

White Lesions and Laser Therapy a Clinical Study

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Abstract: Objective: *To test the diagnosis of oral leukoplakia with diode laser.*

Materials & methods: *Throughout this investigation we found five cases of oral leukoplakia that were validated through biopsy then diagnosed using laser diode.*

Results: *Diode laser offers pain free and fast tissue repair resulting from the procedure. The time of recovery lasted from 7 days to 30 days well after laser cure and no resection from 2 years well after research.*

Conclusions: *The diode laser seems to be an effective means of handling contaminated wounds and helps avoid malignancy by treating oral leukoplakia.*

Keywords: *Oral leukoplakia (OL), verrucous leukoplakia, homogenous leukoplakia, diode laser, treatment*

1. INTRODUCTION:

Oral leukoplakia seems to be a frequent lesion of its oral mucosa. It is indeed a progressive disease that occurs mostly on oral mucosa also as white substance, or even as a crust, that could not be extracted by scratching. Its gradually becomes a multifocal disease. Its global prevalence varies from 0.5-3.4 % and the malignant transformation ranges between 0.17-17.5%.^{1,2}The period leukoplakia remained primary described through Schwimmer 1877 and he said that leukoplakia probably represented a syphilitic glossitis.³ Reports indicated that 15.8%-48% of OSCC (Oral Squamous Cell Carcinoma) patients were related with oral leukoplakia (OL)when diagnosed.^{4,5} Estimation of yearly OL cancerous transition rate is about 1.36% in different population with various geographical areas.⁶

Generally, OL lesions were categorized as non-dysplasia including (moderate, mild and serious) dysplasia. Oral endothelial dysplasia seems to be the essential histopathological predictor to reduce the threat of OL malignancy.⁷ The course of premalignancy is activated by the use of tobacco like smoking, smokeless or inhaled, pan masala and betel quid. Hence these are considered as the significant hazard for most of the OL, followed by intake of alcohol, poor oral and dental hygiene.⁸

Two types of leukoplakia are: homogeneous and heterogeneous leukoplakia. leukoplakia remains graded. The bottom layer of malignant mutation was leukoplakia simplex (homogeneous leukoplakia), while leukoplakia erosives (erythroplakia) including leukoplakia nodular (flecked leukoplakia) were maximum incidence.⁹

There are many treatment that can be used for OL such as the conventional non-surgical treatment by medications or complete removal of lesion from the site by Scalpel dissection, electrical procedure including laser surgery lately employed.¹⁰

Laser is a device that generates a high intensity parallel beam of monochromatic electromagnetic radiation. There are different types of laser that are currently used in dentistry depends on their wavelength range and their absorption. The CO₂ laser was introduced in laparoscopic larynx procedures throughout the 1970s. Laser CO₂, like malignant and leukoplaky lesions of its oral cavity, seems to have been effective in a community of tissue therapeutic procedures¹¹⁻¹⁶ The Nd: YAG (Neodymium: Yttrium aluminum pomegranate) laser was already widely used for treating other mucous lesions.^{11,12}

The diode laser mostly used in dentistry and have a wavelength of 810-980nm Consumed by fatty tissue including liquid as well as chromophores such as melanin as well as oxyhemoglobin.^{19,20} It defined selectively diode laser activity on tissue procedures like incision, flow rate, blood clotting, haemostasis, curettage, etc.. We have very laser assisted teeth whitening and a strong bio-modulation photographic tool. Many diodes were distributed on a wave form and even pulsating when needed. On the basis of emission of waves diodes are classified into two categories: continuous mode and pulsed mos. Continuous mode is used in surgical treatments of more controlled and regulated of emission of wave. In addition, diodes can be used in the orthodontics, prosthodontics and dental surgeons at wavelength between 635, 670, 510, 830 including 980 nm including 810, 930 nm. 810 nm laser diode can be utilized for pain management in lower-level laser treatment (LLLT) and bio-stimulation or for refreshment. Diode laser is a control laser and provides a better control to the surgeon. The depth of tissue penetration is more effective output of this laser device^{13,14}.

Soft tissue operation indicated by diodes include frenectomy, hypertrophic lesion, reconstruction, gingival concealer, implant unveiling including periodontal reconstruction. It has many convenience over traditional scalpel surgeries: its authenticity and visual contact of the area manipulated is its great benefit. The hemostasis control is high and easy to handle and also no damage to the tissue. Replacement of the tissue is very quick Edema, discomfort and frustration are that. This could also be performed without anesthesia locally by giving topical anesthesia to the patients¹⁵.

The objective of the present investigation was to figured out the application besides result of diode laser by way of an operational alternative procedure in the administration or treatment of the premalignant lesions.

2. MATERIALS AND METHODS

This study was done in the Department of Oral Medicine and Radiology, Institute of Dental Science (IDS), Siksha O Anusandhan (Deemed to be University), Bhubaneswar, Odisha. Five patients were included in the study with clinical diagnosis of leukoplakia of buccal mucosa and labial buccal mucosa. Clinical diagnosis was confirmed with the help pf biopsy test results. All surgeries were performed by using local anesthesia.

Diode laser unit having wavelength of 450 nm, input voltage. Vat 1 watt to less the tissue carbonization and fibre core diameter 200-600 micrometer was used and lasers were introduced in plused mode because tissues will get relaxation phase. All universal precautions and guidelines were followed by the surgeons. Laser beam was used in contact mode to the tissue to be removed. Wound was allowed to heal secondarily.

Follow up of 5 visits was done (7 days, 3months, 6 months, 1 years and 2 years in successive manner) for the checkup of healing of wound, recurrence and malignant transformation if any. The institutional ethical committee approved the study protocol. History was recorded from each patients regarding their general health, oral hygiene, any bad

habits associated with occurrence of disease OL. An confirmed consent was obtained from all the participants.

3. RESULTS

Among the five patients identified, males are more in number (4) than female (only one) and the age ranges between 30-50 years. Tobacco, betel quid an alcohol consumption were most common habits was reported. Lesions affected multiples sites in oral cavity such as gum or alveolus, sulcus and tongue. Clinically, at initially none of the patients were showed homogenous type of leukoplakia. Most had identified with multiple plaque. Lesions ranged from a single isolated lesion to multiple lesions extending to the large are of oral mucosa.

Serial no	Age(Years)	Sex	Site of the lesion	Type of leukoplakia
1	37	Male	Left buccal mucosa	Verrcous leukoplakia
2	50	Male	Right alveolobuccal sulcus and attached to gingiva	Verrcous leukoplakia
3	30	Male	Right buccal mucosa	Homogenous leukoplakia
4	30	Female	Left buccal mucosa and alveolobuccal sulcus	Homogenous leukoplakia
5	32	Male	Left commissure of mouth	Homogenous leukoplakia

Table 1: Details of patients

All patients were treated with surgical laser therapy. They had treated with single laser treatment. All patients were showed a good healing after 7days of the treatment. After 3 months as well as after 6 months normal mucosa found in all cases. But after one year recurrence found in 2nd case i.e. a mild growth of 1m.m. and after 2 years it healed itself and no recurrence found in all cases.

Serial no./Days	1st Day	7 Days	3 Month	6 Months	1 Year	2 Years
1	Treatment	Eventful healing	No reappearance	No reappearance	No recurrence	No reappearance
2	Treatment	Eventful healing	No reappearance	No reappearance	No reappearance	No reappearance
3	Treatment	Eventful healing	No reappearance	No reappearance	No reappearance	No reappearance

4	Treatment	Eventful healing	No reappearance	No reappearance	No reappearance	No reappearance
5	Treatment	Eventful healing	No reappearance	No reappearance	No reappearance	No reappearance

Table 2: Multiple visits and data of patients

Case-1



Fig-1: Pre-treatment- Verrucous leukoplakia on left buccal mucosa (03.07.2017) Fig-2: Post treatment- Excisional biopsy after 7 days(suture removal)



Fig-3: Post-treatment laser therapy– 03.08.2017 Fig-4: Post-treatment (retinol a application) - 11.08.2017



Fig-5: Post-treatment- June 12th 2019(after 2 years)

Case-2



Fig-6: Pre-treatment- Verrucous carcinoma on alveolobuccal sulcus and attached gingiva (03.04.2019) the right (20.02.2019) gingiva (20.02.2019)

Case-3



Fig-8: Pretreatment- homogenous leukoplakia 2 (30th June 2017) years (12th June 2019)

Case-4



Fig-10: Pre-treatment- Homogenous leukoplakia Fig-11: Post-treatment- Laser therapy on the left buccal mucosa and alveolobuccal(after 15 days)sulcus(30.05.9019)

Case-5



Fig-12:Pretreatment- Homogenous leukoplakia at Fig-13:Post-treatment – (laser therapy)the left commissure of mouth (05.06.19)

4. DISCUSSION:

The treatment of leukoplakia is to prevent malignant transformation and early diagnosis of malignancy. The WHO described leukoplakia by way of a white cover which can't be

defined clinically. There were a no. of white lesions seen before the clinical diagnosis of OL is done.¹⁶The most common site for occurrence of OL is buccal mucosa and Tongue is by far the most frequent site of malignancy.

Conventional surgery may lead to some certain side effects such as scar formation expression of wound and contamination of the surgical area. Removal of precancerous lesions using laser has comparative advantages over surgical removal. Diode laser could be utilized effectively in the treatment of leukoplakia. It is a small, compact unit and easy to handle. Diode is a semiconductor unit having Gallium-Aluminium-Arsenide as an active medium. Diode laser can either remove or can vaporize the tissue based on the photochemical effect. In our study we have done complete removal of tissues that infected. The diode laser may causes more thermal damaged damage zone in the infected site and marginal damage of biopsy species.¹⁶ But in this study we did a small punch of biopsy to confirm the leukoplakia clinically.

The benefits of used of diode laser comprise a bloodless platform, less painful procedure, minimal swelling, favourable healing with fewer complications and low morbidity. In our study we also observed almost no prospective pain and bloodless surgery.

The large diode laser beam transfers the energy to contaminated tissues that induce swelling, clotting, denaturation among protein and carbonisation of the tissues. Generally laser induced wound and that wound healed with in less time and no scar formation and this may occurred due to the minimal expansion of wound. In this study, in all cases healing progress was good in between 7th day to 30th day of treatment. After 3 months and 6 months all were showed a normal mucosa.

A study reported that the recurrence of OL is found to be 29.3%.¹⁶ We observed that during the period of 2 years, we found no recurrence in any cases.

The diode laser and Nd:YAG lasers are almost same but Nd:YAG laser has one limitation. The limitation is 'hot tip effect' ; the black denatured tissue proteins are present in the fibre tip and they absorb energy very heavily by making the tip very heat. So, The fire induces thermo - mechanical skin cuts as this tip hits contaminated tissue and leading to fluctuation in cutting procedure & coagulation power.¹⁷

5. CONCLUSIONS:

The diode laser unit is easy to handle, compact and a small system compared to other laser units. The laser treatment is also cost effective for the patients and gives effective results after the removal of OL. It also provide a bloodless field to the surgeons, less pain to the patients and overall a good compliance. So the treatment of pre-malignancy becomes promising using diode laser.

The significant hazards of utilization of laser energy are skin burn diseases, eye damage and even causes blindness to operators, patients and other supporting staffs. So, it requires advanced training to the surgeons and supporting staffs to handle the unit. The equipment needs maintenance in a continuous manner. We should give more consideration to these aspects while using the laser system.

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