CASE REPORT

Biostimulation with diode lasers: A novel futuristic approach in the treatment of oral submucous fibrosis – A case report

Sourav Chandra¹, Sheela Kumar Gujjari², Archana R. Sankar²

¹Department of Periodontology, R. G. Kar Medical College and Hospital, Kolkata, West Bengal, India, ²Department of Periodontology, JSS Dental College and Hospital, Mysuru, Karnataka, India

Abstract

Submucous fibrosis of the oral cavity will not regress on its own. Fibrotic band release by surgery is necessary to enable mouth opening. Once trismus has established that the role of medical treatment is limited. Over the years, different methods have been tried with varying rates of success to relieve trismus, of which lasers with biostimulation have gained importance. It is a non-invasive, painless, less time consuming, and an alternative to laser-assisted fiberotomy. Hence, the aim is to present the innovative opportunities of biostimulation using diode laser in managing oral submucous fibrosis (OSMF) and to present new challenging indications of this technology for daily practice. A male patient reported with a complaint of burning mouth along with restricted mouth opening and weight loss for 2 years. There were palpable fibrous bands in the upper and lower labial and buccal mucosa. The patient was scheduled for laser-assisted photobiostimulation and was recalled at the 3rd, 5th, 7th, 14th, 21st, and 30th days. After 1 month, there was a significant improvement in mouth opening. The patient resumed his normal chewing habits and reported no burning sensation. Thus, the study has proved that biostimulation with diode lasers can form an integral part in treating OSMF. In the modern era, the advent of lasers in the field of dentistry has led to enormous improvements in clinical conditions, leading to faster healing, minimal scarring, and also improving patient comfort.

Keywords: Fibrotic bands, laser biostimulation, oral submucous fibrosis, trismus

Introduction

Submucous fibrosis, a pre-cancer condition in the oral cavity commonly called as oral submucous fibrosis (OSMF) is a disorder of collagen. Pindborg and Sirsat, in 1966, have stated it to be a chronic disease which can affect any part of the oral cavity and also the pharynx. Schwartz, in 1953, was the first to describe the condition, but it was Joshi who coined the term. The pre-cancer nature was given by paymaster.

OSMF is known with synonyms such as “diffuse OSMF,” “idiopathic scleroderma of the mouth,” “idiopathic palatal fibrosis,” and “juxta-epithelial fibrosis.”¹ The condition reveals a juxta-epithelial inflammatory reaction and fibroblastic changes which are seen in the lamina propria histologically. This leads to atrophy of the epithelium and a very stiff oral mucosa (trismus).²

Epidemiological data have concluded that the major etiological factor is areca nut. Tobacco, iron and zinc deficiencies, chilies, lime, immunological disorders, and collagen disorders are some of the other etiologies.³ The incidence in India is around 0.5% with a malignancy potential of 7.6%.⁴

It is characterized by rigid oral mucosa which proceeds to trismus and difficulty in mouth opening mainly due to fibrosis of retromolar area and also the involvement of the buccal mucosa. OSMF will not regress on its own or with betel quid cessation. Fibrotic band release by surgery is the primary modality of treatment with the aim of enabling adequate mouth opening.⁵ Various techniques are being advocated to cure trismus, of which laser-assisted biostimulation has gained importance and can be an alternative to laser-assisted fiberotomy due to advantages such as good hemostasis, early wound healing, anti-inflammatory cellular activities, and improved microcirculation.

Semiconductor diode lasers are portable devices with a tissue penetration depth of <0.01 mm, thereby preserving tissues beyond the mentioned depth without damaging the underlying muscles and other deep structures.⁶ The aim of this case report is to present an innovative opportunity where biostimulation with laser can help in managing OSMF and to present this modern technology for daily practice.
Case Report

A 26-year-old male who reported to periodontology was referred from oral medicine and radiodiagnosis, JSS Dental College and Hospital, Mysuru, for managing the burning sensation throughout the mouth with difficulty in mouth opening for 2 years.

A brief history of discomfort, burning sensation, and pain in the mouth which aggravated on consumption of spicy and hot food was given by the patient. He also gave a history of chewing gutkha and smokeless tobacco (20–50 packets/day) for 16 years.

The medical history of the patient was non-contributory. On intraoral examination, the upper and lower labial mucosa were homogeneously white. There was no evidence of erythema or ulcers. Palpation revealed fibrous bands and there were generalized stains on the teeth due to gutkha chewing with mild gingival inflammation. There was severe trismus and the patient had a mouth opening of about 15 mm [Figures 1 and 2].

Punch biopsy of the buccal mucosa revealed increased hyalinization, loss of rete pegs, and atrophy of the oral epithelium. On correlating the clinical and histopathological findings, the patient was diagnosed with Stage III OSMF.

Treatment plan

After non-surgical therapy, the patient was scheduled for laser-assisted photobiostimulation. It is one of the latest treatment approaches in patients with restricted mouth opening. It is an acceptable non-invasive, painless, less time-consuming procedure, and an alternative to laser-assisted fiberotomy.

Laser-assisted photobiostimulation at a distance of 2–3 cm was done using 808 nm sunny diode laser using 600 nm optic fiber in continuous mode in the right and left buccal mucosa [Figure 3] for 10 s at 0.8 W in 3 cycles. The patient was recalled at the 3rd, 5th, 7th, 14th, 21st, and 30th days to evaluate burning sensation in the mouth and also his mouth opening. He was also instructed to abstain from smokeless tobacco, aggressive mouth opening exercise, blowing, and water retention exercises. A month later, notable improvement in the degree of mouth opening from 15 mm to 24 mm was observed [Figures 4 and 5].

Discussion

OSMF is a progressive, debilitating disease, chronic in nature reported among Indians in 1953. It was found only among the people of the Indian subcontinent initially and later; such cases were studied and reported from some of the Southeast Asian and also Western countries. Wide variations of gender distribution are seen in its occurrence as per literature survey. A female predominance was noted in some epidemiological surveys, especially in India. Male predominance could be due to the very easy accessibility of areca nut and its products. The most common sites affected are buccal mucosa and palate.

The condition has multifactorial etiology. Habitual gutkha chewing and other areca nut products have major roles. It is one of the most widely consumed addictive substances after nicotine, ethanol, and caffeine. The constituents of areca nut include flavonoids, alkaloids, and copper, all of which interfere with homeostasis of extracellular matrix. Among the alkaloids, namely, guvacine, guvacoline, arecoline, and arecaidine, the most potent is arecoline. The alkaloids stimulate fibroblasts which cause the production of more collagen. Flavonoids, namely, catechins and tannins are known to suppress collagenase, increase cross-linkage of collagen, thereby reducing its degradation. Inflammation of the oral mucosa results in T-cell activation and macrophage recruitment which leads to an elevated level of pro-inflammatory cytokines and transforming growth factor-beta (TGF-B). The latter considerably increases...
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Collagen mainly by activating procollagen genes and by the upregulation of procollagen proteinase enzymes along with the activity of lysyl oxidase.

The genes of tissue inhibitor of matrix metalloproteinase and plasminogen activator inhibitor are activated by TGF-B which inhibits collagen degradation. A very high concentration of copper present in areca nut stimulates an enzyme – lysyl oxidase, which is essential for final cross-linking of collagen.

The reduction in blood supply as a result of fibrosis promotes fatigue and extensive degeneration of muscles. Diagnostic criteria include a sensation of burning in the mouth, formation of ulcers (at times vesicles), xerostomia, blanching of the oral mucosa, and finally stiffness. The cheek is palpable for vertically running fibrotic bands which also surround the lips in a circumferential manner. Blanching of the oral mucosa, limited movement of the soft palate, and shrunken uvula with restriction of tongue movements are observed in final/advanced cases.

Intralesional injections with hydrocortisone, placental extract, hyaluronidase, and triamcinolone, oral administration of iron supplements, antioxidants, and vitamins have shown to be effective in treating initial cases. Surgery of fibrotic bands using blade and healing by secondary intention is an indication only in moderately advanced and advanced cases, and various reports have suggested that it could result in more fibrosis and disability, leading to overall patient discomfort.

In the present era with excellent science and technology, lasers to relieve the fibrotic bands can result in faster healing and minimal scarring. Diode lasers being compact and portable have numerous applications in the field of medicine. The active part in a semi-conducting diode laser is gallium arsenide or similar compounds. Lasers can seal blood vessels which are smaller than 0.5 mm in diameter, contributing to excellent visibility and precision during treatment.

Laser beam is transmitted through an optical fiber delivery system. The depth of cutting of a tissue is <0.01 mm, thereby preserving structures beyond this depth and causing minimal damage to the adjacent tissue. Another advantage is that lasers form a coagulum of denatured proteins on the surface of tissues which acts as a dressing in the treated site.

In this study, the patient reported with pain and discomfort along with a sensation of burning in the mouth and gave a history of chewing gutkha and smokeless tobacco. Palpation revealed bands in the labial and buccal mucosa, and laser-assisted photobiostimulation was performed which improved his mouth opening.

Although laser is not a panacea for treating OSMF, it is yet a simple, patient- and surgeon-friendly procedure with effective results. Further studies involving a greater population with more parameters are essential to come to a proper conclusion.

Conclusion

The case report has shown that laser-assisted photobiostimulation can form an integral part in the resolution of trismus and an alternative to laser-assisted fiberotomy.

Clinical Significance

The significance of this study is that laser offered hemostasis, facilitated good wound healing, and improved mouth opening without causing discomfort to the patient.

References