

## Diode laser – A cure for obstinate oral lichen planus: A case series and review of the literature

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### ABSTRACT

Oral lichen planus (OLP) is a chronic T-cell mediated inflammatory disease of unknown etiology. Hence, no gold standard treatment modalities are available. Due to therapeutic challenges offered by conventional therapy, there is a need for effective alternate treatment with minimal side effects. The development of lasers has brought light to the treatment of obstinate OLP. Three cases of male patients in the age group 30–40 years complaining of a burning sensation in the mouth have been mentioned. Clinical and histopathological investigations showed typical findings of OLP. The treatment was started with conventional therapy of corticosteroids. The symptoms were assessed on the visual analog scale (VAS) and showed marked reduction but without complete alleviation. Hence, ablation of the lesion using a 980 nm soft-tissue diode laser was planned. The outcome of the treatment was successful, VAS 0 and no recurrence occurred in 11 months follow-up. The results of a 980 nm diode laser for the treatment of OLP are satisfactory and should be considered as a treatment alternative to conventional remedies.

**Key words:** 980 nm diode laser, Conventional treatment, Laser therapy, Oral lichen planus

Oral lichen planus (OLP) is a common disease that affects 1–2% of the population and more commonly, middle-aged females [1]. The lesions appear bilaterally and are common on the buccal mucosa, tongue, lips, gingiva, floor of the mouth, and palate. Six clinical appearances of OLP are – Reticular, Erosive, Atrophic, Plaque-like, Papular, and Bullous [2]. At the junction of intersecting striae is a small raised dot called as striae of Wickham. It is mostly associated with pain or discomfort and interferes with function and quality of life. The probability of conversion of OLP into oral squamous cell carcinoma is 1–2% [3]. Lichen planus results from an abnormal T-cell-mediated immune response, in which basal epithelial cells are recognized as foreign due to changes in the antigenicity of their cell surface [4]. The conventional therapy includes topical application of corticosteroids along with immunosuppressives, retinoids, and immunomodulators. The major disadvantage of topical corticosteroids is the lack of mucosal adherence. In approximately one-third of patients who are treated with topical steroids, secondary candidiasis tends to develop [5]. With that knowledge in mind, the search for effective alternate treatment with minimal side effects is of utmost importance.

### CASE SERIES


#### Case 1

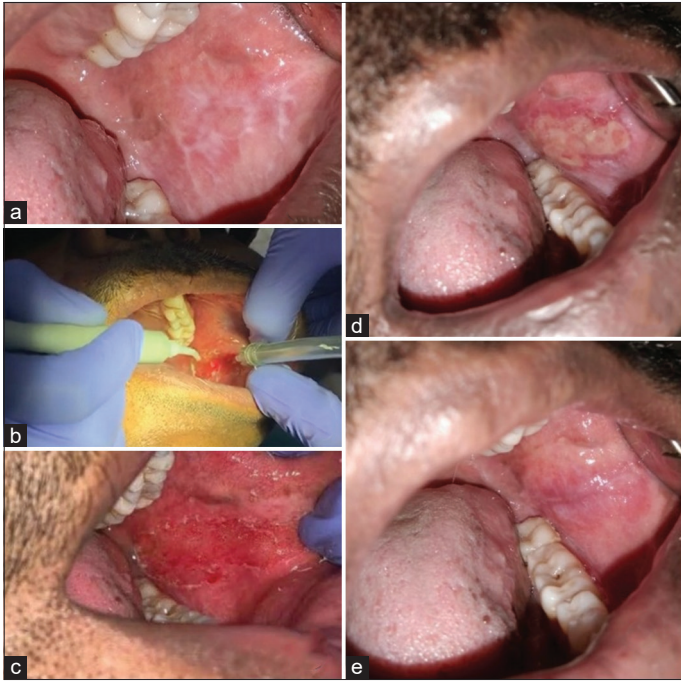
A 35-year-old male patient reported a chief complaint of a burning sensation in the left buccal mucosa for the past year. The patient had constant discomfort in the same region and the burning sensation aggravated on having spicy food. Medical history was irrelevant. On clinical examination, a white non-scrapable patch of 2 × 3 cm with was observed on the left buccal mucosa corresponding to 35, 36, and 37 (Fig. 1a). It showed slightly elevated radiating Wickham's striae. The vitals of the patient were normal and a general examination did not reveal any lesions. Based on clinical signs and symptoms, OLP was diagnosed.

Hematological and biochemistry investigations were insignificant. The histopathological picture showed parakeratinized stratified squamous epithelium with dense band-like subepithelial chronic lymphocytic inflammatory infiltrate which confirmed OLP. The patient was started topical Triamcinolone 0.1%w/w and Tab. Prednisolone 30 mg/day for 7 days along with antioxidants and vitamin A 50,000 IU. Since the patient was cancerophobic, and due to persistent, symptoms, the patient started experiencing psychological stress. Hence, with the patient's consent, ablation of the lesion using a soft-tissue diode laser was planned. The

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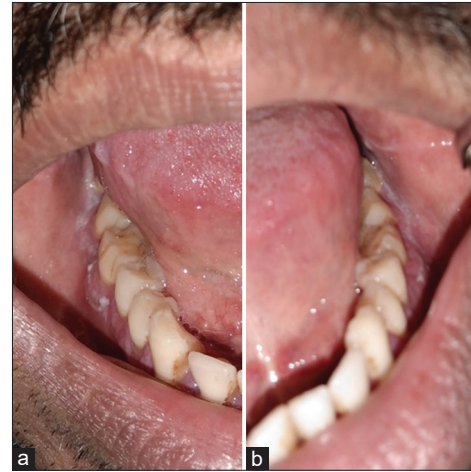
**Figure 1:** (a) Oral lichen planus with characteristic Wickham's Striae; (b) Ablation of the lesion with 980 nm diode laser; (c) immediate post-operative view; (d) 3 days post-operative; and (e) 30 days post-operative view

procedure was done with a 980nm soft-tissue diode laser under local anesthesia (LA) with power output set to 2W in continuous mode (Fig. 1b). The patient was advised 2% Chlorhexidine mouthwash and anti-inflammatory medication. The treatment was well-tolerated by the patient without any immediate adverse reaction (Fig. 1c). The prognosis was good. A follow-up of 3 days (Fig. 1d) and 30 days showed no complications (Fig. 1e). The outcome of treatment was successful without remissions of the lesion in the follow-up period of 3, 6, 9, and 10 months.

### Case 2

A 41-year-old male patient presented with the chief complaint of whitish discoloration and burning in the right and left lower gingiva for 6 months. On clinical examination, a whitish plaque-like, crescent-shaped, and non-scrapable patch following the contour of the gingiva were seen on the attached gingiva of 36, 37, and 38 measuring  $1 \times 3$  cm (Fig. 2a) and 46, 47, and 48 measuring  $1 \times 3$  cm (Fig. 2b). Vitals were normal and other findings were insignificant. A provisional diagnosis of a plaque-like variety of OLP was given.

Hematological and biochemistry investigations were insignificant. The histopathological report showed subepithelial chronic lymphocytic inflammatory infiltrate in the parakeratinized squamous epithelium which confirmed the diagnosis of OLP. Topical Triamcinolone 0.1%w/w, Tab. Prednisolone 30mg/day for 7 days along with antioxidants and vitamin A 50,000 IU. A reduction in symptoms (visual analog scale [VAS] 5) was noted, but still patient insisted on the complete removal of the lesion. Hence, with the patient's consent, ablation of the lesion with a soft-tissue diode laser was planned. The procedure was



**Figure 2:** (a) Oral lichen planus following the (a) right and the (b) left posterior gingival contour

done with a 980 nm soft-tissue diode laser under LA with power output set to 2W in continuous mode. The patient was advised 2% Chlorhexidine mouthwash and anti-inflammatory medication. The treatment was well-tolerated by the patient without any immediate adverse reaction. A follow-up of 30 days showed no complications. The outcome of treatment was successful without remissions of the lesion follow-up period of 3, 6, 9, and 10 months.

### Case 3

A 32-year-old male patient was referred for the chief complaint of a burning sensation on the right side of the cheek for the past year. Medical history was irrelevant. On clinical examination, a whitish reticular non-scrapable patch with brownish pigmentation in the center measuring  $2 \times 4$  cm with radiating Wickham's striae was noticed on the right buccal mucosa (Fig. 3a). Clinical findings led to the diagnosis of OLP.

Hematological and biochemistry investigations were insignificant. The histopathological report confirmed OLP. The lesion had a good prognosis. Topical Triamcinolone 0.1%w/w, Tab. Prednisolone 30 mg/day for 7 days along with antioxidants and vitamin A 50,000 IU. 7 days follow-up showed a decrease in VAS to 4. At the patient's insistence and consent, complete removal of the lesion by ablation was planned. The procedure was done with a 980 nm soft-tissue diode laser under LA with power output set to 2W in continuous mode. The patient was advised with 2% Chlorhexidine mouthwash and anti-inflammatory medication. The treatment was well-tolerated by the patient without any immediate adverse reaction. Telephonic follow-up was taken after 20 days and the patient did not complain of any adverse reaction. A follow-up of 3 months (Fig. 3b), 6, and 9 months showed no recurrence.

### DISCUSSION

OLP is a chronic T-cell-mediated inflammatory disease of unknown etiology. It is characterized by relapses and remissions. Approximately 1% of the patients develop erythroplastic



**Figure 3:** (a) Oral lichen planus in the right buccal mucosa; (b) 3 months post-operative view

lesions [4]. Cases have shown, malignant alteration to carcinoma *in situ* (28.5%) and in microinvasive carcinoma (30–38%) [5,6].

The psychosomatic component is considered one of the etiological factors for the development and progression of OLP. As the lesion has a tendency to relapse, it increases the patient's stress about cancerophobia. The above-mentioned cases had a tendency of cancerophobia and were continuously under psychological stress. The patients were started with conventional therapy with steroids which showed incomplete resolution of the lesions. Due to this, anxiety among the patients increased. Hence, our treatment aimed to completely remove the lesion physically so that the absence of the lesion in the oral cavity decreased the stress on the patient.

The use of soft-tissue diode laser for clinical applications started in the 1980s [7]. A diode is a solid active medium laser, developed from semiconductor crystals by combining aluminium or indium, gallium, and arsenic. For dental use, 800 nm wavelength is available for aluminium medium to 980 nm for the indium [8]. Pigmented tissues highly absorb the diode wavelengths and penetrate deep within the tissue. The use of the diode is to supply direct biostimulative light energy to the cellular photoreceptors that can absorb diode light and encourage mitochondria to produce ATP. Diode laser is a non-invasive and non-pharmaceutical modality with a wide array of clinical uses in various surgical and non-surgical dental procedures and conditions. Studies conducted by Soliman *et al.* [9] on 25 patients of OLP using 980 nm diode laser showed marked clinical recovery in 64% of patients with complete alleviation of symptoms, with recurrence noted in 12% of patients after 3 months. In 2010, Cafaro *et al.* [10] treated 13 patients of OLP using a 904 nm pulsed infrared laser and observed that all patients reported a complete remission of symptoms at the treatment. A study of excimer lasers on eight patients with OLP by Kollner *et al.* [11] showed that only one patient responded completely after 12 sessions. In a study, Trehan *et al.* [12] used excimer laser on eight patients with OLP who had an unsuccessful history of conventional treatment and showed improvement of more than 75% in five patients.

The advantages such as decreased tissue damage, immediate hemostasis, minimally invasive, and precision helped us choose diode laser as the treatment modality and no recurrence was noted in 11 months of follow-up.

## CONCLUSION

As one of the etiological factors for OLP is stress, it was observed in the above-mentioned cases that the patients had a tendency of cancerophobia and constantly checked the lesion in the oral cavity. Since conventional therapy did not completely remove the physical appearance of the lesion, ablation with laser gave a satisfactory result which resulted in decreased psychological stress for the patients since there was no clinical evidence of lesion in the oral cavity, also no remissions of the lesion were noted in long follow-up time. In our conclusion, we would like to mention that, relieving the patient from psychological stress by physical removal of the lesion can also be an asset in the treatment of OLP.

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