



The Open Dentistry Journal

Content list available at: <https://opendentistryjournal.com>



CASE REPORT

Extended Erosive Oral Lichen Planus Treated with a very Low-Level Laser Therapy: A Case Report

Antonello Mamei¹, Martina Salvatorina Murgia¹, Germano Orrù² and Cinzia Casu^{1,3,*}

¹Oral Biotechnology Laboratory (OBL), Department of Surgical Science, University of Cagliari, 09124 Cagliari, Italy

²Oral Biotechnology Laboratory (OBL), Department of Molecular Biology, ISPA-CNR, University of Cagliari, 09124 Cagliari, Italy

³Private Dental Practice, 7, Via Firenze, 09126, Cagliari, Italy

Abstract:

Background:

Oral lichen planus is a chronic idiopathic inflammatory disease that affects the skin and mucous membrane and involves about 1-2% of the population. The management of this pathology aims to control symptoms. Clinically, it can appear as a plaque, in reticular form, or an erythematous/atrophic form. The treatment options include different classes of drugs and non-drug therapies such as a laser. In addition, most drug treatments include numerous side effects.

Objective:

The aim of this work is to evaluate the clinical effectiveness of a particular type of very Low-Level-Laser Therapy for the management of an erosive oral lichen planus case.

Methods:

An extensive form of erosive Oral Lichen Planus was treated using a Low-Level Laser Therapy with a 660 nm diode laser. The treatment was performed once per week for two sessions of five minutes each. Different outcome variables were examined: the size of lesions, evolution of pain symptoms, and presence of side effects and stability of the therapeutic results in the follow-up period.

Results:

After a week, the lesion appeared more homogenous, and the erythematous areas underwent a reduction with a simultaneous decrease in symptoms. After two weeks, the lesion seemed completely healed with the disappearance of pain. The follow-up continued for the other four months, and no relapse was reported. No adverse effects were observed during the study.

Conclusion:

This study suggests that Low-Level Laser Therapy with very low power parameters could be a safe and successful treatment for extended oral erosive lichen planus lesions.

Keywords: Alternative treatments, Case report, Diode laser, Low-Level Laser Therapy, Oral lichen planus, Non-pharmacological therapy.

Article History

Received: June 13, 2020

Revised: October 17, 2020

Accepted: November 12, 2020

1. INTRODUCTION

Oral Lichen Planus (OLP) is a chronic idiopathic inflammatory disease that affects the skin and mucous membrane, characterized by an autoimmune reaction versus keratinocytes mediated by T lymphocytes [1]. The pathology proved more than 1% of the population [2]. OLP affects middle

-aged adults of both sexes, with a slight predominance in women [3]. Etiology is still unknown, but some factors are associated with it as genetic factors having an association with some HLA [4, 5], HCV [6], dental material, drugs [7, 8] and infective agents [9, 10]. Clinically, OLP can appear as reticular (with *Wickham striae*), plaque, papule, atrophic, erosive and bullous [11]. OLP is associated with several systemic diseases [12]. This influences the treatment that aims to resolve the symptoms of the disease [13]. OLP can be treated with drugs

* Address correspondence to this author at Oral Biotechnology Laboratory (OBL), Department of Surgical Science, University of Cagliari, 09124 Cagliari, Italy; Tel: +39 340 8422435; E-mail: ginzia.85@hotmail.it

and surgical treatments. Pharmacological therapy consists of the use of corticosteroids and other immunosuppressant or immunomodulatory drugs [14]. Non-pharmacological therapy includes PUVA [15], photodynamic [16] and laser therapy [17]. Although corticosteroids represent the main treatment for OLP, they are responsible for side effects like candidiasis, adrenal insufficiency, and discomfort during the application, especially if administered systemically and for a long time [18]. Another treatment option is the Low-Level Laser Therapy (LLLT) used for the treatment of OLP [19]. The use of LLLT is a non-pharmacological and non-invasive clinical alternative modality for the treatment of OLP, which has potential analgesic, anti-inflammatory, immuno-modulatory, and biostimulating effects, with minimum adverse effect [20]. Different types of laser were tested as Helium-Neon [21], CO₂ [22] and diode laser [23]. Each type of laser has different parameters, such as wavelengths, intensities, powers, and different durations, number of sessions, and therapeutic approaches that have been documented for laser therapy. The aim of this article is to report a case of a heterogeneous form of OLP treated with a particular type of LLLT following the CARE Guidelines.

2. CASE REPORT

We observed a 42-years old male patient with a heterogeneous form of OLP, with 3 cm of diameter (Fig. 1), and already excised squamous papillomas in the left cheek presented five months ago (Fig. 2). He reported mild pain and a burning sensation in the area of the lesion. The patient generally had good health and reported a previous diagnosis of genital lichen planus. Despite the heterogeneous appearance, the histological examination excluded the presence of dysplasia. Considering the side effects of the conventional corticosteroid treatment and the dimension of the lesion, we have tried to treat it with LLLT (Fig. 3). Before starting the

treatment, signed informed consent was obtained. Two sessions (5 minutes each session) of LLLT using a diode laser (HELBO® TheraLite Laser, 660nm of wavelength, power 100 mW, power density 60mW/cm², continuous mode, fiber tip area 0,17cm²) were performed. After a week, the lesion appeared more homogenous, and the erythematous areas underwent a reduction with a simultaneous reduction of symptoms. After two weeks, the lesion appeared completely healed with the disappearance of pain (Fig. 4). The follow-up continued for the other four months, and no relapse was reported (Fig. 5). In addition, no adverse effects were observed during the study.

3. DISCUSSION

This study described the successful treatment of a big lesion of erosive Oral Lichen Planus. The gold standard for the treatment of OLP is corticosteroids drugs [14]. However, many side effects were described using these drugs as opportunistic infections, impairing the hypothalamic-pituitary-adrenal axis, mucous atrophy and increasing blood pressure [24]. Side effects are common in long-lasting treatments (*e.g.*, for extensive lesions) and when the drug is administered systemically. A more recent approach consists of the use of LLLT, to avoid systemic drug therapy collateral events. Different parameters were described for LLLT. As stated in a recent systematic review [20], lasers used for this oral pathology had very different parameters: wavelength 630 to 970 nm, power output from 10 mW to 3 W, laser energy from 0.3 up to 6 J/cm², power density between 10 and 1000 mW/cm. The most used type of laser was the diode laser. Reported exposure time was comprised between 5s and 8 min, and also the number of sessions varied a lot from 4 to 12 sessions. We, therefore, do not have a unique protocol for the treatment of oral lichen planus with LLLT.



Fig. (1). The lesion as appeared before the LLLT: it had a reddish aspect appearing more erythematous and giving a heterogeneous aspect.



Fig. (2). The lesion had a plaque-like appearance. Behind the last molar, there were the two papillomas.



Fig. (3). The lesion treated with HELBO® TheraLite Laser, 660nm of wavelength, power 100 mW, power density 60mW/cm², continuous mode, fiber tip area 0,17cm².



Fig. (4). The healing process after a week.



Fig. (5). The healing process after two weeks.

However, researchers had found that LLLT could replace corticosteroids therapy for OLP [25, 19], and there are studies that have shown that LLLT, especially with diode lasers, can be very useful in preventing the extension and malignant transformation of oral potentially malignant lesions (leukoplakia and Oral lichen planus) [26].

In our case, the treatment was performed with a diode laser (HELBO® Thera Lite Laser, 660 nm wavelength, 100 mW power, 60 mW / cm² power density, continuous mode, 0.17 cm² fiber tip area) at power 100 mW, applied for 300s (5 min) in continuous mode, power density 60mW/cm² in two sessions. This device has been created to perform photodynamic therapy in addition to phenothiazine chloride dye. This treatment improved the condition of the mucosa and symptoms of the patient and led to complete healing in two weeks. To our best knowledge, these parameters were not used yet for the treatment of OLP. Moreover, we needed only two sessions of LLLT to achieve complete healing of the lesion. Photodynamic therapy is a treatment in which, in addition to laser or LED light, there is the application of a photosensitizer, activated by the laser itself in the presence of oxygen, producing reactive oxygen species (ROS) and other substances that selectively affect altered cells or microorganisms. This therapy has been successfully proposed for the treatment of oral lichen planus in the literature, to even replace topical drug therapy [27, 28].

The use of the device described in this case was documented in the literature in periodontal [29], endodontic [30], orthodontic [31] field, and was also successfully used for the treatment of severe MRONJ [32], not only to perform photodynamic therapy but also for LLLT.

CONCLUSION

From the results obtained, it can also be concluded that the above method could be interesting also for OLP treatment. Using low powers, it is a safe and easy to use laser even for non-laser experts.

Currently, the main limit for the LLLT is the absence of standardization of both care and research protocols: the heterogeneity of the parameters used and the selected wavelengths, albeit in a well-defined range, in fact, prevents us from delineating the gold standard for the different LLLT applications. About clinical studies, it is important to increase the realization of long-term randomized controlled trials to improve the evidence-based approach.

LIST OF ABBREVIATIONS

OLP	=	Oral Lichen Planus
LLL	=	Low-Level Laser Therapy
ROS	=	Reactive Oxygen Species

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The authors confirm that ethics approval is not required in this case report.

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

The participants provided written informed involved in this study.

STANDARD FOR REPORTING

CARE guidelines and methodology were followed to conduct the study.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

- [1] Shavit E, Hagen K, Shear N. Oral lichen planus: A novel staging and algorithmic approach and all that is essential to know. *F1000Res* 2020; 9 F1000 Faculty Rev-206.
- [2] González-Moles MÁ, Warnakulasuriya S, González-Ruiz I, *et al.* Worldwide prevalence of oral lichen planus: A systematic review and meta-analysis. *Oral Dis* 2020. [<http://dx.doi.org/10.1111/odi.13323>] [PMID: 32144836]
- [3] Carbone M, Arduino PG, Carrozzo M, *et al.* Course of oral lichen planus: A retrospective study of 808 northern Italian patients. *Oral Dis* 2009; 15(3): 235-43. [<http://dx.doi.org/10.1111/j.1601-0825.2009.01516.x>] [PMID: 19222766]
- [4] Giannetti L, Dello Diago AM, Spinass E. Oral Lichen planus. *J Biol Regul Homeost Agents* 2018; 32(2): 391-5. [PMID: 29685024]

- [5] Cigic L, Gavic L, Simunic M, Ardalic Z, Biocina-Lukenda D. Increased prevalence of celiac disease in patients with oral lichen planus. *Clin Oral Invest* 2015; 19(3): 627-35. [http://dx.doi.org/10.1007/s00784-014-1288-0] [PMID: 25088620]
- [6] Gerayli S, Meshkat Z, Pasdar A, *et al.* The association between oral lichen planus and hepatitis C virus infection: A report from northeast of iran. *Jundishapur J Microbiol* 2015; 8(4)e16741 [http://dx.doi.org/10.5812/jjm.8(4)2015.16741] [PMID: 26034540]
- [7] Fortuna G, Aria M, Schiavo JH. Drug-induced oral lichenoid reactions: A real clinical entity? A systematic review. *Eur J Clin Pharmacol* 2017; 73(12): 1523-37. [http://dx.doi.org/10.1007/s00228-017-2325-0] [PMID: 28905092]
- [8] Issa Y, Brunton PA, Glennly AM, Duxbury AJ. Healing of oral lichenoid lesions after replacing amalgam restorations: A systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004; 98(5): 553-65. [http://dx.doi.org/10.1016/j.tripleo.2003.12.027] [PMID: 15529127]
- [9] Al Robaee AA, Al Zolibani AA. Oral lichen planus and hepatitis C virus: Is there real association? *Acta Dermatovenerol Alp Panonica Adriat* 2006; 15(1): 14-9. [PMID: 16850094]
- [10] Sand LP, Jalouli J, Larsson PA, Hirsch JM. Prevalence of Epstein-Barr virus in oral squamous cell carcinoma, oral lichen planus, and normal oral mucosa. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002; 93(5): 586-92. [http://dx.doi.org/10.1067/moe.2002.124462] [PMID: 12075209]
- [11] Ma J, Zhang J, Zhang Y, Lv T, Liu J. The magnitude of the association between human papillomavirus and oral lichen planus: A meta-analysis. *PLoS One* 2016; 11(8)e0161339 [http://dx.doi.org/10.1371/journal.pone.0161339] [PMID: 27571417]
- [12] Cassol-Spanemberg J, Rodriguez-de Rivera-Campillo ME, Otero-Rey EM, Estrugo-Devesa A, Jané-Salas E, López-López J. Oral lichen planus and its relationship with systemic diseases. A review of evidence. *J Clin Exp Dent* 2018; 10(9): e938-44. [http://dx.doi.org/10.4317/jced.55145] [PMID: 30386529]
- [13] Gupta S, Jawanda MK. Oral lichen planus: An update on etiology, pathogenesis, clinical presentation, diagnosis and management. *Indian J Dermatol* 2015; 60(3): 222-9. [http://dx.doi.org/10.4103/0019-5154.156315] [PMID: 26120146]
- [14] Lavanya N, Jayanthi P, Rao UK, Ranganathan K. Oral lichen planus: An update on pathogenesis and treatment. *J Oral Maxillofac Pathol* 2011; 15(2): 127-32. [http://dx.doi.org/10.4103/0973-029X.84474] [PMID: 22529568]
- [15] Atzmony L, Reiter O, Hodak E, Gdalevich M, Mimouni D. Treatments for cutaneous lichen planus: A systematic review and meta-analysis. *Am J Clin Dermatol* 2016; 17(1): 11-22. [http://dx.doi.org/10.1007/s40257-015-0160-6] [PMID: 26507510]
- [16] Aghahosseini F, Arbabi-Kalati F, Fashtami LA, Fateh M, Djavid GE. Treatment of oral lichen planus with photodynamic therapy mediated methylene blue: A case report. *Med Oral Patol Oral Cir Bucal* 2006; 11(2): E126-9. [PMID: 16505788]
- [17] Derikvand N, Ghasemi SS, Moharami M, Shafiei E, Chiniforush N. Management of oral lichen planus by 980 nm diode laser. *J Lasers Med Sci* 2017; 8(3): 150-4. [http://dx.doi.org/10.15171/jlms.2017.27] [PMID: 29123636]
- [18] Chamani G, Rad M, Zarei MR, Lotfi S, Sadeghi M, Ahmadi Z. Efficacy of tacrolimus and clobetasol in the treatment of oral lichen planus: A systematic review and meta-analysis. *Int J Dermatol* 2015; 54(9): 996-1004. [http://dx.doi.org/10.1111/ijd.12925] [PMID: 26204904]
- [19] Mutafchieva MZ, Draganova-Filipova MN, Zagorchev PI, Tomov GT. Effects of low level laser therapy on erosive-atrophic oral lichen planus. *Folia Med (Plovdiv)* 2018; 60(3): 417-24. [http://dx.doi.org/10.2478/folmed-2018-0008] [PMID: 30355837]
- [20] Al-Maweri SA, Kalakonda B, Al-Soneidar WA, Al-Shamiri HM, Alakhali MS, Alaizari N. Efficacy of low-level laser therapy in management of symptomatic oral lichen planus: A systematic review. *Lasers Med Sci* 2017; 32(6): 1429-37. [http://dx.doi.org/10.1007/s10103-017-2233-7] [PMID: 28536905]
- [21] Jin JY, Lee SH, Yoon HJ. A comparative study of wound healing following incision with a scalpel, diode laser or Er,Cr:YSGG laser in guinea pig oral mucosa: A histological and immunohistochemical analysis. *Acta Odontol Scand* 2010; 68(4): 232-8. [http://dx.doi.org/10.3109/00016357.2010.492356] [PMID: 20513169]
- [22] Agha-Hosseini F, Moslemi E, Mirzaei-Dizgah I. Comparative evaluation of low-level laser and CO₂ laser in treatment of patients with oral lichen planus. *Int J Oral Maxillofac Surg* 2012; 41(10): 1265-9. [http://dx.doi.org/10.1016/j.ijom.2012.06.001] [PMID: 22784653]
- [23] Mahdavi O, Boostani N, Jajarm H, Falaki F, Tabesh A. Use of low level laser therapy for oral lichen planus: Report of two cases. *J Dent (Shiraz)* 2013; 14(4): 201-4. [PMID: 24724146]
- [24] Thongprasom K, Dhanuthai K. Steroids in the treatment of lichen planus: A review. *J Oral Sci* 2008; 50(4): 377-85. [http://dx.doi.org/10.2334/josnud.50.377] [PMID: 19106464]
- [25] Asadi R, Bardideh E, Shafaei H, Khazaei Y, Emadzadeh M. The effects of photodynamic and low-level laser therapy for treatment of oral lichen planus-A systematic review and meta-analysis. *Photodiagnosis Photodyn Ther* 2018; 23: 254-60.
- [26] Reddy Kundoor VK, Patimeedi A, Roohi S, Maloth KN, Kesidi S, Masabattula GK. Efficacy of Diode Laser for the Management of Potentially Malignant Disorders. *J Lasers Med Sci* 2015; 6(3): 120-3. [http://dx.doi.org/10.15171/jlms.2015.05] [PMID: 26464779]
- [27] Lavae F, Shadmanpour M. Comparison of the effect of photodynamic therapy and topical corticosteroid on oral lichen planus lesions. *Oral Dis* 2019; 25(8): 1954-63. [http://dx.doi.org/10.1111/odi.13188] [PMID: 31478283]
- [28] Mirza S, Rehman N, Alrahlah A, Alamri WR, Vohra F. Efficacy of photodynamic therapy or low level laser therapy against steroid therapy in the treatment of erosive-atrophic oral lichen planus. *Photodiagn Photodyn Ther* 2018; 21: 404-8. [http://dx.doi.org/10.1016/j.pdpdt.2018.02.001] [PMID: 29414735]
- [29] Neugebauer J, Jozsa M, Kübler A. [Antimicrobial photodynamic therapy for prevention of alveolar osteitis and post-extraction pain]. *Mund Kiefer Gesichtschir* 2004; 8(6): 350-5. [http://dx.doi.org/10.1007/s10006-004-0572-6] [PMID: 15583924]
- [30] Xhevdet A, Stubljari D, Kriznar I, *et al.* The disinfecting efficacy of root canals with laser photodynamic therapy. *J Lasers Med Sci* 2014; 5(1): 19-26. [PMID: 25606335]
- [31] Turhani D, Scheriau M, Kapral D, Benesch T, Jonke E, Bantleon HP. Pain relief by single low-level laser irradiation in orthodontic patients undergoing fixed appliance therapy. *Am J Orthod Dentofacial Orthop* 2006; 130(3): 371-7. [http://dx.doi.org/10.1016/j.ajodo.2005.04.036] [PMID: 16979496]
- [32] Tandon S, Lamba AK, Faraz F, Aggarwal K, Chowdhri K. A case report of bisphosphonate related osteonecrosis of the jaw treated by photodynamic therapy. *Photodiagn Photodyn Ther* 2019; 26: 313-5. [http://dx.doi.org/10.1016/j.pdpdt.2019.04.017] [PMID: 31022581]