

## ORIGINAL RESEARCH

# Clinical Evaluation of Collagen in Surgical Management of Oral Submucous Fibrosis

Jigar P. Thakkar<sup>1</sup>, Faldu Milankumar<sup>2</sup>, A. Bhagavandas Rai<sup>3</sup>, Bipin A. Bulgannawar<sup>4</sup>, Charchil Patel<sup>5</sup>, Pinki G. Thakkar<sup>6</sup>

## ABSTRACT

**Introduction:** Oral submucous fibrosis (OSMF) is a chronic, debilitating disease characterized by juxtaepithelial fibrosis of the oral cavity. The present study was based on clinical parameters to evaluate the acceptance of collagen as a biological dressing material as well as its effects on the raw wounds in oral cavity after surgical treatment of OSMF.

**Materials and Methods:** The study population consisted of five patients who visited to the Oral Surgery Department complaining of restricted mouth opening and who were diagnosed as OSMF on clinical examination. Inter-incisal distance was checked using Vernier caliper, and the raw wounds were covered by collagen membrane as a biologic dressing material.

**Results:** Our study showed preoperative mean mouth opening was 15.80 mm, after bilateral release of fibrous band intraoperative mouth opening achieved was 34 mm, after one month it was 24.40 mm, after three months it was 25.70 mm and after six months it was 25.20 mm. The mean Preoperative cheek flexibility was 4.60 mm, after 6 months it was 11.50 mm.

**Conclusions:** In the present study, collagen membrane proved to give better results as the interpositional graft material as it shows rapid epithelization and minimum wound contracture.

**Keywords:** Cheek flexibility, Collagen, Mouth opening, Oral submucous fibrosis, Surgical management

**How to cite this article:** Thakkar JP, Milankumar F, Rai AB, Bulgannawar BA, Patel C, Thakkar PG. Clinical Evaluation of Collagen in Surgical Management of Oral Submucous Fibrosis. *Int J Oral Care Res* 2018;6(1):S94-97.

**Source of support:** Nil

**Conflicts of interest:** None

<sup>1</sup>Assistant Professor, <sup>2</sup>Senior Resident, <sup>3</sup>Head, <sup>4</sup>Associate Professor, <sup>5</sup>Tutor, <sup>6</sup>Senior Lecturer

<sup>1</sup>Department of Dentistry, GMERS Medical College and Hospital, Vadnagar, Gujarat, India

<sup>2</sup>Department of Dentistry, GMERS Medical College and Hospital, Valsad, Gujarat, India

<sup>3,4</sup>Department of Oral and Maxillofacial Surgery, Pacific Dental College and Hospital, Udaipur, Rajasthan, India

<sup>5</sup>Department of Oral and Maxillofacial Surgery, Siddhapur Dental College and Hospital, Siddhapur, Gujarat, India

<sup>6</sup>Department of Pedodontics, Pacific Dental College and Hospital, Udaipur, Rajasthan, India

**Corresponding Author:** Dr. Faldu Milankumar, Senior Resident, Department of Dentistry, GMERS Medical College and Hospital, Valsad, Gujarat, India. e-mail: Dr.milan86@gmail.com

## INTRODUCTION

Oral submucous fibrosis (OSMF) is a chronic, debilitating disease characterized by juxtaepithelial fibrosis of the oral cavity. It is regarded as a precancerous and potentially malignant condition. OSMF is essentially a disease of collagen metabolism, but despite research spanning >3 decades, its pathogenesis is still not fully understood. There is compelling evidence that the areca nut has a primary role in the development of OSMF, but it has yet to be elucidated, and areca nut contains alkaloids, flavonoids, and copper, which all interfere with homeostasis of the extracellular matrix. Four alkaloids – arecoline (most potent), arecaidine, guvacine, and guvacoline – are known to stimulate fibroblasts to produce collagen.<sup>[1]</sup> Flavonoids (tannins and catechins) inhibit collagenase, stabilize the collagen fibrils, and render them resistant to degradation by collagenase, continually chewing areca nut leading to increased activity of the masticatory muscles, depletion of glycogen, and muscle fatigue. The reduced blood supply following fibrosis further promotes muscle fatigue and causes extensive degeneration and fibrosis in the muscles. Another two possible overlapping mechanisms are autoimmune factors and genetic predisposition. It seems likely that OSMF is a multifactorial disease with initiators, promoters, and other modifying cofactors.<sup>[2]</sup> Management aims to reverse or alleviate these signs and symptoms, stop the disease progressing, and minimize the risk of malignant transformation. The current protocol for the management of OSMF can be divided into three broad groups: Surgical, physical, and medical treatments. In the present study, different modalities in the management of OSMF have been discussed and the use of collagen membrane as a biologic dressing material on raw wounds is suggested following the release of fibrous bands. Collagen is a biological product and has the advantage of being more non-antigenic, excellent tissue compatibility, and easy availability. It has been extensively tried as temporary dressing material in other surgical field.<sup>[3]</sup> The study was based on clinical parameters to evaluate the acceptance of collagen as a biological dressing material as well as its effects on the raw wounds in oral cavity after surgical treatment of OSMF.

## MATERIALS AND METHODS

The present study was conducted in the Department of Oral and Maxillofacial Surgery of Pacific Dental College and Hospital, Udaipur, Rajasthan. The study population consisted of five patients who visited to the Oral Surgery Department complaining of restricted mouth opening and who were diagnosed as OSMF on clinical examination.

### Pre-operative Preparation

Patient was evaluated for medical fitness and pre-anesthetic checkup. Written and explained consent was taken from the patient for surgical procedures under general anesthesia and to participate in the study and to attend regular follow-up. Patient was kept empty stomach from the previous night.

### Surgical Procedure

Interincisal opening was measured with Vernier caliper pre-operatively. Local anesthesia with adrenaline was infiltrated in buccal mucosa where bands are palpable. The incision started entirely from the inner aspect of the buccal mucosa behind the commissure of the lip and extended posteriorly preferably up to the pterygo-mandibular raphe region, depending on the location of fibrotic bands. The incision was carried out to the depth of the submucosal layer, and fibrous bands were released. Local anesthesia with adrenaline was infiltrated in the opposite side and the same procedure was done. Interincisal distance was checked using Vernier caliper, and the raw wounds were covered by collagen membrane as a biologic dressing material. The graft was reconstituted by immersion in normal saline for 5 min and then cut with scissors to required shape, leaving a small overlap on the remaining mucous membrane. The grafts were sutured all along the periphery, and if required, quilting sutures were placed to attain close apposition to underlying tissues and to reduce the dead space. Hemostasis was achieved. Mouth opening was again measured. Betadine mouthwash was recommended from the 1<sup>st</sup> post-operative day. From 3<sup>rd</sup> post-operative day, physiotherapy exercise has been guided and advocated with the Hyster's mouth gag and ice-cream sticks. Patients were discharged on the 5<sup>th</sup> post-operative day. All the necessary post-operative instructions were given and follow-up has been done on regular basis.

## RESULTS

The present study was aimed to evaluate the versatility of collagen membrane as a biological dressing material to cover raw wound created after excision of fibrous band in OSMF. Five patients reported to the

Department of Oral and Maxillofacial Surgery, Pacific Dental College and Hospital, Udaipur, Rajasthan, with the complaint of restricted mouth opening. Duration of habit of patients in the present study (in months) shows that the mean duration of habits of four patients was 118.5 months and one patient did not have any habit, but she had sharp cusp which was impinging on the buccal mucosa for 4 years. Regarding clinical staging of patients, three patients had Stage II OSMF, one was in Stage III, and one had Stage I. In respect to burning sensation, three patients had moderate burning sensation, while other two complained of mild burning sensation preoperatively. Evaluating postoperatively after 3 months, three patients had no burning sensation, while two complained of mild burning sensation. At the end of 6 months, two patients complained of only mild burning sensation. The pre-operative evaluation in the present study reveals mild blanching of mucosa in two patients, moderate blanching of mucosa in two patients, and severe blanching of mucosa in one patient. Postoperatively at 3 months, there was no blanching of mucosa in three patients and two patients had mild blanching of mucosa which remained persistent after 6 months. The mean pre-operative mouth opening was 15.80 mm; after bilateral release of fibrous band, intra-operative mouth opening achieved was 34 mm; on 2<sup>nd</sup> post-operative day, it was 20.40 mm; on 7<sup>th</sup> post-operative day, it was 24.60 mm; after 2 weeks, it was 24.80; after 1 month, it was 24.40 mm; after 3 months, it was 25.70 mm; and after 6 months, it was 25.20 mm [Table 1]. Our study showed pre-operative mean cheek flexibility as 4.60 mm; after 1 month postoperatively, it was 10.50 mm; after 3 months, it was 11.10 mm; and after 6 months, it was 11.50 mm [Graph 1]. There was no cheek swelling preoperatively in our study group. Cheek swelling was mild in two patients after two days postoperatively, and there was no swelling at the end of 7<sup>th</sup> post-operative day [Table 2]. On the 2<sup>nd</sup> post-operative week, granulation on buccal mucosa was fair in two patients and good in three patients, and after 1 month, it was fair in one patient and good in four patients [Table 3]. In our study preoperatively, three patients had mild pain and two patients had moderate pain. On 2<sup>nd</sup> post-operative day, three patients had mild, whereas two patients had moderate pain. On 7<sup>th</sup> day, only one patient had mild pain; after 3 months postoperatively, two patients had mild pain; and after 6 months postoperatively, none of the patients had pain.

## DISCUSSION

At first, OSMF was thought to be idiopathic, but it was later concluded to be multifactorial in origin, and

**Table 1: Mouth opening**

Pre-operative	Intra operative	Post-operative 2 days	Post-operative 7 days	Post-operative 2 weeks	Post-operative 1 month	Post-operative 3 months	Post-operative 6 months
14	30	19	22	22	23	23	23
7	26	12	16	18	21	21	23
35	45	25	35	38	40	40	45
17	36	26	30	24	24	24	22
6	33	20	20	21	15	15	13

**Table 2: Swelling**

Pre-operative	2 days	7 days
0	1	0
0	0	0
0	0	0
0	0	0
0	1	0

0: No swelling, 1: Mild swelling, 2: Moderate swelling, 3: Severe swelling

**Table 3: Granulation**

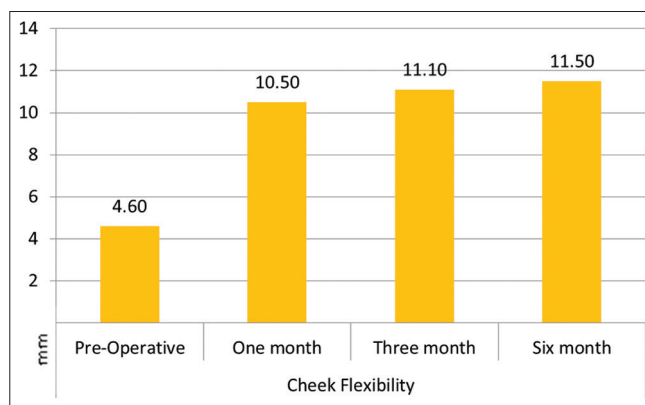
Granulation after 2 weeks	Granulation after 1 month
Fair	Fair
Good	Good
Good	Good
Fair	Good
Good	Good

Good: Involving entire wound, Fair: Nearly entire wound, Poor: Inadequate

possible etiological factors include capsaicin in chillies, iron, zinc, and deficiencies in essential vitamins; various epidemiological studies, large cross-sectional surveys, case-control studies, and cohort and intervention studies have provided overwhelming evidence that areca nut is the main etiological factor in OSMF. A range of case-control studies have given convincing evidence that there is a definite dose-dependent relation between areca nut and causation of the disease, and it is well known that the onset of the disease is directly proportional to the concentration, incidence, and duration of chewing the nut (without tobacco).

In the present study, two patients were male and three patients were female which show that less incidence of male patients in our study. A study by Rajendran has also shown higher incidence of OSMF in female patient due to chronic deficiency of iron and/or Vitamin B complex.<sup>[4]</sup>

Since our study group was severely affected by OSMF, medical or conservative management was not considered to be adequate to fulfill the expectations of the patients. Drug therapy was considered as an adjunct to surgical therapy. Discontinuation of the habit was the primary requisite before the beginning of the study. The surgical treatment involves excision of fibrous bands and forceful mouth opening resulting in a raw wound surface. According to Ashley's principles



**Graph 1: Cheek flexibility**

of plastic surgery, covering the raw wound is necessary to prevent infection, tissue contracture, and scarring. To cover this wound by various flaps, ranging from split-thickness skin graft to nasolabial flap has been tried, but each has its own limitations.<sup>[3,5]</sup>

Results with skin grafting to cover the raw areas have been disappointing as the incidence of shrinkage, contracture, and rejection of graft was found to be very high,<sup>[2]</sup> release of fibrous bands and split-thickness skin grafting has a high recurrence from contracture. The survival of full-thickness skin grafts is questionable.<sup>[6,7]</sup> Kavarana and Bhathena<sup>[8]</sup> and Borle *et al.*<sup>[6]</sup> had successfully used nasolabial flaps in the management of OSMF, but sometimes it may be too small to cover the whole defect, and it also causes a visible scar on face and is often hair-bearing.<sup>[2]</sup> In the present study, collagen was used as an alternative to the other materials to cover the raw areas during the initial phase of healing. Its use is a technically easy procedure, and it is easily available and it avoids secondary surgery at donor site.<sup>[9]</sup> It does not imitate the adjacent tissues and accelerates the healing rate. It also reduces the repeated dressings and post-treatment care.<sup>[10]</sup> Nataraj *et al.*<sup>[11]</sup> and Paramhans *et al.*<sup>[12]</sup> have used collagen in surgical management of OSMF and they have found better mouth opening postoperatively due to their faster epithelization rate and less wound contracture and obviate the need for a flap. None of our cases showed any adverse reaction to the collagen, proving its safety as a biological dressing. Granulation and epithelization were good and wound contracture

was less comparatively. The appearance of grafted area was restored to normal texture in about 3 weeks. These results are similar to the observations in the previous studies by Rastogi *et al.*<sup>[10]</sup> and Nataraj *et al.*<sup>[11]</sup> From the observations of our study, we feel that treatment of OSMF patients should be aimed (1) to improve the mouth opening, (2) to reduce the burning sensation, and (3) to improve the elasticity of buccal mucosa, tongue protrusion, and cheek flexibility by (a) surgical detachment of fibrous bands, (b) covering the defect with biological acceptable graft material, (c) avoiding donor site morbidity and surgical procedure, and (d) preventing post-surgical complications and infection with strict rehabilitation regime made mandatory for the patients in the maintenance phase.

Due to the simple chairside application and good tolerance of the membrane by oral tissues, collagen can be advocated as a temporary dressing material in orofacial region.<sup>[13,14]</sup> It is an alternative to autologous grafts rather than being a replacement of other grafts used in orofacial region and can be viewed as a satisfactory additional armamentarium to oral surgeons.<sup>[10]</sup> Whatever the graft being used, the treatment should be coupled with cessation of betel quid/gutkha chewing and daily mouth opening exercises and proper nutrition to manage properly both early and advanced stages of OSMF.

## CONCLUSIONS

In the present study collagen membrane proved to give better results as the interpositional graft material as it shows rapid epithelization and minimum wound contracture. No additional donor site surgery for grafting was required. Excision of fibrous bands and placement of collagen membrane help to maintain the mouth opening and flexibility of buccal mucosa with reduction of burning sensation. It can definitely be used as an alternative to other autologous grafts in covering the defects of orofacial region. Vigorous mouth opening exercises, cessation of habits, and improvement in the nutritional status are must for better results post-operatively. However, further studies should be conducted, to evaluate the efficacy of collagen membrane in large sample size.

## REFERENCES

- Huang IY, Wu CF, Shen YS, Yang CF, Shieh TY, Hsu HJ, *et al.* Importance of patient's cooperation in surgical treatment for oral submucous fibrosis. *J Oral Maxillofac Surg* 2008;66:699-703.
- Khanna JN, Andrade NN. Oral submucous fibrosis: A new concept in surgical management. Report of 100 cases. *Int J Oral Maxillofac Surg* 1995;24:433-9.
- Yeh CJ. Application of the buccal fat pad to the surgical treatment of oral submucous fibrosis. *Int J Oral Maxillofac Surg* 1996;25:130-3.
- Rajendran R. Oral submucous fibrosis: Etiology, pathogenesis, and future research. *Bull World Health Organ* 1994;72:985-96.
- Tsao CK, Wei FC, Chang YM. Reconstruction of the buccal mucosa following release for submucous fibrosis using two radial forearm flaps from a single donor site. *J Plast Reconstr Aesthetic Surg* 2010;63:1117-23.
- Borle RM, Nimonkar PV, Rajan R. Extended nasolabial flaps in the management of oral submucous fibrosis. *Br J Oral Maxillofac Surg* 2009;47:382-5.
- Prasad LK, Chakravarthy PS, Sridhar M, Ramkumar, Krishna SS, Vivekanand SK, *et al.* An evaluation of various surgical treatment modalities in the management of oral submucous fibrosis a clinical study. *J Orofac Sci* 2009;1:17-20.
- Kavarana NM, Bhatena HM. Surgery for severe trismus in submucous fibrosis. *Br J Plast Surg* 1987;40:407-9.
- Mehrotra D, Pradhan R, Gupta S. Retrospective comparison of surgical treatment modalities in 100 patients with oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009;107:e1-10.
- Rastogi S, Modi M, Sathian B. The efficacy of collagen membrane as a biodegradable wound dressing material for surgical defects of oral mucosa: A prospective study. *J Oral Maxillofac Surg* 2009;67:1600-6.
- Nataraj S, Guruprasad Y, Shetty JN. A comparative clinical evaluation of buccal fat pad and collagen in surgical management of oral submucous fibrosis. *Arch Dent Sci* 2011;2:17-24.
- Paramhans D, Mathur RK, Newaskar V, Shukla S, Sudrania MK. Role of collagen membrane for reconstruction of buccal defects following fibrotic band excision and coronoidectomy in oral submucous fibrosis. *World Artic Ear Nose Throat* 2010;3:1-3.
- Haider SM, Merchant AT, Fikree FF, Rahbar MH. Clinical and functional staging of oral submucous fibrosis. *Br J Oral Maxillofac Surg* 2000;38:12-5.
- Lai DR, Chen HR, Lin LM, Huang YL, Tsai CC. Clinical evaluation of different treatment methods for oral submucous fibrosis. A 10-year experience with 150 cases. *J Oral Pathol Med* 1995;24:402-6.