

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service Available Online at: www.ijdsir.com

Volume - 5, Issue - 6, December - 2022, Page No. : 36 - 43

Comparative clinical study to assess the efficacy of 980 nm diode laser versus conventional topical corticosteroid

for management of oral lichen planus

¹Surg Cdr (Dr) Muneesh Joshi, INHS Dhanvantari, Port Blair, Andaman & Nicobar, Pin – 744102, India

²Col (Dr) T Prasanth, Division of Periodontology, Department of dental surgery and oral health sciences, Armed Force

Medical College, Pune, Maharashtra, Pin – 411048, India

³Col (Dr) Manab Kosala, 15 CDU, Srinagar, Jammu & Kashmir, India

Corresponding Author: Surg Cdr (Dr) Muneesh Joshi, INHS Dhanvantari, Port Blair, Andaman & Nicobar, Pin – 744102, India.

Citation of this Article: Surg Cdr (Dr) Muneesh Joshi, Col (Dr) T Prasanth, Col (Dr) Manab Kosala, "Comparative clinical study to assess the efficacy of 980 nm diode laser versus conventional topical corticosteroid for management of oral lichen planus", IJDSIR- December - 2022, Vol. – 5, Issue - 6, P. No. 36 – 43.

Copyright: © 2022, Surg Cdr (Dr) Muneesh Joshi, et al. This is an open access journal and article distributed under the terms of the creative commons' attribution non-commercial License. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Oral lichen planus (OLP), a chronic inflammatory disease with pathognomonic feature of bilateral white striations, plaques or papules on buccal mucosa, gingiva and tongue. Topical corticosteroids promote healing of erosive lichen planus but their role is limited in other types of lichen planus. Diode lasers offers great benefits over many other lasers because of their small size compared to other types of laser. With this background, a split mouth interventional study comparing the efficacy of Diode laser (980 nm) [Test Group] versus topical corticosteroids (Triamcinolone acetonide 0.01% with orabase) [Control group] for the management of OLP in 08 patients. Assessment was done using the RAE Index and VAS Scoring. 3 months (90 days) Postoperative follow up was done for all patients.

Result: Test group showed complete resolution of the cases using diode laser as management, whereas 50% resolution was seen in the control group using topical corticosteroids as line of treatment.

Conclusion: Use of Diode laser proved to be beneficial for the management of OLP which showed high degree of patient acceptance and complete resolution of symptoms. On the other hand.

Keywords: 980nm Diode Laser, Oral Lichen Planus, wickham's striae, Topical Corticosteroids, RAE scoring, VAS scoring.

1. Introduction

Oral lichen planus (OLP) is an auto-immune disease which is characterised by appearance of bilateral white striations called wickham's striae seen on buccal mucosa. Other features like papules, plaque, blisters,

erosion, erythematous lesions are seen on tongue, lips, gingiva and palate. Prevalence of extra oral lesions, 50% may present on skin, which resolve in 1-2 years whereas the oral lesions may persist for 20 years or more.[1]

Epidemiologically, 1-2 % of the general adult population is affected with OLP with increased predilection towards females with female to male ratio being 1.4:1. The most common complication of OLP is recurrence along with super-infection with Candida. Malignant transformation has been documented mostly seen in erosive and atrophic type of OLP.[2]

Etiology of OLP is still unknown but factors like diabetes mellitus [3], viral infections, collagen disease and emotional stress [4] are associated as causative or precipitating factors. OLP being an autoimmune disease shows the apoptosis of the basal cells of oral epithelium due to T - cell mediated auto-toxic CD8+ T cells. Histological picture shows predominance of T cell infiltration in the epithelium and surrounding connective tissue which are activated by CD8+ lymphocytes.[5] Pathogenesis of OLP is supported by various features of autoimminity like onset in adult, chronicity, predilection for females association with other autoimmune disease like myasthenia gravis, ulcerative colitis, alopecia areata, lichen sclerosus, primary biliary cirrhosis, dermatomyositis, morphea and vitiligo.

In OLP, there is an increase in immune suppressor activity along with excessive presence of autocytotoxic T-Lymphocyte clones in which the Lichen Planus antigen may be expressed due to contact allergens from tooth pastes and dental restorative materials (contact hypersensitivity reaction), mechanical trauma (Koebner phenomenon), drugs (lichenoid drug reactions) and viral infection [6]

There is no definitive protocol for the management of OLP, but various modalities have been

proposed and tried in the literature.[7] Gold standard for treating oral lichen Planus is topical corticosteroids. Various other modalities have been tried like use of systemic drugs, surgical removal of the lesion using scalpel, Cryotherapy and cauterization. [8]

Role of topical corticosteroids is to promote healing in the erosive areas of the lesion, with limited action on papular or plaque, reticular like changes of lichen planus [9]. Aim of using corticosteroids is to decrease the inflammation and submucosal lymphatic infiltrate [10] but candida overgrowth or even adrenocortical suppression are some of the side-effects which are documented and may limit its usage [11].

Recently, Lasers have been introduced for management of OLP. Diode lasers, CO₂ lasers, low level laser therapy have been the newer modalities with good results. Diode lasers have shown efficacious results over many other lasers because of its penetration and tissue interaction. Mode of delivery in diode laser is an added advantage over other lasers as it uses 'fibreoptic cable' which makes it flexible and increases its reach to different areas [12]. Specifically, while using the diode laser at the wavelength 980nm, the optical penetration depth seems to be smaller than the depth of penetration of 1064 nm of Nd:YAG laser and higher than that of CO₂. This physical benefit can be used effectively in the ablation and coagulation of superficial and interstitial lesions [13].

2. Materials and Methods

The study being a randomised split mouth design, allocation of the site to test and control was done using computerized random block allocation method where left and right side was assigned to the test group. Total number of subjects were eight with mean age of 43.2 years, which included 6 females and 2 males with oral lichen planus were enrolled in this study. Study

.....

period was of 3 months. Patients incorporated into the study had bilateral white non scrapable lesion (Fig. 1a & Fig. 1b). Pregnant women, smokers were excluded from the study.





Fig. 1a Fig. 1b

2.1 Histopathologic examination

Biopsy specimens were obtained for histopathologic confirmation of the lesion before including the subject into the study. Specimens were fixed in 10% buffered formalin and embedded in paraffin. These sections were stained with hematoxylin and eosin dye(Fig.1c & Fig. 1d). On histological examination, pathognomonic features of lichen planus were seen and reported.(Fig. 1e & Fig. 1f)





Fig. 1c



Fig. 1e

Fig. 1d



Fig. 1f

- RAE scoring for the size and dimension of the lesion preoperatively and postoperatively to assess the initial size of the lesion and resolution of the lesion, post management.
- 2. VAS scoring immediate post operatively and after 90 days (3 months) to assess the pain and discomfort following the different protocols.

2.3 Procedure of Diode laser application (Test group/ Group A)

In the test group, 980nm diode laser was used to treat the lesion. (Fig. 2a) The procedure was carried out under field block infiltration local anaesthesia. Safety precautions were taken while using laser. Standard safety precautions as advised by the manufacturer were strictly followed during the entire procedure.

The Diode laser was calibrated and measured to the desired power. Activation of the laser was done using a pigmented articulating paper. The diseased tissue was marked with 1-1.5 mm of healthy surrounding tissue to be ablated with diode laser at a setting of 2 watts. (Fig. 2b) The lesion was ablated until the site/lesion color changes to white i.e. photocoagulation was completed with bleeding spots. (Fig. 2c)





Fig. 2a

Fig. 2b



Fig. 2c

Post-surgical instructions included instruction of application of topical lignocaine for comfort of the patient and application of ice at the lesion prevents severe edema.

2.4 Procedure of Topical corticosteroid application (Control group / Group B)

In the control group, patients were advised to apply topical corticosteroid (triamcinolone acetonide 0.01% with orabase) on the lesion three times a day for 3 weeks. (Fig. 2d & Fig. 2e)



Fig. 2d



Fig. 2e

2.5 Follow up

Patients were subjected to follow up for 3 months and recalled for assessment of the lesion and recurrence if any. (Fig. 3a & Fig. 3b)





Fig. 3a

Fig. 3b

3. Results

Eight subjects who were enrolled on this split mouth study received both steroid as well as laser treatment. Total number of sites being 16. The demographic distribution showed 2 males and 6 females, average age being 43.2 years. (Table 1).

Characterstic	Control Group	Test Group	Total	
No. of subjects	8	8	8 (16 sites)	
Mean Age(yrs)	43.2	43.2	43.2	
Sex 2/6 (males/females)		2/6	2/6	

Table 1 – Demographic data of the patients

There was no postoperative bleeding or scar formation and the lased area was always soft on palpation.

During the three months follow up out of the 8 patients treated by Diode laser 980nm, none of the subjects complained from recurrence, whereas sites treated with topical steroid showed delayed healing.

REA index is used specifically for evaluating the OLP lesion on the bases of the type of lesion involved and its dimensions. In this study the REA index was used pre-operatively and post operatively to see the recurrence, if any in both the modalities. On evaluation, at baseline the REA scoring of 8 subjects with 16 site (8 test group and 8 control group) was 5, post operatively, RAE scoring in test group was 0 inferring complete resolution of the lesion whereas mean RAE scoring in

Page

control group was 3 showing reduction of the lesion but

not complete resolution. (Table 2)



Table 2 – RAE Scoring Index

Subjective evaluation of patients was done using VAS index. At baseline the VAS scoring was same for both the group as the study is split mouth but post operatively, after laser ablations the VAS scoring increased to mean VAS scoring of 4 but reduced after 3-4 days, due to the formation of pseudo membrane over the irradiated area in test group. In control group the post-operative VAS scoring also showed reduction from the baseline.

After 3 months of follow-up, the VAS scoring showed marked reduction in test group as compared to control group. In Control group, mean VAS scoring of 4 whereas the test group showed mean VAS scoring of 2 after 90 days. (Table 3)



Table 3 – VAS Score

Inter group comparison of VAS and RAE index were done using paired t-test using SPSS 20.0 Complete resolution of the cases in test group using diode laser as management, whereas 50% resolution was seen in the

© 2022 IJDSIR, All Rights Reserved

control group using topical corticosteroids as line of treatment. Statistical significance was seen in test group in both the indices where the p-value being < 0.05 (Table 4)

Group	No. of Patients (after 90 days)				P- value	P- value	
	Asymptomatic	Symptomatic	Mean VAS	Mean RAE	VAS	RAE	
Diode LASER	8	0	2	0	0.004*	0.003*	
Topical Steroids	4	4	4	4			
TOTAL	12	4			*Statistically significant		

Table 4 – Inter group comparison of VAS and RAE index

4. Discussion

Lichen planus is a relatively common dermatosis that occurs on skin and oral mucous membrane [16]. The etiology of the disease is unknown, some authors state that it is a psychosomatic disorder caused by anxiety or stress and modified by other factors [17].

Steroids have been the drugs of choice in the management of this disease whether topical or systemic [18]. Prolong use of steroids have their own side effects and hazards, which are well documented [8]. As an alternative to steroid therapy, Nonsteroidal anti-inflammatory drugs have been also used but results show less efficacy and benefits. As a mode of treatment, Surgical excision was also tried in cases with erosive lesions. [19]. In addition, the latest modality used for management of OLP is the laser. [8].

Present study tried to assess the results of new modality for management of OLP. Major role in the pathogenesis of OLP is of cell mediated immunity to secondary antigenic changes in oral mucous membrane. Modified keratinocyte surface antigens are the primary targets for cytotoxic cellular response, where most cells and antigen-presenting langerhans cells seem to be the by key cellular elements in lesion progress. The T cells kill target cells either by synthesis and extra cellular

Page4

release of cytotoxic proteins as perforin and granzymes, producing pores in the target cell membrane and killing the cell by osmotic lysis or by stimulating the target cell, through mechanisms that are not well understood to undergo apoptosis. After killing, the activated T cells uncouple from its target, but remain active and can kill again [20].

Although corticosteroids are known to reduce the submucosal lymphocytic infiltrate and reduce the inflammatory reaction [10], large number of cases with recurrence is recorded after cessation of the use of the topical steroid which is because the inability to remove the causative factor/antigen present in the epithelium. To overcome this shortcoming, modalities proving removal of epithelial cells that show signs of apoptosis and liquefactive necrosis from the site of the lesion, destroying keratinocyte surface antigens and autoantibodies as basal cell cytoplasmic autoantibodies and reduce the submucosal lymphocytic infiltrate should be considered as a formative line of management [21].

Topical Corticosteroids are considered the gold standard for the management of OLP which decrease the signs only by modifying of the humoral immunity without removal of the causative factors. Surgical ablation of affected areas may be effective where the lesion is small and localized but in case of extensive lesions, it is very difficult due to the high possibility of reoccurrence of the lesion.

Diode laser at 980nm possesses a power of penetration upto 1.5mm deep [22]. Rise temperature between 50 to 100 degree will cause protein denaturation [23]. The sign of protein denaturation is the blanching of the ablated mucosa.

The immune reaction components present in the range of the depth of penetration of the beam are denaturated due to the ablation of the epithelium and part

of connective tissue.[24] Ablated area act a biological barrier which provides comfort to the patient by isolating the lesion from any thermal or chemical insults, prevents any infection of the area due to the presence of pseudo membrane and prevents the risk of secondary infection. Ice packs were advised post operatively at the ablated area. Two subjects (8%) reported with edema due to non-compliance to the post-operative instruction in the first week which resolved later on. [25]

Use of 980nm Diode laser for management of OLP proves to be a safe and easy modality. Other advantages being its use in outpatient clinic under local anesthesia having high patient compliance. This suffered modality satisfied the patients who psychologically from the long treatment by corticosteroids and the fear and suffering from their side effects.

5. Conclusion

OLP being an autoimmune disease where complete cure of the disease is not possible but, complete resolution of the clinical signs and symptoms can be achieved. 980nm Diode laser has shown superior results with complete clinical resolution of the lesion along with better patient compliance. Thus, providing a good alternative in management of OLP. A marked clinical improvement along with high degree of patient acceptance was observed while using Laser which makes if a better choice over conventional topical corticosteroids.

6. References

1. Eisenberg E. Oral lichen planus: a benign lesion. J Oral Maxillofac Surg 2000; 1 : 58.

 Sugerman P. Oral lichen planus .E medicine 2002; 1: 1-20.

3. Scully C. El Korm M. Lichen planus - review- and update on pathogenesis. J. Oral Pathol 1985; 14: 431 - 458.

 Mc Cartan B.: Psychological factors associated with Oral Lichen planus. J. Oral Pathol. Med. 1995 ; 24: 273.
Porter SR. Kirby A. Olsen I. Barrett W. Immunologic aspects of dermal and oral lichen planus review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997; 83: 358-66.

6. Silverman, S. Gorsky, M.; and Giannotti, K.: A prospective study of findings and management in 214 patients with oral lichen planus. Oral Surge Oral Med Oral Path 1991; 72: 665.

7. Koch P. Bahmer FA. Oral lesions and symptoms related to metals used in dental restorations. Clinical, allergological and histological study. J.Am Dermatol 1999; 41: 4-9.

8. Salah El-Din M. Salah El-Din M. Ezz El-Arab A. Comparative study between CO2 laser and systemic steroid therapy in the management of oral Lichen Planus. A clinical and histopathological study. Egypt Dent J 1997 ; 43: 2427.

9. Lozada F. Silverman S. Topically applied fluocinonide in an adhesive base in the treatment of oral vesiculo erosive diseases. Arch Dermatol 1980; 116: 898.

10. Voute, A. Schulten E. Langendijk P. Kastense P. Nander WI. Fluocinonide in an adhesive base for treatment of Oral Lichen planus. Oral Surge Oral Med Oral Pathol. 1993; 75: 181.

11. Wray D. Mc Cord JF. Labial veneers in the management of desquamative gingivitis. Oral Surge Oral Med Oral Pathol 1987; 64: 141.

Moritz, A. Gutknecht N. Doertbudak O. Goharkhay
K. Schoop U. Schauer P. Sperr W. Bacterial reduction in

A pilot study. J. Clin. Laser Med. Surg. 1997; 15: 33-37. 13. Romanos G. Nentwig G. Diode laser (980 nm) in oral and maxillofacial surgical procedures: Clinical observations based on clinical applications. J. of clinical laser medicine and surgery 1999; 17: 5.

periodontal pockets through irradiation with diode laser-

14. Warwick-Bown NP. Marks NJ. Turbinate surgery: how effective is it? A long-term assessment. ORL J. Otorhinolaryngol. Relat. Spec. 1987; 49: 314-320,

15. Gorsky, M., Raviv, M.: Efficacy of entretinate (Tigasons) in symptomatic oral lichen planus. Oral Surg.Oral Med. Oral Path. 1992; 73: 52-55.

16. Black MM. Lichen planus and lichenoid eruptions.In: Rock A., Wilkinson DS, Ebling FTG, Champion RH,Burton JL, eds. Textbook Of Dermatology. Blackwell1986; pp 4- 42

17. Allen CM. Beck FM. Rossie KM. Kaul TJ. Relation of stress and anxiety to oral lichen planus. Oral Surg Oral Med Oral Pathol, 1986; 61: 44.

 Lozada F. Silverman S. Topically applied fluocinonide in an adhesive base in the treatment of oral vesiculoerosive diseases. Arch Dermatol, 1980; 116: 898.

19. Brightman VJ. Red and white lesions of the oral mucosa: in Burket's Oral Medicine .Ninth edition JB Lippincott company, Philadelphia 1994; 51-120.

20. Boisnic S. Frances C. Branchet M. Szpirglas H. Le Charpentiez Y. Immunohistochemical study of oral lesions of lichen planus diagnostic and pathophysiologic aspects. Oral Surg Oral Med Oral Patho, 1990; 70: 462-465.

 Lamey P. McCartan B. Mac Dollald D. Mackie R.
Basal cell cytoplasmic autoantibodies in oral lichenoid reactions. Oral Surg Oral Med Oral Radiol Endod, 1995; 79: 44-49.

22. Pick RM. Powel LG. Lasers in dentistry, soft - tissue procedures. Dental Clinics of North America. , 1993; 37: 281-297.

23. Anderson RR. Ross EV. Laser-tissue interactions .In cosmetic laser surgery. Fitzpatrick, RE and Goldman, MP. Mosby, Inc, 2000; pp. 1-15.

24. Catone GA. Halusic E. Photobiology of lasers in oral maxillofacial surgery .In Laser applications in oral and maxillofacial surgery. Catone GA and Alling, C. Saunders company 1997; 1: 29-38.

25. L' Esperance FA. Ophthalmic lasers. In Textbook of Opthalmic lasers 3rd ed, .Churchill Livingston, Edinburgh and London, 1989; pp 1-10.