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Case Report

Innovative Approaches to Managing Oral Submucous Fibrosis: A Case Report and Review of Emerging Treatment Modalities

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Abstract

Oral submucous fibrosis (OSF) is a chronic, progressive condition of the oral cavity, marked by juxta-epithelial inflammatory reaction and subsequent fibrosis of the submucosal tissues, leading to restricted mouth opening, oral burning sensation, and potential malignant transformation. The condition is prevalent in South and Southeast Asia, primarily due to the use of areca nut and other chewing habits. This case report presents an innovative treatment approach utilizing a novel combination of antifibrotic agents, regenerative therapy, and laser surgery, which has shown significant promise in reducing fibrosis and improving functionality. We review recent developments in therapeutic strategies, focusing on regenerative medicine, bioengineering, and minimally invasive techniques that are not yet widely adopted. The case highlights the potential for novel bioactive materials and emerging technologies such as platelet-rich plasma (PRP) in reducing fibrosis and enhancing tissue healing. The article contributes to the growing body of literature on OSF management and underscores the need for further clinical trials to evaluate these new modalities.

Kew Words: oral submucous fibrosis; antifibrotic therapy; regenerative medicine; bioactive materials; platelet-rich plasma; laser surgery; tissue healing

Introduction

Oral submucous fibrosis (OSF) is a debilitating condition affecting the oral cavity, characterized by the formation of dense fibrotic bands that restrict mouth opening and cause significant discomfort. The etiology of OSF is strongly associated with habitual chewing of areca nut, a practice common in Southeast Asian countries. Areca nut contains alkaloids and flavonoids, which stimulate fibroblast production, leading to excessive collagen deposition and fibrosis of the submucosal tissues [1]. As fibrosis progresses, patients experience difficulty in opening their mouths, resulting in impaired oral function, dysphagia, and an increased risk of malignant transformation into oral squamous cell carcinoma (OSCC) [2]. Despite extensive study, the treatment of OSF remains challenging due to its irreversible nature and complex pathophysiology. Conventional treatments such as corticosteroid injections, surgical excision, and physiotherapy have had limited success, with many patients experiencing relapse or inadequate resolution of symptoms [3]. Novel therapeutic strategies, including antifibrotic agents, regenerative therapies, and minimally invasive surgical techniques, aim to address the underlying pathology of OSF and improve patient outcomes [4].

This case report presents an innovative approach combining pharmacological therapy with regenerative techniques, utilizing bioactive materials and laser surgery to treat a patient with advanced OSF. The treatment approach has shown significant promise in improving tissue flexibility, reducing fibrosis, and restoring oral functionality. This article also explores the latest advancements in OSF treatment, including the use of platelet-rich plasma (PRP) and bioactive glass ionomer cement, which are emerging as effective tools in managing fibrosis and promoting healing.

Case Report:

A 34-year-old male patient presented with difficulty opening his mouth, accompanied by a burning sensation and oral discomfort. The patient had a history of areca nut chewing for 12 years, with cessation 2 years prior. Clinical examination revealed extensive fibrosis in the buccal mucosa and a limited mouth opening of 15 mm. The patient was diagnosed with advanced OSF based on clinical findings and histopathological confirmation of submucosal fibrosis with inflammatory infiltration [5]. A multimodal treatment approach was adopted, incorporating pharmacological therapy with intralesional injections of hyaluronidase and dexamethasone, followed by regenerative therapy using autologous platelet-rich plasma (PRP) and laser-assisted fibrotomy. PRP was prepared from the patient's blood using a standard centrifugation technique, and the platelet-rich fraction was injected into the fibrotic tissues at multiple points. Laser-assisted fibrotomy using a CO2 laser was performed to release the fibrotic bands. The patient was instructed to perform daily physiotherapy exercises to enhance jaw mobility. After 6 weeks of treatment, the patient showed significant improvement in mouth opening, which increased to 30 mm, and reported a reduction in the burning sensation. Repeat histological examination revealed reduced fibrosis and increased vascularization in the treated areas. The patient continued to

show improvement over a 6-month follow-up period, with no signs of relapse.

Discussion:

Managing OSF remains complex due to its multifactorial etiology and irreversible fibrotic changes. Traditional treatments have focused on symptom reduction and functional improvement, but often fail to address the underlying pathology [6]. Emerging therapies such as antifibrotic agents, regenerative medicine, and bioengineering technologies offer new possibilities for treating OSF [7]. Regenerative therapies, including PRP, have gained attention for their ability to promote tissue healing and regeneration. PRP releases growth factors that stimulate fibroblast activity and collagen remodeling [8]. In this case, the use of PRP in combination with laser surgery led to significant fibrosis reduction and improvement in mouth opening, demonstrating its potential in advanced OSF cases.

Laser-assisted fibrotomy is a promising technique that allows precise excision of fibrotic tissue with minimal damage to surrounding healthy tissues. This approach reduces postoperative complications and promotes faster healing [9]. The CO2 laser used in this case facilitated the release of fibrotic bands and improved mouth mobility with reduced bleeding and scarring compared to traditional methods.

Bioactive materials, such as bioactive glass ionomer cements (GICs), are emerging tools in OSF treatment. GICs promote tissue healing by releasing ions that stimulate cellular activity and collagen synthesis [10]. Although their use in OSF is still experimental, preliminary studies suggest they may help reduce fibrosis and improve oral function.

Further research is needed to evaluate the long-term efficacy of these novel therapies in larger patient populations. Clinical trials investigating PRP, bioactive materials, and laser therapy in OSF treatment are limited, and more robust data are required to establish standardized treatment protocols. Combining these modalities with emerging treatments such as stem cell therapy and gene editing presents exciting future possibilities for OSF management.

Conclusion:

The management of oral submucous fibrosis continues to evolve with innovative treatment modalities aimed at reducing fibrosis, promoting tissue regeneration, and improving functional outcomes. This case report highlights the potential of combining regenerative therapies such as PRP with minimally invasive techniques like laser-assisted fibrotomy in treating advanced OSF. The use of bioactive materials and emerging technologies offers new hope for patients with this debilitating condition. However, further clinical research is needed to validate these approaches and establish standardized treatment protocols. Integrating these novel therapies into clinical practice may lead to more effective and durable solutions for managing OSF.

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