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Minimally Invasive Laser Treatment of Reactive Oral Mucosal Lesions: A Case Series

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Case Report

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Abstract

Background:

Reactive lesions of the oral mucosa, including pyogenic granuloma, inflammatory fibrous hyperplasia, and traumatic fibroma, commonly develop in response to chronic irritation. Conventional surgical excision may be associated with intraoperative bleeding and postoperative discomfort. Laser therapy offers a minimally invasive alternative with improved clinical outcomes.

Aim:

To evaluate the clinical effectiveness of diode laser therapy in the management of few reactive lesions of the oral mucosa.

Materials and Methods:

This case series included four patients diagnosed clinically and histopathologically with reactive oral lesions. The lesions were excised using a 980-nm diode laser operated in continuous mode at 1.0 W in contact mode under local anaesthesia. Intraoperative and postoperative outcomes were assessed during follow-up.

Results:

Laser excision was associated with minimal intraoperative bleeding, good patient compliance, and uneventful healing. Histopathological examination confirmed the clinical diagnosis in all cases. No postoperative complications or recurrence were observed during the follow-up period.

Conclusion:

Diode laser therapy is an effective and minimally invasive treatment modality for reactive lesions of the oral mucosa, offering excellent haemostasis, patient comfort, and favourable healing outcomes.

Introduction

A collection of benign proliferative growths that develop in reaction to persistent local irritation or damage are known as (1)reactive inflammatory hyperplastic lesions of the oral cavity. Tooth calculus, cheek biting, defective restorations, chronic food irritants,tooth plaque, and prosthetic discomfort are (2)common etiological causes. These lesions are inflated tissue reactions brought on by ongoing

inflammatory stimulation rather than actual neoplasms. Irritational fibroma, pyogenic granuloma, and inflammatory fibrous hyperplasia are some of the most common entities(3).

Clinically, these lesions might show up as diffuse overgrowths involving the gingiva or oral mucosa or as isolated nodules. Despite their benign nature, they may result in discomfort, bleeding, esthetic issues, or functional discomfort. With time,these reactive lesions(4) may resemble malignant growths due to overlapping clinical symptoms, which calls for rigorous clinical evaluation and histological confirmation.

Conventional management involves surgical excision using a scalpel along with elimination of the underlying etiological factor and proper curettage. However, scalpel excision is often associated with intraoperative bleeding, need for sutures, postoperative pain, and edema. In recent years, soft tissue lasers have gained popularity as (5)an alternative treatment modality in oral surgery. The 980-nm diode laser, in particular, demonstrates high affinity for haemoglobin and pigmented tissues, providing superior haemostasis and a relatively bloodless surgical field(6). Additional advantages include reduced bacterial contamination, minimal postoperative discomfort, decreased edema, and improved patient acceptance.

Given these benefits, diode lasers(7) have increasingly been utilized for the management of reactive oral lesions. The present case series aims to describe the clinical presentation,management and to highlight the clinical outcomes and advantages of this modality though there are various types of lasers.

Case-1

A 65 year old female patient presented with a two-week history of a painless growth in the upper left front tooth region. The growth was not associated with pus discharge, bleeding, or discomfort during mastication. There was clear impingement of the gingival margin by the lower anterior teeth i.e.,32,33(root stumps) and no history of previous similar swellings were evaluated. The patient was a known diabetic and hypertensive for the past four years and was under medication.Intra-oral examination revealed a solitary, pinkish-red, oval-shaped sessile exophytic growth[Fig. 1(a)] measuring approximately 1 × 0.8 cm in relation to 21–23 region. The growth extended medio-distally from the distal aspect of 21 to the mesial aspect of 23 and labio-palatally from the marginal gingiva to the mid-coronal portion of 21 and 23. The labial surface appeared smooth, while the palatal surface exhibited a bosselated appearance with well-defined borders. On palpation, the growth was non-tender,sessile, firm in consistency, non-fluctuant, non-compressible, and non-reducible, with no bleeding on probing.

Based on clinical findings, a provisional diagnosis of a reactive inflammatory hyperplastic lesion was considered. The growth was managed using diode laser ablation[Fig. 1(b)] under controlled glucose levels (980 nm wavelength, 1.0 W power, continuous contact mode), resulting in satisfactory intraoperative hemostasis, post operative pain and uneventful postoperative healing[Fig. 1(c)] occured within 1 week and histopathologically[Fig. 1(d)] it was confirmed as Inflammatory Fibrous Hyperplasia and the root stumps were extracted to prevent further recurrence.

Case-2

A 37 year old female patient presented with a chief complaint of a growth in the lower front tooth region for the past two years. It was gradually progressive in nature. There was no associated history of pain, pus discharge, or significant functional discomfort. Intraoral examination revealed a diffuse pinkish-red, oval-shaped growth measuring approximately 1 × 0.8 cm in relation to the labial surface[Fig. 2(a)] of 42–44 region. The lesion exhibited a smooth surface with well-defined borders. It extended antero-posteriorly from the distal aspect of 42 to the mesial aspect of 44 and supero-inferiorly from the middle third of the coronal portion to approximately 2 mm below the marginal gingiva. On palpation, the growth was firm in consistency, non-tender, non-fluctuant, non-compressible, and no bleeding on probing. Based on the clinical presentation,age and gender of the patient, a provisional diagnosis of pyogenic granuloma was considered and oral prophylaxis was done,and later the growth was managed using diode laser ablation (980 nm wavelength, 1.0 W power, continuous contact mode) [Fig. 2(b)] and oral prophylaxis was done, achieving excellent intraoperative haemostasis and satisfactory postoperative healing[Fig. 2(c)] and histopathology showed hyperplastic parakeratinized stratified squamous epithelium with ulceration and fibro purulent membrane and confirmed it as pyogenic granuloma[Fig. 2(d)] and finally deep scaling was done to remove the causative factor(sub-gingival calculus).

Case-3

A 30 year old female patient presented with a chief complaint of a soft tissue growth in the right back cheek region since nine months with a history of accidental cheek biting. The growth was gradual in onset and not associated with pain, bleeding, or functional discomfort. Intraoral examination revealed a solitary soft tissue growth[Fig. 3(a)] measuring approximately 0.7 × 0.5 cm on the right buccal mucosa which was located along the line of occlusion, approximately 2 cm anterior to the pterygomandibular raphe. The overlying mucosa appeared normal without ulceration.On palpation, the growth was firm in consistency, non-tender, and pedunculated. It was non-fluctuant and non-compressible.Based on the clinical presentation and history, a provisional diagnosis of irritational fibroma was made.It was completely excised[Fig. 3(b)] using diode laser (980 nm wavelength, 1.0 W power, continuous contact mode), and the ablated tissue was sent to pathology for confirmatory diagnosis and the histopathology reveals connective tissue with irregularly arranged collagen fibres with flat to plump fibroblasts[Fig. 3(c)].The laser ablation results in excellent intraoperative haemostasis and satisfactory postoperative healing without complications.

Discussion

Reactive inflammatory hyperplastic lesions(8) of the oral cavity represent exaggerated tissue responses or granulomatous to chronic local irritation or trauma rather than true neoplastic proliferations. Common etiological factors include plaque accumulation, calculus, faulty restorations, cheek biting, foreign food materials and prosthetic irritation(2). In the present case series, lesions clinically diagnosed as

inflammatory fibrous hyperplasia, pyogenic granuloma, and irritational fibroma demonstrated typical features consistent with reactive pathology and were confirmed histopathologically.

Pyogenic granuloma(9) is a highly vascular lesion characterized by rapid growth and a tendency to bleed due to its rich capillary proliferation. In contrast, irritational fibroma and inflammatory fibrous hyperplasia are predominantly fibrous proliferations resulting from chronic low-grade irritation. Although benign, these lesions may cause functional impairment, esthetic concerns, and anxiety to patients due to their growth pattern and resemblance to neoplastic lesions. Therefore, accurate diagnosis and timely management are essential.

Conventional treatment involves surgical excision using a scalpel along with elimination of the underlying etiological factor. However, scalpel surgery(10) is often associated with intraoperative bleeding, requirement of sutures, postoperative pain, edema, and delayed healing. In recent years, soft tissue lasers have emerged as an alternative modality in oral surgery due to their ability to provide precise cutting with simultaneous coagulation.

The selection of the 980-nm diode laser wavelength in the present case series was based on its favourable interaction with oral soft tissues, particularly its high absorption in haemoglobin and melanin. This wavelength lies in the near-infrared spectrum and provides an optimal balance between cutting efficiency and coagulation. The strong affinity for (11)haemoglobin allows effective sealing of small blood vessels, resulting in excellent intraoperative haemostasis and a relatively bloodless surgical field, which is especially advantageous in vascular lesions such as pyogenic granuloma. Additionally, the 980-nm wavelength enables adequate depth of penetration, ensuring efficient tissue ablation while maintaining control over collateral thermal damage when used at appropriate power settings. Compared to other diode wavelengths (e.g., 810 nm or 940 nm), the 980 nm laser(12) demonstrates superior coagulative properties with effective soft tissue vaporization, thereby reducing the need for sutures and minimizing postoperative discomfort. These characteristics make it particularly suitable for minimally invasive excision of reactive oral lesions, contributing to improved healing outcomes and enhanced patient comfort.The use of 1.0 W power in continuous contact mode with an initiated fiber tip allowed controlled ablation while minimizing collateral thermal damage to adjacent tissues. Additionally, diode lasers are known to reduce bacterial load at the surgical site, thereby decreasing the risk of postoperative infection. The absence of sutures, minimal postoperative discomfort,pain,edema and satisfactory wound healing(13) observed in the present cases further support the clinical benefits of laser therapy.

Another significant advantage observed was improved patient acceptance and comfort, particularly in medically compromised patients, such as the diabetic and hypertensive patient included in this series. Reduced surgical trauma and minimal bleeding(14) contribute to safer management in such individuals.No postoperative complications or recurrence were noted during the follow-up period of six months in any of the cases. Nevertheless, elimination of the causative irritant(2) remains critical to prevent recurrence, irrespective of the surgical modality employed.

Conclusion

Reactive inflammatory lesions of the oral cavity are commonly encountered in routine clinical practice and often require surgical intervention for definitive management. The present case series demonstrates that excision using a 980-nm diode laser operated at 1.0 W in continuous contact mode is a safe, effective, and minimally invasive treatment modality for reactive lesions such as inflammatory fibrous hyperplasia, pyogenic granuloma, and irritational fibroma.

In all cases, laser therapy provided excellent intraoperative haemostasis, clear visibility of the surgical field, minimal postoperative discomfort, and satisfactory wound healing without complications or recurrence during follow-up. The inherent advantages of the diode laser—including reduced bleeding, decreased need for sutures, minimal tissue trauma, and enhanced patient compliance make it a valuable alternative to conventional scalpel excision.

Declarations

Funding:

No financial support was received for this study.

Author Contribution

Author Contributions Statement:A.R.R. performed the study, collected the data, and wrote the main manuscript text. J.K. contributed to the conceptualization and overall design of the study. A.K.K. assisted in data collection. D.A.D.C. conducted the data analysis and contributed to interpretation of the results. V.S.N.J.C. prepared the figures and assisted in visual representation of the data. All authors reviewed, revised, and approved the final version of the manuscript.

Consent to Publish Declaration:

Written informed consent was obtained from all patients for publication of their clinical details and clinical photographs included in this case series. The patients understood that their identities would remain confidential and that all efforts would be made to conceal personal information.

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Figures



Fig.1(a)



Fig.1(b)



Fig.1(c)

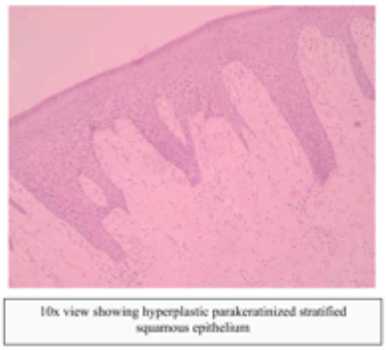


Fig.1(d)

Figure 1: Clinical and histopathological presentation of inflammatory gingival hyperplasia

Figure 1

See image above for figure legend.



Fig.2(a)



Fig.2(b)



Fig.2(c)

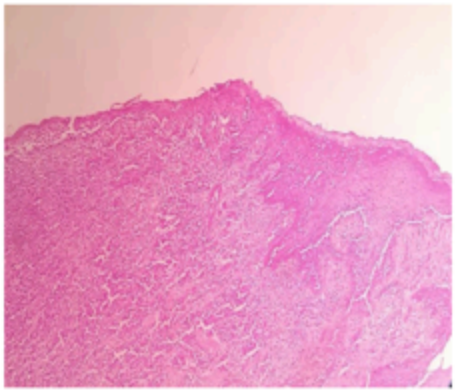


Fig.2(d)

Figure-2: Clinical and histopathological presentation of Pyogenic Granuloma

Figure 2

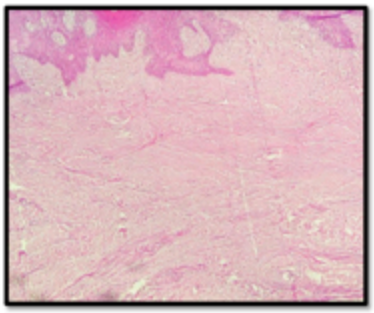
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Fig.3(a)



Fig.3(b)



10X view shows connective tissue with irregularly arranged collagen fibers with flat to plump fibroblasts.

Fig.3(c)

Figure 2: Clinical and histopathological presentation of Irritational Fibroma

Figure 3

See image above for figure legend.