Shanti Badra et al /J. Pharm. Sci. & Res. Vol. 7(10), 2015, 890-892

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Evaluation of Hearing Efficiency in Patients with Oral Sub mucous Fibrosis

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Abstract

Objective: To evaluate hearing deficit in patients with Oral Submucous Fibrosis.
Study background: A Cross Sectional study.
Subjects and methods: 20 patients who presented in Department of ENT, Sree Balaji Medical College And Hospital, clinically diagnosed as having OSMF were evaluated by audiometry.
Results: On comparing hearing loss in patients with grade I OSMF, there was a slight variation observed in values between Rt and Lt sides. Patients with grade II OSMF demonstrated hearing loss which was bilateral in 5 of the 9
patients with Conductive Hearing Loss (CHL). 4/9 patients had mild CHL on either Rt or Lt. sides. 5 cases in group II had normal hearing threshold on both sides. Patient with grade III OSMF had bilateral mild CHL.
Conclusion: Significant correlation was observed between the degree of fibrosis of the palatal muscles and hearing deficit.
Keywords: Oral submucous fibrosis; Audiometry; Conductive hearing loss

INTRODUCTION

Oral Submucous Fibrosis (OSMF) is a progressive disease of the oral cavity which was first described in detail by Joshi [1,2]. The onset of fibrosis is noted as a reduction of mouth opening and stiffening of the mucosa [3-6]. Though there are many studies of OSMF reporting fibrosis and hyalinization in the sub-epithelium, there is a paucity of information related to the involvement by fibrosis of areas adjoining the oral cavity eg. Ear (Eustachian tube), Oro-pharynx, Pharynx [6-8].

Amongst structures communicating with the oral cavity the eustachian tube (pharyngotympanic tube) connects the middle ear cavity with the nasopharynx. Opening and closing functions of the eustachian tube are physiologically important [9]. Normal opening of the eustachian tube equalizes atmospheric pressure in the middle ear; closing of the eustachian tube protects the middle ear from unwanted pressure fluctuations and loud sounds. Abnormal or impaired eustachian tube functions (i.e., impaired opening or closing) may cause pathological changes in the middle ear. This in turn can lead to hearing disabilities [9].

The eustachian tube in the adult is approximately 36 mm long and is directed downward, forward, and medially from the middle ear. It consists of 2 portions, a lateral third (12 mm), which is a bony portion arising from the anterior wall of the tympanic cavity, and medial two thirds (24 mm), which is a fibro cartilaginous portion entering the nasopharynx [10].

The main muscles attached to the eustachian tube and the soft palate are the -tensor veli palatine and levator veli palatine. These two muscles and the other accessory muscles are referred to as palatal /paratubal muscles. The cartilaginous portion of the eustachian tube and its musculature is dynamic organ and its ventilatory function and patency may be impaired if these muscles are involved [11,12].

In OSMF, there can be failure of eustachian tube to effectively regulate air pressure. As eustachian tube function worsens, air pressure of middle ear falls and ear sounds are perceived as muffled and may cause impaired hearing [13].

The aim of the present study was to evaluate the hearing deficit in patients with OSMF.

MATERIALS AND METHOD

After obtaining written informed consent, the clinical profile of the patients was worked out by taking thorough case history and clinical examination of the ear for exclusion of ear infections and any other abnormalities. Cases with no pathology of the middle ear, e.g., TM perforation, cholesteatoma, previous surgery were included in the study. Interincisal opening, duration and frequency of betelnut chewing were noted for all the patients. Depending on the Interincisal opening and the degree of fibrosis the cases were divided into grade I, II and III. The mouth opening (interincisal distance of maxillary and mandibular incisors at maximum possible mouth opening) was measured and graded .

Procedure of audiometry

Pure Tone Audiometry is the most common technique used for hearing assessment. Pure tone is delivered to the ear through headphone for air conduction and by bone vibrator for bone conduction. Hearing level in decibel above the normal threshold is plotted. The frequency tested usually ranged from 250 to 8000 Hz.

Interpretation of audiogram

The pure tone average is the average of the hearing threshold levels at 500, 1000, 2000 Hz only .The deafness can be graded into several categories by air conduction threshold.

1. 10-15 dB - Normal Hearing
2. 16-25 dB - Minimal Hearing Loss
3. 26-40 dB - Mild

4. 41-55 dB - Moderate
5. 56-70 dB - Moderate to Severe
6. 71-90 dB - Severe
7. Above 90 dB is profound deafness

When there is a hearing loss, the next step is to try and determine whether the loss is caused by a sensory problem (sensorineural hearing loss) or a mechanical problem (conductive hearing loss).

This distinction is made by using a bone vibrator, which bypasses the mechanical parts of the middle ear. If hearing is better using bone than air, this suggests a Conductive Hearing Loss (C.H.L.). In the present study all the patients were evaluated using both air conductive and bone conductive audiometry, and their mean was recorded as values for that particular case.

RESULTS AND OBSERVATIONS

On comparing hearing loss in patients with grade I OSMF, there was a slight variation observed in values between Rt and Lt sides which could be due to subjective factors. Patients with grade II OSMF demonstrated hearing loss which was bilateral in 5 of the 9 patients with CHL. 4(/9) patients had mild CHL on either Rt or Lt. sides. 5 cases in group II had normal hearing threshold on both sides. Patient with grade III OSMF had bilateral mild CHL

Statistical Analysis

Results were tabulated (Table 9) and evaluated statistically using the Statistical Package for Social Service (SPSS) 16 software for Microsoft windows. The tests used were Paired test, Pearson's Chi-square and Mann Whitney tests to find the association between grade of OSMF and hearing deficit. Pearson's Chi square test was done to find the association between the stage of fibrosis and hearing deficit. `p' value of less than 0.05 was considered as statistically significant. The inter incisal opening of the studied group varied from 14 mm to 33 mm. Of the total patients 25% (5/20) were diagnosed as having grade I OSMF, 5% (1/20) had grade III OSMF and the rest (14/20), i.e., 70% had grade II OSMF.

Comparison of degree of mouth opening with Conductive Hearing Loss on Left Side shows significant Pearson's Rank correlation as depicted in Table 1. There is a negative correlation between the two which is similar to the findings on the right side (Table 2), i.e., there is a decrease in hearing efficiency with reduction in mouth opening on both sides.

DISCUSSION

OSMF is considered as OPMD under the category of 'morphologically altered tissue in which external factor is responsible for the etiology and malignant transformation' [14,15]. Although only areca nut chewing may not cause any oral pathology as such 16, but along with the slaked lime and other ingredients (which can cause inflammation) it can leads (OSMF) [16,17].

Oral submucous fibrosis is predominantly a disease of oral cavity and oropharynx which has been studied in great detail in the past few decades. Various aspects of OSMF including immunohistochemistry of the tissues have been performed. Various authors have described variety of histopathological changes in the oral mucosa [4-7]. However, very few authors have evaluated the effects of fibrosis extending into the palatal and paratubal muscles. Gupta et al. [7] have reported histopathological changes in palatal muscles in OSMF on incisional biopsy. They have described degenerative changes in palatal/paratubal muscles in the form of loss of cross striations in (13.2 per cent), oedematous muscle fibres in (9.4 per cent) and atrophy in (9.4 per cent) cases. It was concluded that there was definite involvement of palatal and paratubal muscles in OSMF. This could further cause eustachian tube dysfunction in patients with OSMF [18,19].

Extension of fibrosis into nasopharynx involving the pharyngeal orifice of eustachian tube and in the muscles affects the functions of eustachian tube. In the course of normal hearing, sound waves enter the auditory canal and strike the eardrum, causing it to vibrate. The sound waves are concentrated by passing from a relatively large area (the eardrum) through the ossicles to a relatively small opening leading to the inner ear. The alternating changes of pressure agitate the basilar membrane on which the organ of Corti rests, moving the hair cells. This movement stimulates the sensory hair cells to send impulses along the auditory nerve to the brain [20].

In a small portion of normal hearing, sound waves are transmitted directly to the inner ear by causing the bones of the skull to vibrate, i.e., the auditory canal and the middle ear are bypassed. This kind of hearing, called bone conduction [20].

In adults, the Eustachian tube is approximately 3 mm in diameter (less than 1/10 inch). Cartilage provides the supporting structure for the first two-thirds of the Eustachian tube, with the last third (the part closest to the middle ear space) being made of bone. In OSMF there is further narrowing of the normally small opening of the pharyngeal orifice of the eustachian tube [21-24] As a result there is a failure of the Eustachian tube to effectively regulate air pressure. More commonly partial or complete blockage of the Eustachian tube can cause sensations of popping, clicking, and ear fullness and occasionally moderate to severe ear pain. As Eustachian tube function worsens, air pressure in the middle ear falls, and the ear feels full and sounds are perceived as muffled.

In the present study, significant correlation was observed betweenthe degree of fibrosis of the palatal muscles and hearing deficit.

The efficacy of the eustachian tube to equalize air pressure was recorded as altered in the group studied. There were changes in sound perception between the right and the left ear which was found to be statistically significant. These changes showed a negative correlation indicating that the ability of the eustachian tube to equalize air pressure within the ear is affected in submucous fibrosis. The perception of sound both as air conducted mechanism of transmission of waves as well as bone conduction mechanism decreases with increasing grades of OSMF. As a result these patients have altered response to loud sounds, and the bone conduction audiometry was also found to be significantly affected. This could be attributed to the combined effects of the constituents of areca nut which alter the perception of

sound [25-27]. Various studies have shown that there is altered level of circulating cytokines and immunoglobulins, an elevated levels of various trace metals which contribute to the severity of symptoms [21-24].

CONCLUSION

OSMF is considered as a potentially malignant which affects structures adjacent to the oral cavity. The fibrosis of the oro-pharynx leads to altered perception of sound as evaluated by audiometry. There is a gradual deficit in the perception of sound, which may have clinical and functional significance. We wish to conclude that all cases of OSMF should be evaluated for hearing deficit.

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