11 [33, 34]. Transmission of oral SCP can occur *via* direct contact, sexual transmission, perinatal vertical transmission from mother to child, or contaminated objects [34]. Surgical excision including the lesion and a small margin of surrounding tissue is the recommended treatment approach [34]. The recurrence and malignant transformation risks of SCP are generally low [33]. However, recurrence may vary depending on the lesion subtype and may be influenced by incomplete excision, persistent viral infection, or immunodeficiency [35]. In Case No. 5, the patient reported that the lesion developed during infancy and had a history of recurrence despite previous interventions. Following our surgical procedure, a recurrence was observed at the five-month follow-up, and the patient was referred to the infectious diseases department for systemic evaluation.

Biopsy is a critical diagnostic tool in identifying premalignant lesions among localized GEs. In some malignancies, oral manifestations may be the first clinical signs [36]. Additionally, microbiota alterations in periodontal diseases particularly due to periodontopathogens may contribute to the development of cancerous lesions [37]. Periodontal therapy and routine maintenance play a key role in maintaining oral health and preventing dysbiosis, thereby helping to reduce recurrence risk [38]. In our case series, all patients received supra- and subgingival debridement and were provided with oral hygiene instructions prior to surgical intervention. Further research is warranted to explore molecular diagnostics, bacterial strain profiling, and the role of periodontal microbiota in lesion recurrence.

Conclusions

Localized GEs encompass a heterogeneous group of lesions with diverse etiologies and clinical presentations. A comprehensive approach involving medical and dental history, HP analysis, and tailored surgical management is essential for accurate diagnosis and successful treatment. This case series highlights the diagnostic value of biopsy and the importance of interdisciplinary collaboration in complex or recurrent cases.

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

Compliance with ethical standards

In our institution, Ethics Committee approval is not required for retrospective case reports involving previously collected and anonymized patient data.

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Corresponding author
Ayça Muhterem, DDS, Department of Periodontology, Faculty of Dentistry, Dokuz Eylul University, 15 Temmuz Sağlık ve Sanat Yerleşkesi, 56/17 Tıp Derslikleri Binası, 35340 İnciraltı, Balçova/İzmir, Türkiye; Phone +90 507 992 24 76, e-mail: ayca.muhterem@deu.edu.tr

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