A Cross Sectional Study of Oral Submucous Fibrosis in Central India and the Effect of Local Triamcinolone Therapy

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Abstract The use of processed arecanut is on the increase. In the impending danger of increased occurrence of oral submucous fibrosis and subsequent oral cancer following this habit is colossal. So an attempt is made to clinically evaluate the condition and to evaluate the effect of triamcinolone on this condition. Using the clinical data collected from the patients presenting in the ENT OPD of NSCB Medical College Hospital, Jabalpur, a cross sectional study was done and the effect of intralesional triamcinolone on this condition is noted by biweekly submucosal injections of 40 mg triamcinolone for 12 weeks and followed up for 1 year. The effect of therapy was evaluated subjectively by improvement in symptoms and objectively by increase in mouth opening. The age of occurrence and sex predilection also showed a significant change with more young males being affected by the condition. There was no significant correlation between effect of triamcinolone therapy and duration of addiction but a significant correlation ($P < 0.0001$) was noted with the frequency of addiction per day. A significant improvement in mouth opening is observed following local triamcinolone therapy. The results imply that the exposure and the frequency of chewing habits, and not mere the duration that is significant in producing the condition and affecting the treatment outcome. Local triamcinolone therapy has good effect in the initial stages of the disease. The fact that more youngsters are being affected needs serious consideration.

Keywords Oral submucous fibrosis · Triamcinolone · Arecanut · Tobacco · Gutkha · Trismus

Introduction

Oral submucous fibrosis (OSMF) is a chronic progressive and irreversible disease affecting the oral, oropharyngeal and sometimes the esophageal mucosa. OSMF is a disease that causes changes similar to those of systemic sclerosis (scleroderma) but limited to oral tissues. The disease is seen in those from Indian subcontinent and from many parts of South-East Asia such as Taiwan.

In their review, Pillai et al. [1] concluded that the etiology is unknown but is probably multifactorial. Main contributing factor as thought by Jayanthi et al. [2] is the use of pan which typically consists of areca nut, tobacco and crude lime wrapped in betel leaf. Experimentally, an alkaloid component of the areca nut, “Arecoline” can induce fibroblast proliferation and collagen synthesis and may penetrate the oral mucosa to cause progressive cross linking of collagen fibres [3, 4]. Tobacco chewing and smoking are not considered to play a role in the development of this disease. In this study we tried to analyze various clinico pathological aspect of the oral submucous fibrosis including the natural course of the disease and the effect of treatment with local triamcinolone.

Materials and Methods

The present study was conducted over a period of one year. Study included 52 patients of OSMF, attending ENT Department of NSCB Medical College Jabalpur, M.P, Central India. Patients complaints were noted, history of

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chewing pan, pan masala, gutkha and areca nut with frequency and duration of use obtained in detail and thorough ENT checkups were done, with special attention being paid to ulceration of mucosa, white fibrotic bands and extent of lesion causing difficulty in opening mouth as well as in protrusion of tongue. Ear was examined for the state of tympanic membrane. Anterior and posterior rhinoscopy was performed to rule out nasal pathology as routine part of ENT examination. The diagnosis of Oral Submucous Fibrosis was made based on the clinical features and no biopsy was taken as any insult to oral mucosa was found to enhance fibrosis.

All patients were asked to quit tobacco chewing and were managed with local injections of triamcinolone acetate, which was given at biweekly intervals at the dose of 40 mg at a time, on multiple sites in the oral cavity using insulin syringe for a period of 12 weeks. Only insulin syringe was used and no other methods (e.g. L.P needle) were used for injection as they were more traumatic. Patients were also given vitamin A, oral multivitamin and iron supplementation and were followed up and results of treatment noted based on the increase in mouth opening objectively and the improvement of other symptoms subjectively. Hyaluronidase which is commonly used for treatment of oral submucous fibrosis is not used in this study group. The patients were followed up for a period of 1 year.

Statistical Analysis

In this study following statistical methods are used;

Mean

Defined as sum of values (ΣX) divided by the no of values (N) and denoted by $\bar{X}$. i.e. $\bar{X} = (\Sigma X)/N$.

Standard Deviation

The most important and widely used measure for studying deviation, known as the root mean square deviation and denoted by (sigma)

$$S = \sqrt{\frac{\sum_{i=1}^N (X_i - \bar{X})^2}{N - 1}}$$

where Σ is sum of values, X is value of variable, $\bar{X}$ is mean and N is no of observations.

Paired t Test

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1 X_2} \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where

$$S_{X_1 X_2} = \sqrt{\frac{(n_1 - 1)S_{X_1}^2 + (n_2 - 1)S_{X_2}^2}{n_1 + n_2 - 2}}$$

n = number of participants, 1 = group one, 2 = group two. $n - 1$ is the number of degrees of freedom for either group, and the total sample size minus two (that is, $n_1 + n_2 - 2$) is the total number of degrees of freedom, which is used in significance testing.

Pearson's Correlation Coefficient

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\left(\sum X^2 - \frac{(\sum X)^2}{N}\right) \left(\sum Y^2 - \frac{(\sum Y)^2}{N}\right)}}$$

where X is group 1, Y is group 2 and N is number of observations.

P Value (Probability of Difference)

- $P > 0.05$ —Difference is not significant (NS)
- $P \leq 0.05$ —Difference is significant (S)
- $P < 0.01$ —Difference is highly significant (HS)

$P < 0.001$ —Difference is very highly significant (HS).

Results

Almost of the 52 patients of OSMF, one boy was of 10 years and nine were in age group of 11–20 years, 25 patients were in the age group of 21–30 years, 14 cases belonged to 4th decade, two patients were between 41 and 50 and the remaining one patient was above 50.

Males were much more commonly affected than females with 37 males and 15 females.

The most commonly used arecanut product was gutkha which is the commercially available as packets or prepared manually by mixing arecanut, tobacco and lime. 29 out of 52 patients (55.77%) were using this preparation and 12 patients were in the habit of using supari which contained arecanut only, 10 patients used betelquid which is a traditional preparation with pan, tobacco, arecanut, and lime, and one patient was not having any addictions. This shows that the commercially available processed arecanut in gutkha and supari are more harmful than the traditional preparations like betelquid.

Duration of the chewing habit along with their frequency of chewing was also noted. 21 patients (40.38%) had a chewing habit of less than 5 years and 17 had for 6–10 (32.69%) years and 6 (11.54%) had for 11–15 years. The mean duration was 7.12 with a standard deviation of 4.74. Most of the patients (29/52, 55.77%) had a frequency

Table 1 Mean interincisal mouth opening in millimeters in patients treated with inj. triamcinolone

	Mean	<i>d</i>	<i>t</i>	<i>df</i>	S.E	<i>P</i> value
Pretreatment, mean interincisal mouth opening in mm (<i>n</i> = 52)	19.9 ± 4.35	7.46 ± 5.83	18.4925	49	0.442	<i>P</i> < 0.0001
Post treatment, mean interincisal mouth opening in mm (<i>n</i> = 51)	26.96 ± 7.97					Highly significant

A highly significant improvement in the interincisal mouth opening is seen following treatment in study group with submucosal injection of triamcinolone

d Difference in mean, *t* paired *t* test, *df* degree of freedom, *n* number of observations, *S.E* standard error

of 6–10 times/day and only 3 patients who chewed less than 5 times/day were affected. Rest of patients were of the habit of chewing 11–15 times/day. The mean frequency was 8.20 with a standard deviation of 2.55.

The most interesting fact in the study was that, all patients after knowing the dangerous effects of areca nut, completely stayed away from using it even though that was very difficult.

All of the 52 patients complained of difficulty in mouth opening and burning sensation in the oral cavity followed by retrosternal pain complained by 16 patients. Change of taste, pain in throat, difficulty in swallowing, nasal tone of voice, and pain in the ear were present in 6, 5, 3, 3, and 2 patients, respectively. No patients presented in the initial stage of disease with normal mouth opening and with vesicles in the oral cavity.

Trismus was present in all 52 patients. The mouth opening was 26–30 in 8 patients (15.38%) 21–25 in 19 patients (36.54%), 16–20 in 19 patients (36.54%) 11–15 in 4 patients (7.69%) and <10 in 2 patients (3.85%). Blanching of buccal mucosa and soft palate was present in all 52 patients (100%). 40 patients (76.92%) had blanching of the uvula, 37 patients (71.15%) of pillars, and 6 patients (11.54%) had involvement of tongue and lips were involved in 3 patients (5.77%) In 36 patients (69.23%) the oro dental hygiene was found to be poor. Palatal perforation was present in two patients (3.84%).

Out of 50 patients treated 21 (42%) patients showed increase in mouth opening of greater than 11 mm and 19 (38%) patients showed an increase of 6–10 mm and the rest 10 patients showed an increase of less than 5 mm.

The patients with less than 5 mm increase in mouth opening after the complete course were considered to be non responding to therapy or failure cases.

A highly significant improvement (*P* < 0.0001) in the interincisal mouth opening is seen following treatment in study group with submucosal injection of triamcinolone.

There was a highly significant correlation (*P* = 0.0001) between initial mouth opening and the increase in mouth opening following treatment.

There was no statistically significant relation (*P* = 0.184) between increase in mouth opening and the duration of the addiction of the patient.

Table 2 Correlation between increase in mouth opening and initial mouth opening

<i>r</i>	<i>df</i>	<i>P</i> value
0.79	49	<i>P</i> < 0.0001 Highly significant

There is a highly significant correlation between initial mouth opening and the increase in mouth opening following treatment

r Coefficient of correlation, *df* degree of freedom

Table 3 Correlation between increase in mouth opening and duration of addictions

<i>r</i>	<i>df</i>	<i>P</i> value
0.189	49	<i>P</i> = 0.184 Not statistically significant

There is no statistically significant relation between increase in mouth opening and the duration of the addiction of the patient

r Coefficient of correlation, *df* degree of freedom

Table 4 Correlation between increase in mouth opening and frequency of addictions

<i>r</i>	<i>df</i>	<i>P</i> value
−0.458	49	<i>P</i> = 0.0007 Highly significant

There is a highly significant negative correlation between frequency of addiction and increase in mouth opening

r Coefficient of correlation, *df* degree of freedom

There was a highly significant (*P* = 0.0007) negative correlation between frequency of addiction and increase in mouth opening.

None of the patients showed a decrease in mouth opening after the treatment, for 1 year. Tables 1, 2, 3 and 4.

Discussion

Mostly the patients belonged to 3rd and 2nd decade due to increase in the habits of chewing of pan, betel nut and pan masala (gutkha) in this age group. The results of this study shows that chronic irritation caused by chewing of pan,

betel nut, pan masala, tobacco and other habits like smoking, excessive use of chillies/spices can lead to fibrotic changes in oral mucosa similar to the observations made by Sirsat and Khandolkar. Dayal PK et al. [3] had found male predominance (M:F = 4.2:1) in their study. This is consistent with this present study, which showed, a very strong male predilection 3:1. (%). Earlier there was definite female predilection as reported by Pindborg et al. But recently there is a paradigm shift in this aspect. Considering the fact that the availability of processed areca nut and the wide spread acceptance of its use may be the reason why there is a male predominance.

All of the patients in the present study had a common complaint of trismus (difficulty in opening the mouth) and burning sensation in the mouth. Some of the other less common complaints were retrosternal burning pain, pain in throat, change of taste, difficulty in swallowing etc. The main symptoms in the cases studied by Desa [9] were recurrent stomatitis, trismus, inability to blow the cheeks and inability to protrude the tongue.

All of the patients in the present study group were having trismus. The 52 cases had an average interincisal mouth opening of 19.5 mm though it ranged from 9 to 26 mm before treatment. Desa [9] in his study found that trismus was present in 35 out of 64 cases. Blanching of oral mucosa with areas of fibrosis is diagnostic of submucous fibrosis as described by all other previous workers.

R. M. Borle and S. R. Borle [10] treated 326 OSMF patients; one subgroup of patients received systemic antioxidants and another subgroup received submucosal triamcinolone injections. They noted that the subgroup of patients treated with antioxidants showed better overall improvement and the number of patients having relapse was lower than those treated with triamcinolone injections. A majority of group one patients had symptomatic relief within 1 week of treatment initiation. No improvement of trismus was noted. The disease became reactivated within 3–4 months. Group 2 patients had symptomatic relief after a 2 weeks period. A relapse to eruptive phase was seen in 4–6 months, but lesser number of patients had relapse when compared to group one patients.

Similarly in this study, all the patients stopped their habit of chewing from the beginning of treatment and following treatment we found improvement in trismus, recurrent ulcerations, burning sensation in oral cavity, and also in blanching of oral mucosa. However, since these

parameters need subjective evaluation, objective parameter of inter-incisal mouth opening was used as a criterion to assess the clinical improvement. Highly significant improvement in inter-incisal mouth opening was noted following treatment as compared to pre treatment mouth opening. Paired *t* test was applied. (Pre-treatment mean inter-incisal mouth opening 19.9 ± 4.35 mm. Post treatment mean inter-incisal mouth opening 26.96 ± 7.97 mm) ($t = 18.4925$, $P < 0.0001$).

Conclusion

The present study shows that there is significant effect of triamcinolone in the treatment of oral submucous fibrosis and its effect depends on the stage of presentation and on the frequency of the chewing habits of the patients and not on the duration of the habits.

Therefore, it has been concluded that most important measure is prevention, and that the use of pan/gutkha/pan masala should be forbidden in patients.

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