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Effective Management of Desquamative Gingivitis Using Dual-Wavelength Diode Laser Therapy (640 nm and 810 nm): A Case Report

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ABSTRACT

Background: Desquamative gingivitis (DG) is a clinical term describing erythematous, desquamative, and often painful gingival lesions commonly associated with mucocutaneous disorders. Traditional management typically involves topical or systemic corticosteroids, which may carry risks of side effects and relapse. With the growing interest in non-invasive alternatives, laser therapy has emerged as a promising modality.

Case Presentation: This case report describes the successful management of a patient diagnosed with desquamative gingivitis using dual-wavelength diode laser therapy at 640 nm and 810 nm. The 640 nm laser was employed for its biostimulatory and anti-inflammatory effects, while the 810 nm laser was used for its deeper tissue penetration and decontamination capabilities. Following multiple sessions, the patient exhibited a marked reduction in pain, erythema, and lesion severity, with no reported side effects.

Conclusion: Dual-wavelength diode laser therapy proved to be an effective and well-tolerated alternative for the management of desquamative gingivitis in this case. The synergistic use of 640 nm and 810 nm lasers offers a non-pharmacological option with promising clinical outcomes. Further research and randomized clinical trials are warranted to establish standardized laser protocols for DG treatment.

Keywords: *Desquamative gingivitis, diode laser, 640 nm, 810 nm, photobiomodulation, non-invasive therapy, oral mucosal lesions*

1. INTRODUCTION

The term “desquamation” is derived from the Latin word ‘Desquamare’, which means scraping fish flakes.[1] As a word, desquamation means ‘loss of epithelial elements in small and large amounts, peeling of skin, and exfoliation’.[2] Chronic desquamation of the gingiva is referred to as desquamative gingivitis. Tomes and Tomes in 1894 explained Chronic desquamative gingivitis.[3]

Desquamative gingivitis is a clinical finding, which presents with vesicular formation, atrophy, erosion and desquamation, characterized with diffuse erythema of the marginal and keratinized gingiva.[4] Lesions start with diffuse erythema and minimal desquamation. The affected gingiva epithelium is very fragile and tends to exfoliate easily, even with the slightest trauma.[3] Large ulceration areas can be observed in some cases.[5] The desquamative gingivitis is seen after puberty, especially in individuals over 30 years of age.[3] It is more common in women than in men.[3]

Desquamation of epithelial tissue is generally seen in free and keratinized gingiva. Generally, the lesions that affect the buccal/labial surfaces of the gingiva, although not formed due to bacterial plaque, are exacerbated with plaque accumulation.[6] Although they are generally observed in the anterior region, they can be seen in any gingival area.[7]

While only desquamations can be observed in the patients, there can also be associated vesicular-bullous lesions, in addition to ulcerative and lichenoid lesions. In severe cases, it can be seen generalized at the oral mucosa, and the alveolar mucosa can be affected together with the gingiva.[6] The patient can either have no complaints or there can be a burning sensation or severe pain. In general, there is chronic pain, which especially increases with the intake of acidic foods. Limitation of oral function and speech difficulties due to pain can also be observed.[7]

Systemic and topical corticosteroids are used for the medical treatment of DG. Topical corticosteroids are commonly used to treat DG. However, their effects are limited due to the saliva volume and the tongue movements which decreases the effectiveness of the treatment. Direct application of chlobetasole-17- propionate to the affected site is recommended.[3, 8]

The use of systemic steroids and other cytotoxic drugs presents an increased risk of adverse side effects. Consequently, alternative treatment modalities have emerged. Among them, photobiomodulation (PBM), also called low-level laser therapy (LLLT), or laser therapy, stands out.[9] Different types of laser (ultraviolet, helium–neon, and diode) with distinct doses, output power, and time of irradiation are applied to the injury site and the irradiation is repeated for several sessions.[10] They can be used due to their proposed anti-inflammatory effects, pain relief, and accelerated regeneration of damaged tissues, without demonstrating the adverse effects associated with drug intake treatment.[11, 12]

In the present case the desquamtive gingivities is treated using the LASER by photobiomodulation used on alterative day with dual-wavelength diode laser therapy using 640 and 810 nm simutaneously. The drastic resolution of the lesion was noticed just by 3 applications along with reduction of pain and burning sensation which allowed patient to have food comfortably.

2. CLINICAL PRESENTATION

History

60 years old female patient reported with chief complaint of burning sensation in the gums since 10 years. Patient was apparently alright 10 years back and started experiencing burning sensation on consumption of sour and spicy food. The intensity of burning sensation increased with time because of which patient couldn't have food and maintenance of the oral hygiene was a difficult task. Patient visited physician where they prescribed topical steroids, surface anesthetics, multivitamin tablets which temporarily relieved the burning sensation.

Patient didn't report any history of medical illness, medications. deleterious habits. General physical examination revealed all the vital signs were in normal range.

Intraoral examination revealed poor oral hygiene. Gingival examination revealed fiery red, glazed, atrophic or eroded gingiva, particularly seen on the buccal/labial surface of the gingival epithelium, involving marginal, interdental and attached gingiva throughout the maxillary arch (fig 1). On palpation there was tenderness and peeling off of the gingival mucosa (fig 2).

Fig 1: Intraoral photograph showing erythema in marginal, interdental and attached gingiva throughout maxillary arch

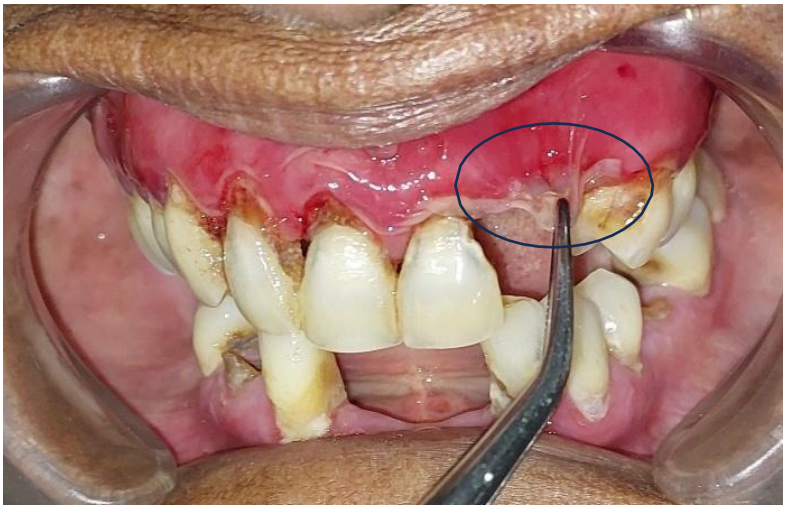

Fig 2: Peeling off of the gingival mucosa

Based on the history and clinical examination findings, provisional diagnosis of desquamative gingivitis was given. Since patient already was on topical steroids, surface anesthetics and multivitamins, we decided to go with the photobiomodulation therapy with LASERS. Scaling and root planning procedures was postponed due to the condition of the gingival which was not suitable even for the slightest trauma.

Photobiomodulation Therapy

Device used was Diode laser with Wavelength of 640–810 nm both the wavelengths were used in combo coherence mode at 100 mv/min in a continuous mode and Energy Density was 6–10 J/cm² with Frequency of 3 sessions were given on alternate day basis for one week. All Laser protective measures were followed.

Procedure

Suraface anaesthesia was applied [lignocaine 2%] so that frictional pain due to laser tip can be reduced. Laser 0.8 cm diameter circular tip was placed to affected gingival areas, irradiation was done in continuous mode, ensuring even energy distribution for 1 minute per site.

After each application of Laser, gingival evaluation was done. Examination of gingiva showed gradual reduction in signs and symptoms like, erythema and burning sensation from first application (fig 3), second application (fig 4) and the third application (fig 5). The patient started having the food comfortably because of reduction of burning sensation and appropriate oral hygiene measures were encouraged. Oral prophylaxis with scaling and root planning was planned after the 7 days.

Outcomes

1. **Pain Reduction:** Significant improvement in pain levels assessed using the Visual Analog Scale (VAS), before starting with photobiomodulation therapy VAS score was 9 at the end of third session of PBM score was reached to 2
2. **Healing of Lesions:** Reduction in erythema, fragility, erosion of gingiva was evident at the end of fourth session of PBM. (Fig 3, 4, 5)
3. **Long-Term Stability:** Follow-up over six months showed no recurrence of symptoms.

Fig 3: Reduction of erythema after 2 days of first biomodulation therapy

Fig 4: Reduction of erythema after 2 days of second biomodulation therapy

Fig 5: Reduction of erythema after 3 days of third biomodulation therapy

3. DISCUSSION

Desquamative gingivitis (DG) is a clinical manifestation rather than a diagnosis, often associated with mucocutaneous disorders such as lichen planus, mucous membrane pemphigoid, and pemphigus vulgaris. The condition presents with erythema, desquamation, ulceration, and pain, significantly affecting a patient's oral function and quality of life. Traditional management approaches include corticosteroids, immunosuppressants, and good oral hygiene maintenance. However, these methods often offer symptomatic relief without addressing underlying tissue healing.

In recent years, laser therapy has emerged as a promising adjunctive tool in the management of inflammatory and

autoimmune oral mucosal diseases, including DG. In the present case, diode lasers at wavelengths of 640 nm and 810 nm were used for the treatment of desquamative gingivitis. These wavelengths were chosen for their specific tissue interaction characteristics and anti- inflammatory, biostimulatory, and analgesic effects.

The 640 nm laser falls within the red visible spectrum, which is known to be absorbed effectively by chromophores like cytochrome c oxidase in mitochondria. This absorption leads to increased ATP production, enhanced cellular metabolism, and modulation of inflammatory mediators, thus promoting wound healing and pain relief. Studies have shown that low-level laser therapy (LLLT) in the red spectrum can significantly reduce inflammation and accelerate re- epithelialization of oral mucosal lesions.[13]

The 810 nm diode laser, which falls in the near-infrared (NIR) region, exhibits deeper tissue penetration and is well-absorbed by melanin and hemoglobin. It is widely used for soft tissue ablation, bacterial decontamination, and biostimulation. In the context of DG, the 810 nm laser offers the benefit of de-epithelialization of affected areas, destruction of pathogenic microorganisms, and enhanced local immune response, contributing to faster clinical recovery and reduced recurrence.[14]

In this case, the dual-wavelength approach using 640 nm and 810 nm lasers was employed to synergize the superficial biostimulatory and deep anti-inflammatory effects. The treatment resulted in a marked reduction in erythema, discomfort, and lesion size within a short period, suggesting a potential role of photobiomodulation (PBM) and minimally invasive laser-assisted healing in the clinical resolution of DG.

This approach aligns with the principles of photomedicine, where lasers are used not only for surgical intervention but also for immune modulation, pain relief, and regeneration of oral mucosa. Compared to conventional topical corticosteroid therapy, laser therapy offers a non- pharmacological alternative with fewer side effects and better patient compliance—particularly for chronic or recurrent cases.[15,16]

4. CONCLUSION

This case highlights the successful application of 640 nm and 810 nm diode laser therapy in the management of desquamative gingivitis. The dual-wavelength approach provided synergistic effects—superficial biostimulation and deep anti-inflammatory action—resulting in rapid symptomatic relief and lesion resolution. Laser therapy not only served as a minimally invasive and well-tolerated treatment but also enhanced the patient's overall comfort and compliance. This case underscores the potential of laser technology as a valuable adjunct in the multidisciplinary management of chronic oral mucosal diseases like DG.

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