

Treatment of Oral Leukoplakia Using Different Surgical Techniques with Diode Laser

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Received: September 19, 2020; **Published:** October 31, 2020

Abstract

Oral premalignant lesions such as leukoplakia and erythroplakia remain a diagnostic and management challenge having a potential for malignant transformation. The management includes non-surgical and surgical therapies. The gold standard being laser excision. Lasers by far have been a well-established treatment modality for oral premalignant lesions and has potential advantages over surgical excision using scalpels. Various studies have shown the application of different lasers for the management of oral premalignant lesions showing effective outcomes. In the present study, the authors have described different surgical techniques to treat oral leukoplakia and have reported effective results with no recurrence.

Keywords: Diode Lasers; Oral Leukoplakia; Laser Excision; Oral Premalignant Lesions

Abbreviations

OL: Oral Leukoplakia; PMD: Premalignant Disorder; NRT: Nicotine Replacement Therapy

Introduction

Oral leukoplakia (OL) is a potentially malignant disorder (PMD) of the oral mucosa. According to WHO (1977), it has been defined as "a predominantly white lesion of the oral mucosa that cannot be characterized as any other definable lesion" [1]. The prevalence of oral leukoplakia, worldwide, is approximately 1 - 2% for all ages. There are geographical differences with regard to gender distribution. Smoking, alcohol abuse, lasting mechanical injuries, are reported as the most important causative factors.

Leukoplakia is being recognized by two forms: Homogeneous and the non-homogeneous type. Homogeneous leukoplakia has predominantly white lesion of uniform flat, thin appearance, smooth/wrinkled or corrugated surface throughout the lesion, whereas non-homogeneous leukoplakia has been a mixture of white-and-red lesion that may be either irregularly flat, nodular, or verrucous [2]. Leukoplakia shows characteristic histologic findings such as epithelial hyperplasia, and/or hyperkeratosis, with or without epithelial dysplasia or carcinoma [3].

There is no consensus regarding the most appropriate treatment for oral leukoplakia. Presently it has multiple treatment modalities such as stop the habits, nicotine replacement therapy (NRT), surgical and conservative methods. The commonly used conservative modalities are, vitamin A supplements, antioxidants, carotenoids, isotretinoin supplements, injection hyaluronidase, steroids, glycerin soap massage. Surgical treatment includes conventional surgery (using scalpel), electrosurgery, cryosurgery, and laser surgery [4,5]. The surgical modality should be considered if the lesion doesn't resolve, even after stopping the habits and/or medical treatment. The most common surgical method is complete excision of lesion.

Conventional surgeries using scalpel have disadvantages like bleeding during surgery, need for sutures, post-operative pain and swelling. The laser treatment modalities have made tremendous progress in the field of dentistry. Their precision allows a conservative and site-specific minimally invasive surgery with sterilization of the surgical area, minimal intra-operative hemorrhage, minimal post-operative pain and swelling with less need of medications.

The present study was designed to investigate the efficacy and compare the recurrence between two different surgical techniques to treat oral leukoplakia using diode laser depending upon its position in the oral cavity.

Materials and Methods

Four systemically healthy subjects with age ranging from 25 to 50 years with oral leukoplakia who required excision were enrolled in the study. Detailed history, clinical examination, and all the necessary investigations were performed for all the patients before inclusion in the study. A punch biopsy was done to look for any dysplastic changes. Subjects showing dysplastic changes after punch biopsy were not included in the study. Also smoking and alcohol habits of the patients were monitored, and those who were able to quit the habits for at least a month after counselling were included in the study. Surgical procedure was carried out one month after the punch biopsy site healed. The lesions were classified according to location and clinical appearance.

Group A: Included two subjects with homogenous leukoplakia (as confirmed by biopsy) pertaining to buccal/labial mucosa (non-keratinized oral mucosa) and were treated by excising the lesion with a diode laser.

Group B: Included two subjects with homogenous leukoplakia (as confirmed by biopsy) involving the gingival tissue and were treated by scraping method using a diode laser.

Surgical procedure

Case 1 (Group A): A 30 year old male patient reported to the private clinic with chief complaint of persistent asymptomatic white lesion on lower right buccal mucosa. Patient had noticed the lesion one year ago and there was no increase in size since then. The patient was systemically healthy with no family and medical history. He reported habit of tobacco chewing since four years and had stopped eight months ago. Intraoral examination revealed a non-scrapable lesion which extended from corner of the mouth to the retromolar area, measuring about 4 x 5 cm in size (Figure 1). A diagnosis of homogenous leukoplakia was made following biopsy and a laser surgery was planned for the same. Patient was briefed about the condition and an informed consent was taken.



Figure 1: Preoperative view showing white lesion on lower right buccal mucosa (Case 1).

Following the administration of local anesthesia, a 940 nm diode laser (Ezlase, Biolase) with 400 nm tip was used for the removal of leukoplakia. The lesion was first marked with 0.5 watt continuous mode, which included 1mm of safety margin around the lesion to avoid the recurrence, followed by removal of lesion using a partial thickness flap technique with 2 watts, pulsed interval and pulse duration was 50 ms (Figure 2). The entire lesion was excised intact and was again sent for a histopathologic evaluation to re-confirm the diagnosis. Laser bandage was done for better healing and analgesics were prescribed.



Figure 2: Site showing complete excision of the lesion (Case 1).

Case 2 (Group B): A 48 year-old male patient reported to the private clinic, with a chief complaint of white patch on left buccal mucosa. The physical examination was unremarkable. Clinical examination revealed a greyish white patch from the attached gingiva of first pre-

molar to the vestibule and extending till the mid buccal of the second molar region, measuring about 3.5 x 3 cm (Figure 3). The lesion was non-tender and non-scrapable. The patient noticed mild burning sensation while having spicy food and had a habit history of chewing tobacco since 3 years. A diagnosis of homogenous leukoplakia was made following biopsy and a laser surgery was planned for the same. Patient was briefed about the condition and an informed consent was taken.



Figure 3: Preoperative view showing white lesion on lower left buccal mucosa (Case 2).

Following the administration of local anesthesia, a 940 nm diode laser (Ezlase, Biolase) with 400 nm tip was used for the removal of leukoplakia. Marking of the lesion was done with a low power setting of 0.5 watt continuous mode which included 1mm of safety margin around the lesion to avoid the recurrence, followed by scraping the lesion with a setting of 0.7 watts continuous mode (Figure 4).



Figure 4: Site showing complete excision of the lesion (Case 2).

Technique used for removal was the scraping technique, the power used in group B was less as compared to group A because scraping requires less energy as compared to an incision. The lesion was scraped using light brushing strokes and the tip was bent to reach the distogingival surface of the molar. The scraped lesion was sent for histopathologic evaluation to re-confirm the diagnosis. Laser bandage was performed for better healing and analgesics were prescribed.

In both the groups, the patients were recalled after seven (Figure 5 and 6), ten and fifteen days to check for healing, and thereafter one year to check for recurrence. Also, a tele-counselling was done once a month to keep a track of the patient's habit.



Figure 5: 7 days postoperative view (Case 1).



Figure 6: 7 days postoperative view (Case 2).

Discussion

White and red lesions of the oral cavity remain a diagnostic and management challenge. Different methods both non-surgical and surgical are employed for its management. Use of the laser for management of oral premalignant lesions has got many advantages over other treatment modalities. Through various studies, it can be inferred that surgical management is the gold standard for oral premalignant lesions. It has been estimated in the literature that the laser is an effective tool to treat oral leukoplakia.

Leukoplakia in general is a potentially malignant disorder with an overall malignant transformation of 1% worldwide. 0.3% malignant transformation is seen in the Indian population. It is more common in males than females particularly between 40 - 70 years of age and it greatly varies in shape and distribution [6].

Initially most of the cases were treated by conventional surgery followed by complications such as intra-operative bleeding, post-operative pain and swelling, infection at suture site. With the recent advancements and developments in the field of lasers, diode lasers has become the choice of treatment for excisional biopsy [7].

Diode lasers have been used in a variety of soft tissue surgical procedures because of certain advantages such as ability to decontaminate owing to its bactericidal property, less post-operative pain and swelling, reduced inflammatory signs, a bloodless surgical field and less need for medications [8].

Ishii, *et al.* [9] have shown the highest rate of recurrence with cryosurgery (71.4%), followed by laser vaporization (30.1%), excision surgery (25%), laser excision (22.2%). The author also suggested that the excision technique is more apt for oral leukoplakia occurring on non-keratinized epithelia (i.e. the tongue and the buccal mucosa), as they have a higher risk of epithelial dysplasia and malignant transformation. Despite of complete removal, adjacent or peripheral epithelial tissue may proliferate resulting in recurrence. Also, it was noted that the incidence of epithelial dysplasia and the rate of recurrence was not high in gingival cases.

Some studies have shown that the recurrence in laser surgery was ~7.7 - 38.1% [10,11].

While performing excision using lasers, it mostly results in gingival tissue recession followed by root exposure. And hence to overcome this, we have used a scraping technique along with partial removal of interdental papilla when required and have found no recurrence. Also, we have noticed that all the patients included in the study did not resume the habit over a period of one year.

Conclusion

The present study is one of its kind where the authors have focused on different laser surgical techniques to treat oral leukoplakia which can give effective and better results in terms of recurrence. Through our finding we can infer that laser scraping can be used in gingival areas while laser excision can be indicated for cases on non-keratinized oral mucosa (buccal/labial mucosa) in cases of surgical management of the leukoplakia with diode lasers

Limitations of Study

Sample size and the follow period should be extensive.

Conflict of Interest

There are no conflicts of interest.

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Volume 19 Issue 11 November 2020

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