



Case Report

Diode laser in synergy with pharmacological therapy in treatment of OSMF

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ABSTRACT

Oral submucous fibrosis (OSMF) leads to progressive limitation in the opening of the mouth and protrusion of the tongue, thus causing difficulty in eating, swallowing, and phonation. The treatment modalities include both pharmacological and surgical modes of treatment. To achieve adequate mouth opening, the complete release of fibrotic tissue is essential. Pharmacological therapy is useful only in the initial stages while surgical therapy is used in later stages of the disease. Incising the fibrotic tissue with a conventional blade or electrocautery can cause further fibrosis. Laser excision comparatively leads to lesser intraoperative bleeding hence better vision, faster healing of tissues, and least or no post-operative scarring.

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1. Introduction

Oral submucous fibrosis (OSMF) is an insidious, chronic disease affecting any part of the oral cavity and sometimes the pharynx.^{1,2} Occasionally it is preceded by and/or associated with vesicle formation^{1,3} and is always associated with a juxta-epithelial inflammatory reaction followed by progressive hyalinization of the lamina propria.^{1,4} Eventually it results in subepithelial and submucosal myofibrosis leading to stiffness of the oral mucosa and deeper tissues with progressive limitation in the opening of the mouth and protrusion of the tongue, thus causing difficulty in eating, swallowing, and phonation.^{1,5}

Oral submucous fibrosis is an unsatisfactorily treated disease. All available treatments give the patient only symptomatic short-lasting relief. This is mainly because the disease is progressive in nature. The younger the age, the more rapid is the progression of the disease, and the more likely is the recurrence of symptoms.^{6,7}

Treatments proposed for OSMF include pharmacological, surgical, and physical. However, they have proven to be palliative rather than curative. They only aim to enhance the patient's ability to open the mouth, which becomes restricted when more scar tissue is formed as the disease progresses, but none have proved curative or have reduced the morbidity significantly.^{6,8} Physical therapy helps in remodeling tissues and includes physiotherapy exercises, splints, or localized heat by microwave diathermy. On the other hand, pharmacological therapy involves drug delivery that is given orally, topically, or by sub-mucosal injections. Surgical management is an option for treatment in advanced cases.^{9,10}

To achieve adequate mouth opening, the complete release of fibrotic tissue is essential. However, incising the fibrotic tissue with a conventional blade or electrocautery can cause further fibrosis^{11,12} in addition to the need for grafting at the end of the surgery.¹³ Lasers provide favorable features like good hemostatic properties and flexibility of the probe which makes it useful in the limited access; especially in trismus. In addition, the incision through the fibers is precise with minimal damage to the adjacent tissue.

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Therefore, the healing is quick even without any graft or biological dressing. Moreover, the operating time is less and the entire procedure does not cause scarring in contrast to conventional scalpel excisions. Due to the minimal morbidity associated with this procedure, better patient compliance is experienced.¹¹

A number of cases of OSMF have been treated to study the efficacy of one of the treatment modalities. However in order to perceive the synergistic effect of pharmacological therapy with lasers as well as the added merits of the latter we utilized both pharmacological as well as laser therapy to treat this case of OSMF.

2. Case Report

A male patient aged 58 years reported to the clinic with the chief complaint of inability to open his mouth. The patient gave a history of gutkha chewing for the last 25 years and claimed to have stopped the habit one year ago. He admitted to gradual progress in a reduction in the mouth opening. So much so that he could insert only one finger into his mouth and used a spoon to eat. This had led to a steady decrease in his weight as well. On clinical examination, buccal mucosa showed increased rigidity and loss of flexibility along with palpable fibrous bands. Hence the case was diagnosed as oral submucous fibrosis S3M3. The staging was given according to Chandramani More et al classification of 2011.¹⁴

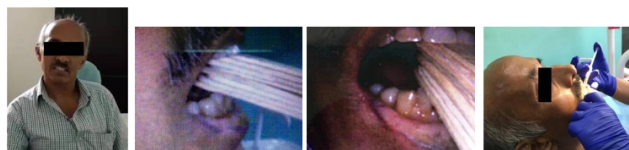


Fig. 1:

The patient was informed about the diagnosis as well as the relation it had with his habit. He was motivated to quit the habit fully. He was also briefed about the treatment plan formulated for him. At the first visit, the mouth opening was recorded as 15mm. The patient was prescribed capsules containing oral lycopene 8mg and was instructed to take them twice daily. Submucosal injections of Dexamethasone combined with Hyaluronic acid 1500 International Units were started during the first visit itself. The patient was explained home exercises to be carried out with ice candy sticks 15-20 times daily. He was also explained about gradually increasing the number of sticks to facilitate mouth opening. The patient was recalled for 6 doses of submucosal injections biweekly for over 3 weeks. This time span was decided so as to achieve minimum additional mouth opening so that laser therapy could be carried out efficiently.

A mouth opening of 18mm was achieved at the end of the pharmacological therapy. On the day of the Laser therapy,



Fig. 2:

the patient was explained about the entire procedure. Local anesthesia was administered in the form of local infiltration into both right and left buccal mucosa (2% lignocaine with 1:100,000 epinephrine). All the necessary precautions were taken and the clinician and the patient were instructed to put on the protective eyewear. A 980nm diode laser was used in this procedure. Laser was used only in the area where fibrotic bands were present. Following tip initiation, initial demarcation of the fibrotic bands was done using the laser tip in 1 W pulse mode (pulse interval 50 μ sec and pulse duration 50 μ sec). Later, the laser was used in a continuous mode with 1 Watt power. Incisions were given first on the right buccal mucosa up to the depth of 2-3mm and the taut fibrotic bands were released. Care was taken to limit the extent of the procedure only to the mucosal and the submucosal layers avoiding penetration into the deeper muscular layer. A similar procedure was carried out on the left buccal mucosa. Throughout the procedure, the patient was advised to keep his mouth open and as wide as possible. This was because it was found that stretching of the mucosa at the time of laser excision facilitated in faster rupture of the bands, resulting in an enhanced mouth opening. The mucosa as well as the laser tip was swabbed with moist gauze from time to time in order to remove any debris and permit thermal relaxation of the tissue. Literature shows, cases done using lasers wherein a single large incision or an inverted "Y" incision was performed leaving a wide inter-incisional gap.^{15,16} But we incorporated a few modifications in the procedure. We performed multiple transbuccal horizontal incisions parallel to one another to release the bands enhancing the mouth opening immediately after the procedure as well as induce faster healing.

At the end of the procedure both right and left buccal mucosa were copiously irrigated with Povidone Iodine. All the post-operative instructions were given to the patient. The patient was prescribed analgesics and advised commencement of home exercises after 48 hours. Post-operative mouth opening was recorded as 27mm.

First follow-up was scheduled for the third-day post-surgery. Mouth opening was recorded again as 26mm. Besides exercising with ice candy sticks patient was advised to exercise with conch by blowing into it 7-8 times daily in



Fig. 3:

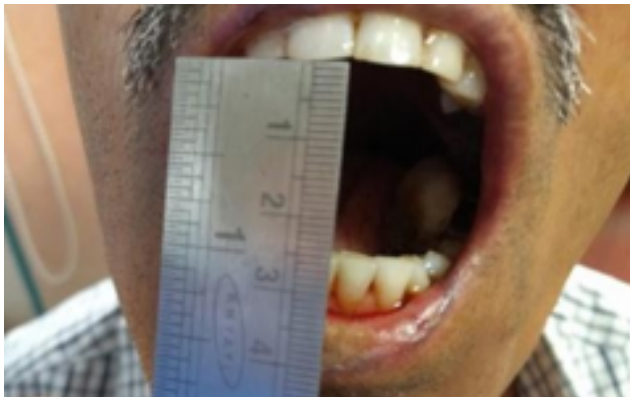


Fig. 4:

order to improve cheek flexibility post-surgery. Next follow-up visits were planned every month for 3 months duration followed by a recall visit at the end of one year.

3. Discussion

The prevalence of OSMF in the Indian subcontinent is reported to be in the range of 0.2 to 1.2% with a female to male ratio of 3:1.2. It carries a 7-13% risk of malignant transformation.^{15,17,18} Development of OSMF is attributed to two main etiological agents areca nut and its alkaloids.¹⁹ Both conservative and invasive treatment modalities have been tried to improve signs and symptoms of oral submucous fibrosis.^{20,21} Lycopene is a powerful antioxidant obtained from tomatoes. It has been shown to inhibit various types of cancers and have potent benefits in oral premalignant lesions where it has been shown to modulate dysplastic changes. Lycopene has the highest singlet oxygen quenching capacity with a high capability of quenching other free radicals in vitro. The inverse relationship between lycopene intake or serum values and cancer risk has been

observed in particular for cancers of the prostate, pancreas, bladder, cervix, and oral leukoplakia.^{20,22}

A. Kumar et al,²³ tried lycopene in OSMF with a daily dose of 16 mg and the drug has given promising results in reducing signs and symptoms in the initial stages of OSMF. However, with the evolution of technology, the focus of researchers has shifted towards Lasers in the management of OSMF due to the several benefits it carries along with it.^{24,25}

A comparison of the conventional technique and the modified technique for use of diode laser implemented in our case is stated as follows:

1. A single incision is deficient to cut all the bands and may cause re-occurrence of trismus whereas in our technique we palpate the bands and where ever it is required we give the incision so as to make sure that we released all the bands.
2. 2-3mm deep incision technique can be done in multiple areas in the mucosa depending on the presence of the bands.

The rationale for the use of lasers in this case procedure was photo-thermal action. This resulted in disruption of the tissue by sufficient deposition of heat to vaporize the tissue. Laser energy is selectively absorbed in the target tissue resulting in either a direct tissue cut (cold cut) or rupture (thermal cut) due to vaporization of the water within a cell, a process better known as thermo-mechanical tissue ablation. This unique mechanism limits the amount of collagen damage to a minimum of 5 μm (approximately 2 cell widths), sparing the extracellular collagen matrix.¹⁵ Tissues treated with lasers release less histamine¹⁵ and hence minimal post-operative pain and inflammation was reported in our case. In addition, the absence of scarring and minimal tissue shrinkage was the added benefit of using lasers.

Evidence indicates that there was only 0.5 mm of tissue shrinkage attributed to a laser when compared to 3 mm with a Bard-Parker blade.^{15,25} The procedure favors immediate mouth opening and immense post-operative benefits for the patient. Moreover, the use of laser caused no wound dehiscence and no second site surgery was required to cover the raw area. Less scar formation leads to more supple, flexible, and elastic mucosa, accounting for no tissue shrinkage after surgery.¹⁵

In our case, the follow-up period of one year showed no recurrence which to an extent can also be attributed to the discontinuation of the causative habit. Just like every procedure, laser does have its merits and demerits. But the overall benefit of laser surgery surpasses the demerits of the conventional technique. Advantages of lasers include a relatively bloodless operative field and thus excellent visibility, fewer chances of bacterial infection, reduced mechanical tissue trauma, quicker healing, reduced post-operative edema, scarring, and tissue shrinkage.^{11,15,26} The

possible complications in laser surgery can be excessive or collateral tissue damage due to misdirected usage.

4. Conclusion

Laser is a simple surgical procedure with effective results in the management of OSMF. When added with a pharmacological mode of treatment lasers give exceptional results. More extensive studies involving a greater number of cases are required for a definitive outcome. Such promising results should encourage more widespread use of this new technique in the management of OSMF

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Source of Funding

None.

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