

Effects of Oral Submucous Fibrosis on Auditory Tube Function: A Case–control Study

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Abstract

Background: Oral submucous fibrosis (OSMF) is a precancerous condition, recognized as collagen disease with resemblance to localized scleroderma. The study is to analyze the middle ear pressure of OSMF patients of various grades of disease.

Materials and Methods: A total of 40 OSMF patients (80 ears) and 40 healthy controls (80 ears) were analyzed for middle ear pressure by the use of impedance audiometry.

Results: The impedance audiometry test shows statistically significant difference in middle ear pressure of OSMF patients and control.

Conclusion: The study suggests that the middle ear pressure may be affected by disease and its progression.

Key words: Impedance audiometry, Middle ear pressure, Oral submucous fibrosis

INTRODUCTION

Oral submucous fibrosis (OSMF) is a chronic, insidious process characterized by juxtaepithelial deposition of fibrous tissue followed by fibroelastic changes of lamina propria with epithelial atrophy causing trismus and inability in total.^[1] The disease is having great resemblance to localized scleroderma. The disease is having great resemblance to localized scleroderma, although vesicle formation use to occur.

The most common cause is chewing areca nut,^[2] although other causes are chronic iron and Vitamin B-complex deficiency, autoimmunity, hypersensitivity, and genetic predisposition.

Histopathologically changes such as edema, infiltration of inflammatory cells, excessive deposition of fibroblast,^[3] and constricted blood vessels can be seen. Severe cases of

OSMF show degenerative changes in deeper tissue along with muscle fibers.^[4,5] Changes in these muscles which are attached to auditory tube and soft palate leads to change in middle ear pressure and causes hearing impairment.^[6]

Pathogenesis of disease is mainly by reduction of phagocytes of collagen by fibroblasts, increase secretion of growth factors and decreased the production of antifibrotic cytokines.^[2]

Shah *et al.*^[7] clinically evaluated auditory tube function with the help of pure tone audiometry and found significant impairment in OSMF patients.

OSMF patients complain of soreness of mouth, intolerance to chilies and spicy foods, burning sensation of mouth, ulceration of oral mucosa, and difficulty in protruding tongue and opening mouth.^[8] Loss of hearing is due to blockage of auditory tube.^[9]

MATERIALS AND METHODS

The study was conducted at BMMSH Ranchi, India, between January 2017 and December 2017 on 40 OSMF patients with no other oral lesions and 40 age and sex-matched healthy controls after taking permission from ethical clearance of the institutional ethical committee.

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On basis of history and clinical features such as soreness of mouth, intolerance to chillies and spicy food, burning sensation of mouth, ulceration of oral mucosa, palpable fibrous bands and decrease mouth openings, the diagnosis of OSMF was established.^[10]

Patients were divided under three groups on the basis of mouth opening which was calculated using metallic caliper and scale taking edges of upper and lower jaw central incisors as reference point (0–10 mm, 11–20 mm, and 21–30 mm).

Detailed ENT examination was done by myself to rule out any other factors affecting the hearing ability and middle ear pressure.

Impedance audiometry was done using Interacoustic AT235 equipment. Small probe was inserted in auditory canal which emits low frequency (226 Hz) and continuous change of positive and negative pressure was created by pump of instrument. The compliance was measured in the form of graph, obtained of three types among which Type A is normal and Type B and C are abnormal suggesting of disease in middle ear. Shift in compliance peaks showed that the middle ear pressure is maintained and compliance peaks with no shift showed poorly function of auditory tube.

RESULTS

Subject group comprised 32 males and 8 females aged between 18 and 56 years (mean age being 28) and control group comprised 30 males and 10 females aged between 21 and 47 years (mean age being 27) [Table 1].

Comparison between mouth opening and type of curves on the basis of impedance audiometry result shows in OSMF group of 80 ears auditory tube function test revealed no shift in compliance peaks in 42 (53%) ears with –200 daPa pressure changes after swallowing. On comparing both groups, the result of auditory tube function test was highly statistically significant $P = 0.000$ [Figure 1].

On comparing mouth opening and auditory tube dysfunction, on the basis of auditory tube function test, the result obtained was statistically significant [Table 2].

DISCUSSION

OSMF is a chronic, insidious disabling disease involving oral mucosa, oropharynx, and rarely larynx.^[11] Disease characterizes by burning sensation of mouth, blanching and stiffness of oral mucosa, trismus, loss of gustatory sensation, hypomobility of soft palate and tongue, and hearing loss due to blockage of auditory tube.^[12] It affects about 0.2–1.2% of Indian population^[13,14] having male predominance.^[15] Mainly affects in the second and third decades of life. In my study, similar findings were present which was accordance with the studies of Gupta *et al.*^[16] and Shah *et al.*^[6] In the present study, most of the patients were beetle nut chewers which were also a main etiological factor for the disease to happen.

The malignant transformation of the disease is 4–13% worldwide and 7.6% in Indian population.^[17,18] Several staging and grading system proposed by various researchers on clinical and histological features.^[19,20]

Clinically, staging is done on the basis of features such as burning sensation of mouth, ulcer formation, blanching of mucosa, limited mouth opening, restricted tongue protrusion, and extension of fibrous bands.^[21,22]

Histologically in early OSMF shows fine fibrils of collagen, hypertrophic fibroblast, dilated and congested blood vessel, and edema, loss of rete pegs, and infiltration of inflammatory cells.^[3]

Pathologically changes seen in mucosa, submucosa, muscles, and deeper tissue.^[4] Binnie and Cawson reported homogeneous collagenous subepithelial zone along with degeneration of muscle fibers.^[23]

Oliver *et al.* reported that dense collagen bundles were extended into underline striated muscles.^[24]

Rajendran *et al.* reported focal lysis and hypercontraction of myofibers and extensive fatty infiltration between muscle bundles in biopsy patients of OSMF.^[4]

Palatal and paratubal muscles in the form of levator veli palatini, tensor veli palatini, tensor tympani, and salpingopharyngeus which regulate the patency and

Table 1: Age and sex distribution of OSMF subjects and controls

Age (in years)	Subjects			Controls		
	Male (n=32)	Females (n=8)	Total (n=40)	Male (n=30)	Females (n=10)	Total (n=40)
Range	18–56	28–47	18–56	21–47	25–37	21–47
Mean age	28	35	26	30	37	27

OSMF: Oral submucous fibrosis

Table 2: Result of comparison between Mouth opening and Auditory tube dysfunction

Mouth opening (in mm)	ETFT		P value
	Normal	Dysfunction	
0–10 (n=16)	0	16	P<0.05
11–20 (n=28)	12	16	
21–30 (n=36)	26	10	

ETFT: Eustachian Tube Function Test

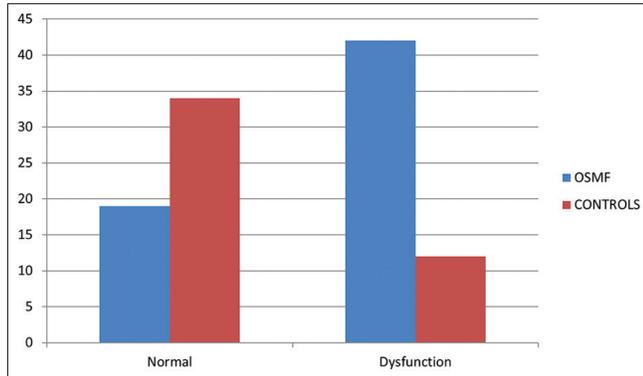


Figure 1: Result of Eustachian tube function test

function of pharyngeal orifice resulting in impairment of function and patency of auditory tube, leading to hearing loss.^[9]

CONCLUSION

From this study, it is evident that the middle ear pressure got affected by disease process and cause hearing impairment. The result can be further justified by involving more sample size and patients of OSMF.

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