

# Novel technique for using the diode laser to treat refractory erosive oral lichen planus

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**Refractory erosive oral lichen planus (OLP)** is a common oral disease and treatment thereof poses a considerable problem in oral medicine. Conventional surgery, cryosurgery and CO<sub>2</sub> evaporation can offer temporary pain relief without promising healing of the ulcer. This article presents a case report of erosive OLP that did not respond to a topical steroid and only partial symptomatic pain relief by low intensity laser and CO<sub>2</sub> laser irradiation was obtained. Complete healing of the ulcer was achieved two weeks after treatment according to the laser welding technique using an 830 nm diode laser (continuous wave) for two treatment episodes. The three-month follow-up showed no ulceration or symptoms.

## Introduction

Oral lichen planus (OLP) is a common autoimmune disease resulting from auto-cytotoxic T lymphocytes triggering apoptosis of epithelial cells, leading to chronic inflammation of oral mucosa. Regarding the symptoms, atrophic and erosive OLP are generally painful for sufferers.<sup>1</sup> The management of OLP is still symptomatic relief by reduction of inflammation, aiming for pain control. There is a range of treatment options, such as avoiding initiating factors, applying a topical steroid, or taking an immune-suppressive drug or systemic steroid.<sup>1</sup> Low intensity laser therapy is an additional therapy for conservative treatment of OLP.<sup>2</sup> For refractory OLP, particularly erosive OLP, treatment

choices are surgical methods such as surgical removal with a free soft tissue graft, cryosurgery and CO<sub>2</sub> laser evaporation.<sup>1,3</sup> The results of these surgical methods appear to be satisfactory in terms of pain relief, but not promising in terms of healing of the lesion, particularly in the case of erosive OLP and recurrence overall. Concerning the risk of malignant transformation of long-term OLP, especially the erosive type,<sup>1,4</sup> an innovative therapy for recovery from OLP ulceration is still under consideration. Regarding the laser technique for treating OLP, the welding technique with the benefit of promoting closure of the surgical wound margins in large vessels and skin<sup>5</sup> has not been applied to treatment of this oral lesion. This report introduces the novel technique of using the diode laser to treat an erosive OLP case with no response to a topical steroid and only partial pain relief from refractory to low intensity laser therapy and CO<sub>2</sub> laser irradiation.

## Case report

A 55-year-old male patient was referred by his general dentist for treatment of refractory erosive OLP with spontaneous moderate pain and severe pain when drinking and eating.

## Past history of treatment

The diagnosis was confirmed by histopathological investigation. The patient had no response to treatment

Fig. 1\_The erosive OLP lesion before laser welding.

Fig. 2\_The laser welding procedure for treating OLP using an 830 nm diode laser.

Fig. 3\_Immediate post-laser welding of the OLP lesion.



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**Fig. 4**\_Recovery of the buccal mucosa from OLP one week after the first laser welding.



**Fig. 4**

**Fig. 5**\_Recovery of the buccal mucosa from OLP one week after the second laser welding.



**Fig. 5**

with a topical steroid for three months and could not tolerate the side-effects of severely oily skin and generalised acne from the systemic steroid. He had no known allergies or systemic disease.

The patient had then been treated with low intensity laser therapy (830 nm, continuous wave, 100 mW, 4 J) once a week for four treatment episodes and defocused CO<sub>2</sub> laser (continuous wave, 1 W) irradiation with a high water content absorbing gel once a week for two treatment episodes. These laser treatments partially relieved pain and offered some temporary reduction in the size of the ulcer but did not bring complete recovery. The patient continued to complain of pain in the region of the ulcer, stimulated by drinking and consuming spicy foods.

### Oral examination

The extra-oral examination showed no palpable superficial cervical lymph nodes or other significant abnormality. From the intra-oral examination, there was a 2 x 4 mm ulcer covered with a yellowish slough and surrounded by a 1 to 2 mm band of erythematous mucosa (Fig. 1).

### Laser welding technique and result

A novel laser technique, laser welding, was undertaken using an 830 nm diode laser (continuous wave, 2 W) under topical anaesthesia. The laser was applied with light touch contact at the ulcerated area and with near contact at the peripheral reddened area (Fig. 2). Post-operatively, the surface of the area treated appeared dry and brownish without any carbonisation and with a reduction in the reddened mucosa of the peripheral area (Fig. 3).

The results at the one-week follow-up showed remarkable pain relief and a decrease in the size of the ulcer to 1 x 4 mm (Fig. 4). Laser welding was then repeated using the same technique mentioned above. One week after the second treatment, there was no ulceration only a few white striae on the buccal mucosa (Fig. 5). The patient occasionally felt a mild burning sensation in this area when eating spicy food. He was advised to avoid

hot and spicy foods. At the three-month follow-up after the second laser welding treatment, there was no evidence of ulceration or the previously inflamed buccal mucosa.

### Discussion

The results of this novel technique suggest that it has the ability to achieve complete recovery of erosive OLP, in terms of both symptoms and mucosal healing, while the low intensity laser and CO<sub>2</sub> laser irradiation, at least the methods used in this case, were able to relieve the spontaneous pain only partially. The reason for this is that this technique has a bio-modulation effect as always observed when using 830 nm low intensity therapy,<sup>2</sup> together with minor changes in tissue structure in the welding mode, 70 to 80 °C, producing helical unfolding collagen in a favour of healing<sup>6</sup> and wound closure.<sup>5</sup>

### Conclusion

The novel technique used here (we have called it the "laser welding technique for oral mucosa"), using an 830 nm diode laser (continuous wave, 2 W), was able to gain complete recovery from ulceration clinically in a case of refractory erosive OLP. Therefore, the laser welding technique is worth further study with regard to exploring basic tissue reaction and clinical efficacy.

*Editorial note: A list of references is available from the publisher.*

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