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CO_2 laser evaporation of oral lichen planus

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Abstract. Oral lichen planus is a relatively common disease of the oral mucosa. The buccal mucosa and lateral border of the tongue are mostly involved, although the condition can occur anywhere in the oral cavity. The erosive type in particular can cause spontaneous pain during eating. In the period from 1975 to 2003, a group of 21 patients with 39 lesions of oral lichen planus which caused pain, even after conservative therapy, were treated with CO_2 laser evaporation. During a follow-up period of 1–18 years (mean 8 years) 21 patients were pain free (85%) and 6 patients (15%) experienced painful recurrence after treatment. After retreatment with CO_2 laser evaporation there were no complaints of pain. Among the many treatments available, high-potency topical corticosteroids remain the most consistent and effective. In patients whose condition is unresponsive to topical corticosteroids, CO_2 laser evaporation can cause long-term remission of symptoms, and may even be the treatment of first choice in patients suffering from painful oral lichen planus.

Keywords: oral lichen planus; carbon dioxide laser evaporation.

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Lichen planus is a common, chronic, mucocutaneous disease. It is thought to affect 1–2% of the general population. Oral lichen planus is a cell-mediated immune condition of unknown aetiology, in which T lymphocytes accumulate beneath the epithelium of the oral mucosa and increase the rate of differentiation of the stratified squamous epithelium, resulting in hyperkeratosis and erythema with or without ulceration[9].

Oral lichen planus affects women more than men in a ratio of 3:2. The disease may present anywhere in the oral cavity. The buccal mucosa, the border of the tongue and the gingiva are the most common sites, whereas palatal lesions are uncommon. Oral lichen planus usually presents as symmetrical, bilateral lesions or multiple lesions. Oral lesions may coexist with cutaneous lichen planus.

Oral lichen planus can be divided into six types: reticular, papular, plaque-like, erosive, atrophic and bullous. The reticular, papular and plaque-like forms are usually painless and appear clinically as white keratotic lesions. The erosive, atrophic and bullous forms are often associated with a burning sensation and in many cases cause severe pain[19]. The risk of malignant transformation of oral lichen planus remains controversial[9,19,25].

Traditional treatment consists of various drugs, including antifungal ointments, retinoids[22,2], and local and systemic corticosteroids; for example, fluocinonide[18,6,20,3,30,27,1,5], cyclosporine[13,31,10,26], mouth psoralen + UVA radiation treatment[16], tacrolimus[14,21,24], pimecrolimus[7], oral metronidazole[4], interferon-α cream[23], hydroxychloroquine[8], heparin[12] and fenretinide[28]. Surgery and cryosurgery are seldom performed.The use of laser treatment in the oral cavity has gained acceptance, including treatment of oral premalignant lesions, for example leukoplakia[11]. Of the many types of laser available, the CO_2 laser has become established to treat the evaporation of superficial mucosal lesions. This laser allows superficial removal of just epithelium by evaporation[17,15,29,11]. The aim of this study was to retrospectively evaluate the effectiveness of the CO_2 laser

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in the management of oral lichen planus in patients with complaints of pain, and to look at the recurrence rate compared with other treatment modalities according to the literature.

Materials and methods

In the period 1975–2003, 21 patients with 39 oral lichen planus lesions were selected for CO_2 laser evaporation. These cases have been studied retrospectively. Before CO_2 laser evaporation the patients had been treated with different drugs (fluocinonide, triamcinolone), or by a wait-and-see policy. The drugs were used as a topical application four times a day and for at least 14 days. This treatment gave no or just a temporary effect. Diagnosis of all the lesions was confirmed by histopathologic examination including immunofluorescence. Incisional biopsies were taken under local anaesthesia (see Fig. 1).

Several CO_2 laser systems were used with the same physical characteristics: Sharplan 791, Cavitron and Sharplan 40 C. The laser was equipped with a micromanipulator, an operation microscope (Zeiss Opmi 1) and an endoscope with a 45-degree stainless steel mirror coupled to the micromanipulator. This gives the advantage of optical magnification and a stable system to aim the laser beam at the area to treat, resulting in excellent control over the procedure. With this equipment all sides of the oral cavity could be treated. The treatment was carried out by moving a slightly defocused CO_2 laser spot of about 1 mm over the lesion and evaporation was continued until the submucosal connective tissue was reached. Use of the operation microscope makes it clearly visible when enough epithelium has been evaporated. The ulcerated areas are slightly evaporated. A margin of about 3 mm around the visible lesion was taken. An output power of 15–20 W was used, and defocusing of the beam was achieved by an adjustable lens in the micromanipulator. The energy supplied to the lesion is 1.5–2.0 Joule/mm^2. The Sharplan 40 C was used with a scanning device (Surgitouch) connected to the operation microscope. This made it possible to use the laser beam in focus with a very short exposure time to reduce carbonization. Normal protective measures were taken. All personnel and patients wore laser-protective glasses. All treatments were carried out with the patient under local anaesthesia on an outpatient basis. For postoperative care a 0.1% chlorhexidine mouthwash and paracetamol analgesic were prescribed. See Fig. 2 for postoperative view.

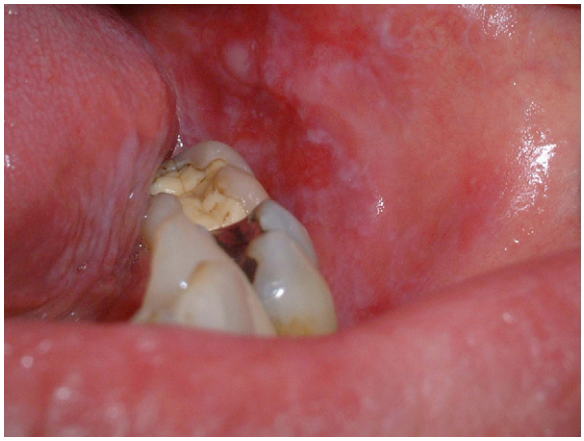

Fig. 1. Oral lichen planus of the left cheek.

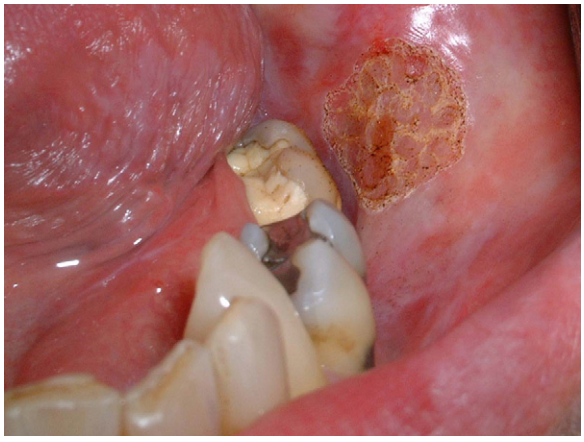

Fig. 2. CO_2 laser evaporation of oral lichen planus of the left cheek.

After CO_2 laser treatment, patients were seen on a regular basis for follow up: 6 weeks, 3 months (see Fig. 3) and 6 months after treatment. After 6 months patients were seen once a year. Patients were asked if they had new complaints and oral examination was carried out to look for new lesions and recurrences. There was no evidence of adrenal suppression or acute pseudomembranous candidosis.

Results

The mean age of the 21 patients was 52.3 (range 34–62) years. The male:female

Fig. 3. Three months after CO_2 laser evaporation of oral lichen planus of the left cheek.

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Table 1. Location of lichen planus lesions

Location	*n*	%
Cheek	18	46
Gingiva	2	5
Alveolar ridge	2	5
Floor of mouth	4	10
Tongue	12	31
Trigonum retromolare	1	3
Total	39	100

ratio was 1.0:0.7. Eight lesions showing dysplasia were excluded from the study. The location of the lesions is shown in Table 1.

Thirty-nine lesions in 21 patients were treated with CO_2 laser evaporation on the indication of complaints. Twenty-nine (74%) lesions were painful when consuming spicy foods. Three lesions (7%) were spontaneously painful, and in 7 (19%) lesions the pain was changing over time.

In 13 lesions the clinical classification was erosive/ulcerative (33%), 16 (40%) were reticular and 6 (16%) were plaque-like lesions. In 4 (11%) lesions the clinical classification was unknown. No lesions were associated with amalgam restorations, and there were no lesions associated with a history of drugs. All lesions were idiopathic.

The mean follow up was 8 years (range 1–18 years). After treatment with CO_2 laser evaporation in 24 lesions (62%) no pain and no recurrence were seen. Fifteen lesions (38%) showed clinical recurrence and six of these caused pain after complete epithelialization. Nine lesions were without pain.

The six painful recurrences were clinically classified in two cases as plaque like, one case erosive, one case reticular and two cases unknown. These six lesions were retreated with CO_2 laser evaporation. After this treatment there were no more signs of pain. The nine recurrences without pain were classified in five cases as plaque like, two reticular and two erosive.

There was complete epithelialization after treatment and retreatment in 3 weeks in all cases. In the follow up of these patients several painful recurrences occurred, but these lesions developed at other previously untreated locations in the mouth. In one case the possibility of galvanic irritation was mentioned as an aetiologic factor.

Discussion

Different methods have been used to treat painful symptoms of oral lichen planus. In the 1990s most studies reported on conservative treatment and a few on surgical excision and cryosurgery. In this study most of the patients complained of pain or burning sensations even after conventional therapy such as fluocinonide and triamcinolone.

CO_2 laser evaporation is not a standard treatment modality for oral lichen planus, but was done as a last effort. Therefore, there was only a small group of patients available for a retrospective analysis. Since CO_2 laser treatment in oral lichen planus has been reported only once so far[17], the results must be compared with those of studies where patients were treated with topical or systemic drugs.

According to the literature the mainstay treatment for oral lichen planus is topical steroids. For recalcitrant, severe, erosive or ulcerative oral lichen planus where topical approaches have failed, systemic corticosteroids can be considered. There are several studies which show good results but there are also side effects [18,6,20,3,30,27,1,5].

Cyclosporine has been used as an immunosuppressive drug to treat oral lichen planus, as a mouthwash three times daily, as a topical drug four times daily, or as a rinse daily for a period of 4 weeks. In these studies none of the patients showed complete remission[13,31,10,26]. The use of cyclosporine has disadvantages, e.g. a bad taste, and there is a decrease in sensitivity of the mucosal surface on initial application in some patients[27]. Cyclosporine is very expensive, and systemic use can cause nephrotoxcity[25]. Most studies report recurrence after stopping treatment.

There has only been one paper published on the use of CO_2 laser evaporation for the treatment of oral lichen planus[17]. In this study 10 patients were observed who developed lichen planus with complaints such as a burning sensation and an intolerance to hot or spicy food and toothpastes. The authors used the same CO_2 laser as in the present study. All patients noticed immediate relief of all symptoms with no side effects. When lichen planus recurred, it did not occur in the lasered areas but in untreated areas. Recurrences in this study were not related to the location of the lesion. Based on these results, CO_2 laser evaporation may be considered at an earlier stage. In the present study, oral lichen planus lesions were treated with CO_2 laser evaporation, giving good results in the long term with no side effects. There were no problems with regard to wound healing. In every case there was complete epithelialization within 3 weeks. After six cases of retreatment there were no complaints of pain and this result was maintained for many years. The 39 lesions had different clinical classifications, and the six lesions with pain after initial CO_2 laser evaporation were variously plaque like, erosive and reticular. No conclusions can be made about clinical classification of a lesion in relation to development of a recurrence and/or complaints.

In conclusion, when there is no further improvement with steroids and taking into account the side effects, CO_2 laser evaporation seems to be a good treatment option for oral lichen planus and may even be considered as first choice. Although this is a retrospective study, with no control group, the reduction in pain is an interesting result. A randomized clinical trial is necessary to confirm the value of this method of treatment of oral lichen planus.

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