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Adjunctive Use of LASER in The Management of Desquamative Lesions: A Case Series

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Abstract

Auto-immune disorders result from an exaggerated immune response damaging organs and tissues due to genetic predisposition and environmental triggers. They may effect the oral cavity and commonly manifest as oral lichen planus, mucous membrane pemphigoid, pemphigus vulgaris and epidermolysis bullosa acquisita . Oral manifestations can serve as early indicators of broader immunological problems. Symptoms involve changes such as thickened lines of redness, blisters, erosion, and ulcers, often occurring on the tongue, buccal mucosa, and gingiva. Current treatments for desquamative lesions focus on general disease symptoms and involve topical corticosteroids, immunosuppressants, and antibiotics, but systemic steroid usage carries notable risks. As an alternative, low-level laser therapy (LLLT) has emerged as promising modality, offering anti-inflammatory effects, pain relief, and tissue regeneration without the drawbacks of traditional medications.

Case series

This case series demonstrates the effects of three different modalities of lasers (Laser ablation, PBM and PDT) in gingival lesions caused by autoimmune diseases like oral lichen planus, Pemphigus vulgaris and epidermolysis bullosa, potentially providing a safer and effective therapeutic option as an adjunct to topical steroids

Conclusion: The outcome in our cases suggests that the use of LASER in the management of desquamative lesions had a beneficial effect which included increased steroid free period, improved patient reported outcome measures, improved patient reported experience measures.

Keywords: Lasers, Photobiomodulation, Low level laser therapy, desquamative lesions, case series

Introduction

LASER is an acronym of light amplification by stimulated emission of radiation.[1] Lasers are intense beams produced by stimulated emission of radiation from a light source [2]. Einstein identified that a laser is promoted by the emission of radiation as a natural process. When a beam of light passes through a specific medium causing stimulation of the atoms within the medium to transfer the light in a specific direction, that is, the same direction as the medium by the same wavelength as that of the original beam, a laser beam is

created. Lasers are capable of increasing light intensity to synthesize beams of an effective wavelength, which are directional and of a high intensity [1]. Albert Einstein's theory of spontaneous & simulated emission of radiation describes three characteristic features of lasers as follows: monochromatic, i.e. all the waves have the same energy and frequency; coherent, which describes all the waves of light to be in phases related to each other in speed and time; and collimated ensuring parallelism of the waves (low beam divergence).[2]

In this case series Laser ablation, photobiomodulation and photodynamic therapy are tried in the management of Lichen Planus, Pemphigus vulgaris and Epidermolysis Bullosa using Low Level Laser Therapy by using a diode laser.

Case 1

A 30 yrs old female reported to dept. of periodontology with a chief complaint of pain in her gums since last 1 year. The patient was presently on topical corticosteroids (triamcinolone acetonide 0.1%), lycopene and anesthetic gel. However, the patient was not relieved of her symptoms.

Intraoral examination revealed gingival erythema on maxillary and mandibular marginal and attached gingiva (Fig. 1a). Nikolsky's sign was positive (Fig. 1b). Sloughing of epithelial surface and bleeding on probing were also present.

Based on clinical history, examination a provisional diagnosis of Bullous pemphigoid was established. Incisional biopsy using stab and roll technique was done from upper right region. (Fig.1c) The samples were subjected to histopathological analysis (H&E) and direct immunofluorescence (DIF) examination. Histopathological examination revealed subepithelial clefting with epithelial separation from the underlying lamina propria, leaving an intact basal layer. DIF revealed linear deposits of C3 complement at the basement membrane (Fig.1d)

For the treatment the patient was administered local anesthesia. The power was set at 0.8W in continuous wave mode. LASER ablation was done for 10 seconds in contact mode. (Fig 1e). During the procedure LASER plume was suctioned to remove the smoke.

The patient was under periodic follow up for 6 months and reported with reduced pain and discomfort. (Fig 1f)

Figure 1a:

Figure 1b:

Figure 1c:

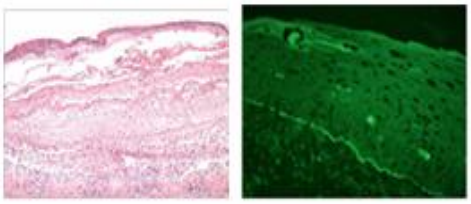

Figure 1d:

Figure 1e:

Figure 1f:

Case 2

A 42 years old female patient reported with a chief complaint of ulcerations in her mouth since last 2 years. The patient had difficulty eating food and complained of foul smell.

On intraoral examination multiple areas of irregular superficial ulcerations and erosions presented bilaterally on the buccal mucosa along the occlusal plane, extending posteriorly to the retromolar trigon, faucial pillars, and the hard and soft palate (Fig 2a). These lesions were described as well-defined raw hemorrhagic erosions within an erythematous background and not attached to the underlying structures. Nikolsky's sign was present at the lower left premolar area (Fig. 2b)

Based on clinical history and examination, a provisional diagnosis of pemphigus vulgaris was established. Incisional biopsy was done from upper left buccal mucosa in the region between premolars region. (Fig.2c) The samples were subjected to histopathological analysis (H&E) and direct immunofluorescence examination (DIF) which revealed intraepithelial clefting above the basal cell layer. Basal cells had a characteristic tombstone appearance and acantholysis. DIF was positive for intercellular deposits of IgG in the epithelium. (Fig 2d)

For the treatment Photo biomodulation (PBM) was done with 980-nm gallium-aluminum arsenide (GaAIAs) diode laser. The device was used according to the manufacturer's instructions. A collimated probe, with a diameter of 0.6 cm and a spot size of 0.28 cm^2, was used. The output power was 300 mW verified (Fig 2e) using the calibrating door of the laser device (Fig 2e). Each session was performed delivering a fluence of 4 J/cm^2, and the probe was held perpendicularly at a distance of about 2 mm. The patient underwent two laser sessions weekly for a total duration of one month. Patient was evaluated periodically at 1, 3- and 6-months interval. The symptoms improved considerably, moreover, patient reported a complete resolution of symptoms at the end of the laser sessions. There was no recurrence of lesions at the end of 6 months. (Fig 2f)

Figure 2a:

Figure 2b:

Figure 2c:

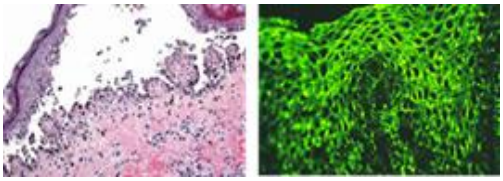

Figure 2d:

Figure 2e:

Figure 2f:

Case 3

A 53 years old female patient reported with chief complaint of soreness and burning sensation while eating hot and spicy food on the left and right buccal mucosa. The lesions were of long-standing duration with periods of remission on and off since 5 years.

During the examination of the oral cavity, plaque-like lesion (Fig 3a) with keratotic striae (Wickham's striae fig 3b) was found on the left buccal mucosa. Xerostomia due to lack of sufficient saliva was observed. Based on signs and symptoms, a provisional diagnosis of Lichen Planus was made. Incisional biopsy (Fig 3c) was done from left buccal mucosa and subjected to Histopathological and DIF.H & E revealed hyperkeratosis, hydropic degeneration of the basal layer, and sawtooth rete pegs, lamina propria exhibited dense, bandlike infiltrate, primarily of T lymphocytes. DIF was positive for Fibrillar deposits of fibrin at the dermal–epidermal junction (Fig. 3d)

Photodynamic therapy (PDT) was done using 4 applications in 1 month with 50 µl toluidine blue (1 mg/ml) combined with laser irradiation for 2.5 min, fluence:1.5 J/cm^2, power density: 10 mW/cm^2, 630 nm.(Fig 3e)

The patient was evaluated after 1,3 and 6 months and showed a marked improvement of symptoms and resolution of all symptoms in 6 months.

Figure 3a:

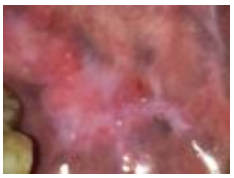

Figure 3b:

Figure 3c:

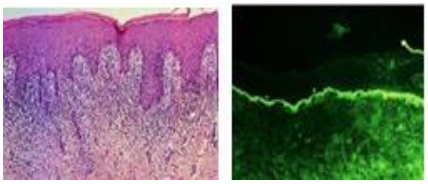

Figure 3d:

Figure 3e:

Figure 3f:

Discussion

Chronic Desquamative Gingivitis

The term chronic desquamative gingivitis was coined by Prinz in 1932. It describes a reaction characterized by intense erythema, desquamation, and ulceration of the free and attached gingiva.[3] Patients can be asymptomatic, but when symptomatic, their complaints range from a mild burning sensation to intense pain. In 1960, McCarthy and colleagues [4] suggested that desquamative gingivitis was not a specific disease entity but was instead a gingival response associated with a variety of conditions like bullous pemphigoid, pemphigus vulgaris,

linear immunoglobulin A [IgA] disease, dermatitis herpetiformis, lupus erythematosus, chronic ulcerative stomatitis, dermatomyositis, mixed connective tissue diseases. Diagnosis of desquamative gingivitis is based on a systematic approach which includes meticulous history, clinical examination, microscopic examination and immunofluorescence studies.[5]

Systemic steroids remain the treatment of choice for desquamative lesions as they are both effective and capable of inducing a rapid remission. However, adverse effects of steroids are time and dose dependent. Adjuvant therapies are therefore used to provide a steroid-sparing effect. Conventional adjuvants include various immunosuppressive adjuvants such as Azathioprine, Mycophenolate, Methotrexate, Cyclophosphamide, Cyclosporine; and anti-inflammatory agents like gold, Dapsone and many others. Unfortunately, these medications are often associated with significant toxicities. Though the majority of the patients will ultimately respond to these therapies, a few patients develop recalcitrant disease.[6] Over the years, advances have been made to expand therapeutic armamentarium for Desquamative lesions. Emerging therapies include i.v. immunoglobulin, plasmapheresis, immunoadsorption, extracorporeal photochemotherapy, rituximab, TNF-antagonist and other experimental therapies such as Desmoglein-3 peptides. [7,8]

In 1917, Albert Einstein set the foundation for the invention of the laser by explaining photoelectric amplification, and it was introduced to the public in 1959. Miaman was the first person who used the laser in 1960 on the hard and soft tissue. Advancements in the application of lasers over the last two decades have extended their use in caries prevention, bleaching, cavity preparation, dentinal hyper-sensitivity, growth modulation as well as for diagnostic purposes. In the soft tissue, it has been used in wound healing, the removal of hyperplastic tissue to uncover impacted or partially erupted tooth, photodynamic therapy of malignancies, and photo-stimulation of herpetic lesion. It has been discovered that lasers have increased the efficiency, specificity, ease, cost, and comfort of dental treatment.[9]

Lasers conduct heat by converting electromagnetic energy to thermal energy. The properties of a laser are determined by its wavelength, which influences its clinical applications. In general, a range from 193 to 10,600 nm (ultraviolet to infrared) is used in medicine and dentistry. The action of lasers is enhanced by the various chromophores present in tissues, especially heme and melanin, which are abundantly found in the oral cavity. This allows the maximization of their effectiveness in treating oral lesions. Zokaee et al. described the use of lasers as a novel prophylactic and therapeutic method with light emitted in the 600–1000-nm spectrum range (red to near-infrared).[10] Gross et al. reported that lasers have analgesic and wound healing effects. The anti-inflammatory effect of low-level lasers is derived from their ability to limit the release of inflammatory mediators, such as bradykinin, histamine, and especially prostaglandin, during inflammatory responses.[11] Nonthermal laser therapy can promote cell and tissue alterations caused by different types of metabolic activation, such as the increased activity of mitochondria and the Na+/K+ pump, increased vascularization, and fibroblast formation, thereby accelerating the recovery tissue healing by noninvasive means. Lasers are recommended for the treatment of oral lesions, such as mucoceles, fibromas, papillomas, hemangiomas, gingival enlargement, aphthous ulcers, leukoplakia, lichen planus, and vesiculobullous lesions, as well as for gingival depigmentation, frenectomy

procedures, and the management of pain associated with temporomandibular disorders.

Laser at low power has been used very effectively in the treatment of oral lichen planus, leukoplakia, aphthous ulcers, pemphigus and even oral manifestations of HIV.[12,13] So many different lasers, including surgical lasers such as argon, Nd: YAG, diodes and CO2, seem to have a stimulative/ regulative effect on tissue that encompasses pain relief and wound healing.[14] It has been suggested that use of CO2, which has high coefficient of absorption in water, is very suitable for soft-tissue applications. Furthermore, at low power it supplies direct biostimulative light energy to body's cells, leading to increased ATP production and increased cellular metabolism. This is clinically important in wound healing.[15] The effect of laser light is usually localized at the treatment site however there can be more generalized systemic effects.[15]

In a study by Jajarm et al, 630 nm diode laser was used for Low level laser therapy (LLLT), the result showed LLLT was as effective as topical corticosteroids with fewer side-effects. Pain score, lesion severity, and appearance were reduced in both groups. Based on the findings mentioned, LILT could be an appropriate alternative for treatment of erosive-atrophic OLP [16]

Conclusion

This case series suggests that the use of LASER in the management of desquamative lesions had an beneficial effect which included increased steroid free period, improved patient reported outcome measures, improved patient reported experience measures. LASER could be considered as an adjunctive therapy in symptomatic management of desquamative lesions, which do not respond to conventional treatment or suffering from recalcitrant lesions. However dosage, power density, fluence and time are important factors to be considered prior to usage. Further studies with randomized controlled trials are required to establish the efficacy of laser in the management of desquamative lesions.

References

1. Convissar RA. Principles and Practice of Laser Dentistry-E-Book: Elsevier Health Sciences; 2015.
2. Mishra MB, Mishra S. Lasers and its clinical applications in dentistry. International journal of dental clinics. 2011 Oct 1;3(4):35-9.
3. Merrit AH: Chronic desquamative gingivitis, J Periodontol 4:30, 1933.
4. McCarthy FP, McCarthy PL: Chronic desquamative gingivitis: a reconsideration, Oral Surg 13:1300, 1960
5. Lo Russo L, Fedele S, Guiglia R, et al: Diagnostic pathways and clinical significance of desquamative gingivitis, J Periodontol 79(1):4–24, 2008.
6. Scully C, Challacombe SJ. Pemphigus vulgaris: Update on etiopathogenesis, oral manifestations and management. Crit Rev Oral Biol Med. 2002;13:397–408.
7. Balachandran C. Treatment of pemphigus. Indian J Dermatol Venereol Leprol. 2003;69:3–5.
8. Husein-ElAhmed H, Gieler U, Steinhoff M. Lichen planus: a comprehensive evidence-based analysis of medical treatment. J Eur Acad Dermatol Venereol. 2019 Oct;33(10):1847-1862
9. Eslami H, Eslami K. Laser application on oral surgery. Eur J Pharm Med Res. 2016;3(11):194–198.
10. Zokaee H, Akbari Zahmati AH, Mojrian N, Boostani A, VaghariM. Eficacy of low-level laser therapy on orofacial pain:A literature review. Adv Hum Biol 2018;8:70-3
11. Gross AR, Dziengo S, Boers O, Goldsmith CH, Graham N, Lilge L, et al. Low level laser therapy

(LLLT) for neck pain: A systematic review and meta-regression. Open Orthop J 2013;7:396-419

12. Loh HS. A clinical investigation of management of oral lichen planus with CO2 laser surgery. J Clin Laser Med Surg. 1992;10:445–9
13. Convissar RA. Laser palliation of oral manifestations of Human immunodeficiency virus infection. J Am Dent Assoc. 2002;133:591–598.
14. Convissar RA. The biological rationale for the use of lasers in dentistry. Dent Clin North Am. 2004;48:771–94
15. Miserendino LJ, Levy G, Miserendino CA. Laser interaction with biologic tissues. In: Miserendino LJ, Pick RM, editors. Lasers in dentistry. Chicago: Quintessence; 1995. pp. 39–56
16. Jajarm HH, Falaki F, Mahdavi O. A comparative pilot study of low intensity laser versus topical corticosteroids in the treatment of erosive-atrophic oral lichen planus. Photomed Laser Surg. 2011;29(6):421–425.