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Role of Collagen Membrane for Reconstruction of Buccal Defects Following Fibrotic Band Excision and Coronoidectomy in Oral Submucous Fibrosis

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Abstract:
Objective*: Various local grafts have been used to cover the buccal mucosal defects after the fibrotic bands are released in oral submucous fibrosis but all of them are associated with complications and morbidities. The aim of our study is to evaluate the effect of collagen membrane to cover the mucosal defect after the excision of fibrotic bands.*
Materials And Methods *: A total of 30 histologically proven cases of advanced oral submucous fibrosis having a mouth opening of less than 20 mm were surgically treated .The procedure involved (1) bilateral release of fibrotic bands (2) bilateral coronoidectomy (3) covering the buccal defects with collagen membrane. Regular followup was done and results were assessed by comparing the preoperative & postoperative maximum mouth opening.*
Results*: Mean maximum mouth opening of the patients preoperatively was 10.1mm. Mean intraoperative interincisal distance after band excision and coronoidectomy increased up to 38.2mm. Six months after the surgery the average mouth opening was 37.63 mm, at 1 year, 36.10 mm and at 2 years 34.87 mm. Collagen membrane which was used healed in 2 weeks with satisfactory results.*
Conclusion: *The collagen membrane used to cover the buccal defects after fibrotic bands release had excellent results and obviate the need for a flap*
Key Words: *Buccal defect reconstruction, Coronoidectomy, Collagen Membrane, Interincisal distance,Oral submucous fibrosis,*

I. Introduction:

In 1952, Schwartz coined the term atrophicaidiopathica mucosa oris to describe an oral fibrosing disease he discovered in 5 Indian women from Kenya (1). Joshi, subsequently coined the termed oral submucous fibrosis (OSF) for the condition in 1953 (2). Caniff, et al., in 1986 described submucous fibrosis as a chronic progressive scarring disease of the oral cavity and oropharynx (3).Oral submucous fibrosis is a chronic debilitating disease of the oral cavity characterized by inflammation and progressive fibrosis of the submucosal tissues (lamina propria and deeper connective tissues). Oral submucous fibrosis results in marked rigidity and an eventual inability to open the mouth.(4,5) The buccal mucosa is the most commonly involved site, but any part of the oral cavity such as the soft palate, pterygomandibular raphe, the anterior pillars of fauces and even the pharynx can be involved.(6)

The condition is well associated with areca nut chewing; a habit practiced predominately in Southeast Asia and India. Worldwide, estimates of oral submucous fibrosis indicate that 2.5 million people are affected, with most cases concentrated on the Indian subcontinent, especially southern India.(4) The rate varies from 0.2-2.3% in males and 1.2-4.5% in females in Indian communities.(5) The migration of endemic betel quid chewers has also made oral submucous fibrosis a public health issue in many parts of the world, including the United Kingdom, South Africa, and many Southeast Asian countries.(7)Oral submucous fibrosis has a high rate of morbidity because it causes a progressive inability to open the mouth, resulting in difficulty in eating and

consequent nutritional deficiencies. Oral submucous fibrosis also has a significant mortality rate because it is a premalignant condition and malignant transformation has been noticed in 3-7.6% of cases (8, 9)
Oral submucous fibrosis is clinically divided into 3 stages: (10)
Stage 1: Stomatitis
Stage 2: Fibrosis
a- Early lesions, blanching of the oral mucosa
b- Older lesions, vertical and circular palpable fibrous bands in and around the mouth or lips, resulting in a mottled, marble-like appearance of the buccal mucosa Stage 3: Sequelae of oral submucous fibrosis
a- Leukoplakia
b- Speech and hearing deficits

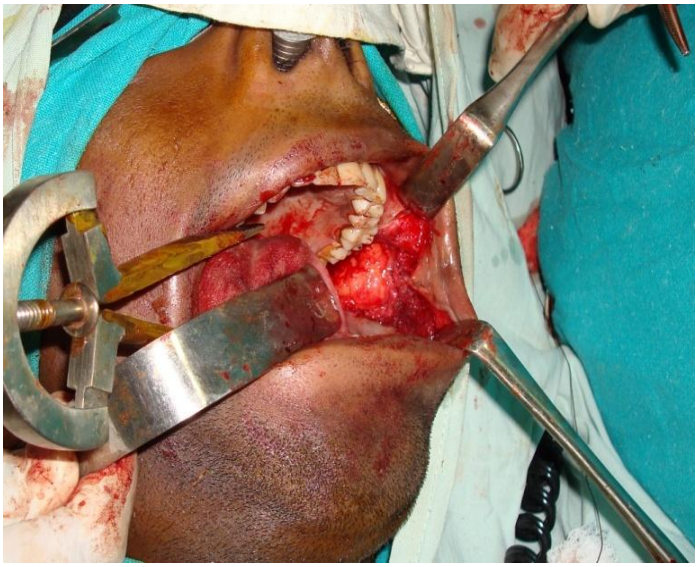
Histologic findings in oral submucous fibrosis are generally characterized by diffuse hyalinization of the subepithelialstroma, atrophic epithelium and intercellular edema, with or without keratosis, epithelial dysplasia, chronic inflammation and fibrosis in the minor salivary glands in the area of quid placement; and atrophy of the underlying muscle.(3)

Staging: Khanna and Andrade (11) in 1995 developed a group classification system for the surgical management of trismus.
• Group I: Earliest stage without mouth opening limitations with an interincisal distance of greater than 35 mm.
• Group II: Patients with an interincisal distance of 26-35 mm.
• Group III: Moderately advanced cases with an interincisal distance of 15-26 mm. Fibrotic bands are visible at the soft palate, and pterygomandibular raphe and anterior pillars of fauces are present.
• Group IVA: Trismus is severe, with an interincisal distance of less than 15 mm and extensive fibrosis of all the oral mucosa.
• Group IVB: Disease is most advanced, with premalignant and malignant changes throughout the mucosa.
Surgical treatment is indicated in severe cases. Surgery consists of bilateral fibrotic bands release with bilateral coronoidectomy and resurfacing the buccal defect with various grafts which have their own complications and morbidities. We have used collagen membrane to cover the buccal defect after the surgery which had satisfactory results with no morbidities to patients.

II. Methods and Material

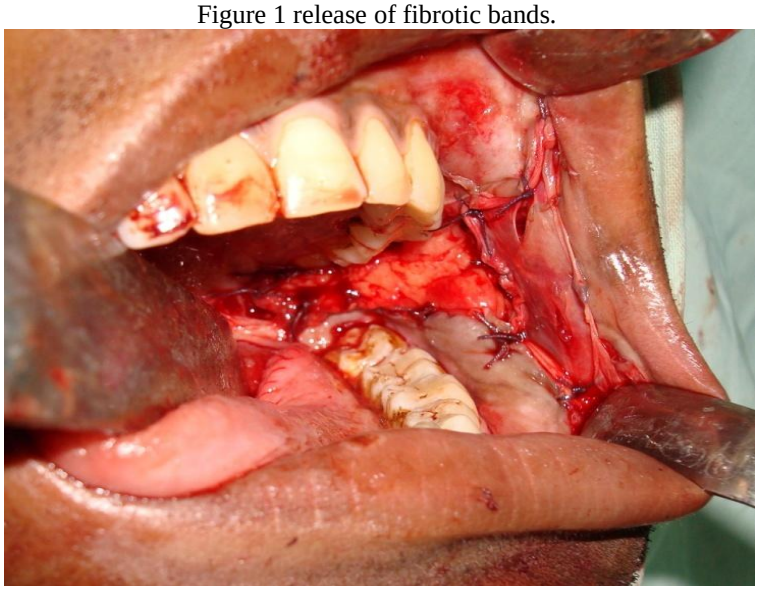
A total of 30 patients of oral submucous fibrosis were admitted in our hospital from June 2006 to August 2008. All these patients had advanced oral submucous fibrosis with interincisal distance not more than 20 mm. Patient's age, sex, etiology, history of gutkha chewing, and preoperative mouth opening were documented. All cases were histopathologically proven. Patients were subjected to surgical intervention .Patients were followed regularly for 1 year and maximum interincisal distance was measured with verniercalipers and noted.

Surgical Technique: Surgical technique involved (1) bilateral release of fibrotic bands (2) bilateral coronoidectomy (3) covering the buccal defects with collagen membrane.



The operation was performed under general anesthesia with nasal intubation. After opening the mouth, the buccal mucosa was incised transversely from just behind the commissure of the oral cavity to extending posteriorly at the level to 1 cm below the orifice of Stensen's duct depending upon the location of the fibrotic bands. All the bands were released by blunt dissection starting from the pterygomandibular raphe to the corner of the mouth, bilaterally. Confirmation was done by palpation that all the bands are dissected thoroughly (Figure 1).

Figure 1 release of fibrotic bands.



This incision was extended vertically along the coronoid process up to its tip. The overlying tissue was cleared by sharp dissection till the coronoid process was visible. Using a micromotor burr, chisel and mallet, the coronoid process was excised bilaterally. Interincisal distance was measured after coronoidectomy. Next, the collagen membrane was placed on buccal defect and fixed. (Figure 2) Patients were put on Ryle's tube feedings the next day and continued for 7 days. After the oral mucosa has healed, the patients were given oral feedings. All Patients were instructed to stop chewing betel nuts or other addictive habits. Patients were taught mouth opening exercises with a Heister's mouth opener or using ice cream sticks and were instructed to carry out this exercise 5 times a day. Patients were followed at an interval of 2 months, 6 months and 1 year whereby interincisal distance was measured and documented.

Figure 2 Collagen membrane being sutured to buccal mucosa.

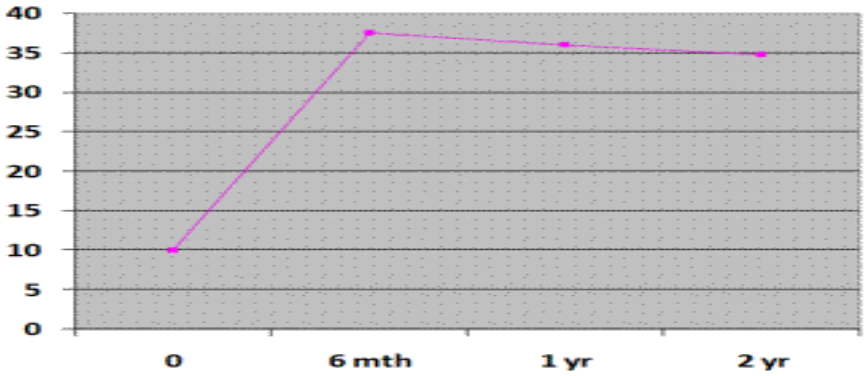
III. Results

A total of 30 patients were studied from age 16 years to 60 years (Mean 32 years) who were habitual betel nut chewers. Males had preponderance of 58.6% and females of 41.4%. The Mean maximum mouth opening of the patients preoperatively was 10.1 mm. The Mean intraoperative interincisal distance after band excision and coronoidectomy was 38.2mm. Two months postoperatively the average mouth opening was 37.63 mm, at 6 months 36.10 mm, and at 1 year 34.87mm (Figure 3).

Figure 3 Completely healed oral mucosa with good mouth opening.

Mean & Standard Deviation Before and After Surgery

Data	Pre Op	2 Months	6 Months	1 Year
Number	30	30	30	30
Mean	10.13	37.63	36.13	34.87
StdDiv	3.742	4.433	1.549	3
P Value	< 0.001	< 0.001	< 0.001	< 0.001



Healing with the collagen membrane took place in all patients. Two weeks was required for healing of the buccal mucosa (Figure 4). Out of 30 patients, 8 patients showed poor granulation of the buccal mucosa and the total healing time in these patients was 1 month to 1 1/2 months. Two patients, who did not follow the oral exercises, had the recurrence after the surgery.

Figure 4: Graph showing Mean maximum interincisal distance after surgery.

IV. Discussion

Oral submucous fibrosis is a chronic debilitating disease associated with restricted mouth opening and poor oral hygiene. The treatment aims at good release of fibrosis and provides long term results in terms of mouth opening. The various conservative treatments with intralesional injections of steroids, hyaluronidase, placental extract and physiotherapy are not beneficial to provide a long-term effect in advanced cases of oral submucous fibrosis.(12, 13) Surgical intervention is required in these cases. The surgical treatment commonly followed is the release of bilateral fibrotic bands with bilateral coronoidectomy. Like any other wound, raw areas in the oral cavity are prone to infection, contraction and scarring so there is a need to cover the buccal defect after the fibrotic bands are released. A mucosal graft(14) is the best treatment for oral submucous fibrosis, as it is ideal graft to cover the oral mucosa, but is limited by the quantity of oral mucosal available for grafting. Thick mucosa taken from the cheek may result in scar formation, whereas a uniform thin graft removed with a microtome from the cheek is costly and complicated. Split-skin grafting has been tried but it has a high failure

rate as fibrotic areas have less vascular supply besides retaining the coloration of skin. Also seen is the growth of hair and sweat glands. Skin is not suitable for grafting in elderly people due to atrophy and inelasticity.(11)

A nasolabial flap (15) has also been used by some surgeons and has a good survival rate, but sometimes it may be too small to cover the whole defect. It also causes a visible scar on the face and requires a second surgery for division. Tongue flaps are bulky and when used bilaterally causes disarticulation, dysphagia and increases the chance of aspiration. In addition, the tongue is involved with the disease process in 38% cases (16). The use of bilateral, small, bipaddled radial forearm flaps for reconstruction of bilateral buccal defects requires two flaps with two microsurgeries. The procedure is more time consuming and technically demanding, and it involves two forearm donor sites with sacrifice of the radial arteries in both the right and left hands. Island palatal flaps again have limitation to reach posteriorly. (17) In our study we have used collagen membrane to cover the mucosal defect after the excision of the bands, because of its easy availability, method of extraction and its low antigenicity. Collagen is available in the form of laminates, sheets, fabrics, gels, powders, and sponges and has been used as temporary dressing materials in burns and ulcers(18,19). Collagen has also been used as a haemostatic agent,(20) in tendon grafting,(21) and in the induction of bone formation. Adherence is an important factor for the survival of the collagen membrane in oral cavity. The adherence of the collagen membrane may be a result of fibrin collagen interaction but is most likely a result of fibrovascular growth into the collagen membrane. It takes 5 to 10 days for adherence. All collagen membranes sloughed off with time. In spite of weakening of the collagen due to collagenolysis, it resisted the masticator forces for a sufficient period of time and allows healthy granulation tissue to form uniformly.

The advantages of using a collagen membrane to cover the defect of oral mucosa are as follows:

1. Collagen membrane is easily available.
2. Application of collagen membrane on oral mucosa is simple and easy.
3. Good tolerance of membrane by oral tissue.
4. There are no adverse effects of using this membrane.
5. There is no need to perform a second operation for obtaining a graft or detachment of the pedicle.
6. No morbidities which is associated with various other grafts.

No problems associated with donor-site healing.

Therefore, it can be advocated in covering the oral mucosal defect after bilateral fibrotic bands are released and coronoidectomy is performed.

Conclusion

In this study, collagen was found to be acceptable to cover the defect of the oral mucosa after bilateral fibrotic band release in cases of oral submucous fibrosis. It is an excellent grafting material, without the morbidity associated with the other various grafts and flaps that can be used to cover the oral mucosa defect after release of the fibrotic bands.

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