Treatment of Oral Submucous Fibrosis Using Split Skin Graft and a Polyethylene Stent: A Prospective Study

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Abstract

Aim Aim of this study was to evaluate the split skin graft held in place with a polyethylene stent for the treatment of oral submucous fibrosis.

Methods Fifteen prospective patients diagnosed clinically with oral submucous fibrosis, from June 2011 to 12 December 2012, were recruited for this study. All patients were treated surgically using the same surgical technique of fibrotomy followed by split skin graft along with a polyethylene stent. Preoperative and postoperative mouth opening measurements at 1 week and after a minimum of 6 months were evaluated by measuring the inter incisal distance.

Results Mean follow up was 9.8 months with a minimum of 6 months. Mean preoperative mouth opening was 12.9 mm (6–20 mm). Intraoperatively mean mouth opening was 37.9 mm (36–41 mm). After 1 week mean mouth opening was 35.8 mm (31–40 mm). At 6 months follow up, mean mouth opening was 33 mm (20–40 mm).

Conclusion Fibrotomy followed by split skin graft along with a polyethylene sheet stent and sufficient postoperative physiotherapy is a simple, cost effective and viable treatment modality for oral submucous fibrosis.

Keywords Oral submucous fibrosis · Polyethylene stent · Fibrotomy

Introduction

Pindborg and Sirsat defined oral submucous fibrosis (OSMF) as, “An insidious chronic disease affecting any part of the oral cavity and sometimes the pharynx. Although occasionally preceded by and/or associated with vesicle formation, it is always associated with a juxta-epithelial inflammatory reaction, followed by a fibroelastic change of the lamina propria, with epithelial atrophy, leading to stiffness of the oral mucosa and causing trismus and inability to eat [1]”.

It is a chronic insidious disease that has been identified as a precancerous condition, with a potential for malignant transformation of 7–30 % [2]. OSMF is mainly attributed to the chewing of areca nut [3, 4] and is seen in high incidence in countries that chew products of the areca nut like India, Bangladesh, Sri Lanka and Pakistan. Areca nut chewing is said to result in the activation of a cascade of matrix metalloproteinases and other enzymes which ultimately result in promotion of fibrogenesis [5].

When there is marked limitation of mouth opening due to said fibrosis, the choice of treatment is surgical. Various treatment modalities exist, with varying results. We present our experience using a split skin graft held in place using a polyethylene stent in the treatment of OSMF.

Materials and Methods

In this prospective series, 15 patients with OSMF were treated from June 2011 to December of 2012 in Saveetha Dental College and Hospitals. The study was reviewed and approved by the institutional ethical committee. Informed consent was obtained from each patient enrolled in the study. Nine male and 6 female patients were included in this study. The age range was between 27 and 54 years (Mean 38.6 years). All

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Table 1 Mouth opening measurements at various time intervals

No.	Age	Sex	Preoperative mouth opening	Intraoperative mouth opening	Postoperative mouth opening- 1 week	Postoperative mouth opening- 6 months	Follow up duration- months
1	37	M	16	36	35	33	10
2	36	F	17	37	35	39	12
3	27	F	18	38	37	35	7
4	28	M	8	40	39	37	8
5	51	F	17	36	33	25	11
6	34	M	9	37	37	35	12
7	41	M	12	36	35	38	13
8	40	F	10	38	35	32	8
9	52	M	8	37	31	20	6
10	54	M	11	39	35	34	14
11	42	F	10	39	37	36	9
12	31	M	20	41	40	38	9
13	44	F	14	39	36	29	10
14	29	M	17	38	36	40	12
15	33	M	6	37	35	32	6

patients reported with limited mouth opening of <20 mm at preoperative measurement. All patients were treated using the same method. Mouth opening was evaluated preoperatively and postoperatively by measuring the inter incisal distance using a pair of calipers.

All the operations were performed under general anaesthesia via fibre optic nasal intubation. A standard fibrotomy was carried out in the buccal mucosa bilaterally for all patients. Incisions were made using electrosurgical cautery along the buccal mucosa, bearing in mind the anatomic position of Stenson's duct orifice. The fibrotomy was carried out posteriorly up to the anterior tonsillar pillars and up to the corner of the mouth depending on the clinical presentation of the fibrous bands. Further fibrotic bands were palpated and freed by finger manipulation until no restrictions were felt.

A mouth opening of minimum 35 mm on table was considered adequate [6]. If adequate mouth opening could not be achieved, bilateral coronoidectomy was carried out after extending and deepening the pre-existing wounds.

A surgical stent was prepared preoperatively by cutting a polyethylene sheet into an oval shape. The stent was kept in 2 % glutaraldehyde solution overnight to ensure sterility. Intra operatively, the stent was cut into the adequate size for each patient. Split skin grafts were harvested and prepared from each patient's thigh. The grafts are stretched over the surgical stent and adapted onto the raw wound area. The graft and stent were secured by through-and-through bolster 2-0 silk sutures.

The stent was kept in place for 7 days, following which it was removed. All patients were admitted in hospital for that duration. Also all patients received nasogastric tube feed for the duration of admission. The surgical stent kept

each patient's mouth open for the duration of hospital stay. They also received prophylactic antibiotics for 3 days postoperatively. Physiotherapy was initiated upon discharge. All the patients were followed up for a minimum of 6 months (Mean of 9.8 months).

Results

The mean preoperative mouth opening was 12.9 mm (range 6–20 mm). Intra operatively the mean mouth opening achieved was 37.9 mm (range 36–41 mm). All patients were discharged after removal of the stent after 7 days. On discharge, the mean mouth opening was 35.8 mm (range 31–40 mm). On 1 patient (No. 8), the skin graft did not take up and was removed along with the stent. In the rest of the patients, the skin grafts took up at the area of the wound. The donor site healed uneventfully in all patients. At 6 months follow up, the mean mouth opening was 33.5 mm (range 20–40 mm). At this duration, 7 patients had a mouth opening of <35 mm. Two patients had a mouth opening at an unacceptable level of <25 mm. The mouth opening gain preoperatively and 6 months after surgery was 20.7 mm. The results are summarised in Table 1.

Discussion

OSMF is a disease almost exclusive to the Indian sub-continent, due to the widespread habit of areca nut chewing. The disease most commonly begins as a

Fig. 1 Preoperatively prepared polyethylene stent which was cut and sterilised one day before the surgery

burning sensation and intolerance to spicy food. Ulceration and vesicle formation usually follows, after which fibrosis with paleness and blanching of the oral mucosa ensues. This results in stiffness of the tongue, lips and palate [7].

Chewing of areca nut products result in a localised mucosal inflammatory action. There is an increase in cytokines and other growth factors which then stimulate the production of collagen via procollagen genes and enzymes. Lysyl oxidase activity is also markedly increased. Also there is an inhibition of collagen degradation. All in all, there is promotion of localised fibrogenesis and inhibition of fibrinogenic breakdown [8].

Current treatment for OSMF includes both surgical and conservative management. Conservative management includes the use of antioxidants, corticosteroid injections and proteolytic agents [9, 10]. Surgical management commonly involves incision and release of fibrous bands followed by covering the raw wound area with suitable grafts and flaps like split skin grafts [11], buccal fat pad [12], or other local flaps [13, 14].

In this series of patients, we utilised a split skin graft with a cheap and easily available polyethylene stent, which was cut from an empty intravenous saline bottle and sterilised appropriately. The stent allowed the graft to be spread sufficiently over the raw area. Also the semi rigid stent keeps the patients' mouth open in the immediate post-operative period which might contribute to success in regaining mouth opening later. The stent helps in securing the skin graft to the wound, and this was done with the aid of bolster sutures through the cheek. Only in 1 patient did a graft fail to take up at the wound area in this series of patients. However it did not affect the

Fig. 2 Outer surface of skin graft stretched over the stent

clinical outcome of the patient and the wound healed uneventfully, albeit taking a little longer. Also the stent adapted to the buccal mucosa is more comfortable than an occlusal block used to prop the mouth open (Figs. 1, 2, 3, 4, 5).

Routine coronoidectomy and temporalis myotomy were not performed in all cases [14]. Only those patients in whom satisfactory mouth opening was not achieved on table were subjected to the procedure. In this series of patients, 3 patients (numbers 3, 10 and 13) received this procedure. It was unnecessary to subject all the cases to additional trauma from the surgery.

All patients were taught mouth opening exercises. In 2 patients who recorded an unsatisfactory 6 month mouth opening of <25 mm, they admitted to not performing regular physiotherapy, especially early after discharge. Active mouth opening exercise is one of the main factors behind surgical success [15], and the authors believe without active physiotherapy any form of surgical treatment for OSMF will not succeed. Failure to perform postoperative physiotherapy was mainly due to pain intolerance.

The drawbacks of this method of treatment include harvesting the graft results in a second surgical site and the stent results in discomfort for the first week after surgery. Also, unlike the buccal fat pad [16], it depends on the raw area for survival of the graft.

The split skin graft, although an older technique, is still a viable option for the treatment of OSMF. At our centre this method still gives comparable results with newer treatment modalities. This combined with a simple polyethylene stent, provides the surgeon with a cheap and cost effective method to treating OSMF. However it has to be remembered that patient compliance is of utmost importance in the success of surgical treatment. Future studies should aim at comparing various modalities of treatment

Fig. 3 Following fibrotomy to release the fibrous bands and checking for intraoperative mouth opening adequacy, the stent along with the graft is then placed and seated along the raw buccal mucosa, following which it is secured with bolster sutures

Fig. 4 Extraoral view of bilateral bolster sutures after fibrotomy with skin grafting and stent in place

for OSMF to identify the most effective and predictable procedure for successful treatment.

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Fig. 5 Postoperative photograph depicting healing of surgical site with uptake of skin graft after 6 months