SNORING - A MESOPHARYNGOMETRIC PROFILE

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INTRODUCTION

Airway noises have always been a source of anguish for an ENT surgeon. Whether it is a wheeze, croup, stridor or snoring. Any disordered breathing sounds, sets the ENT surgeon looking for possible causes. Snoring has never been a diagnostic dilemma for us, possibly because it's importance and effects were not clearly known. Even now in our country, snoring is considered a sign of good sound sleep. Snoring has always been ignored in the past, as the cause was invariably pinned on the blocked nose, adenoids and deviated nasal septum. The cause and treatment was never a source of worry for the doctor. In the last few years, the concept of snoring has taken a new turn. Lot

of research has gone into finding out its causes and the ill effects. It's effects on the normal physiology of the patient has interested doctors all over, breaking barriers of specialities and all have thus plunged in the study of this now so important symptom called snoring which is a symptom, not a disease and always points to the underlying physical or physiological obstruction of the airway (Remmers J, 1978). We have in the recent times been lucky to have a sleep disorder center in Safdarjang Hospital and our department has been associated with it for the last so many years. We felt it is time we share some of our experiences with these cases of snoring and highlight some of our findings in some patients. Nasal disease and

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nasal complaints have been excluded from the study. We performed mesopharyngo-metry in all cases. Mesopharyngometry is a technique where the physical attributes of the oral cavity, like the tongue, tonsil, palate and pillars are measured and graded for documentation, convenience and uniformity (Fujiwara, 1993). This paper will purely deal with the physical attributes seen in these

cases by various investigation procedures. To discuss the effects of this disorder is not in the scope of this paper and will be published elsewhere.

MATERIAL AND METHODS

400 patients referred from the department of pulmonary medicine and seen directly in the OPD of the ENT

Table - I
Clinical Examination and methodology for Mesopharyngometry

Snoring grades : {according to history.}	
Grade I	: Snoring but partner not disturbed. (Mild)
Grade II	: Snoring loud enough to disturb partner only. (Moderate)
Grade III	: Snoring loud enough to be heard outside the room. (Severe)
Grade IV	: Snoring loud enough to be heard by neighbor or outside the house.(Profound)
Mesopharyngometric Measurements and Methodology :	
Tonsil (Mckenzie's classification)	
Grade I	: Post pillars seen.
Grade II	: Post pillars partly seen.
Grade III	: post pillars not seen at all.
Tongue :	
Grade I	: On opening mouth soft palate edge seen.
Grade II	: Soft palate edge hidden partly by tongue.
Grade III	: No edge of the soft palate seen.
Palate types :	
Long, Short, Thick, Thin, Bulky, Wide.	
Uvula :	
> 10mm or < 10mm in length. ; 5mm < or > width.	
Inter Pillar Distance (Normal 20mm)	
< 20mm	: Wide arch, flaccid.
>20mm	: Narrow and taut.
Lateral Pharyngeal Bands :	
Grade I	: Not seen behind the posterior pillar.
Grade II	: Partially seen behind the post. Pillar
Grade III	: Fully seen and forming an arch on post. Pharyngeal wall.

Table - II
Snoring types seen in total no. of cases n = 389

Sl. No.	By History	Grading	Patients	%
1.	Very Loud (Profound)	Grade IV	66	16.9
2.	Loud (Severe)	Grade III	168	43.1
3.	Moderate	Grade II	95	24.4
4.	Mild	Grade I	60	15.4

Table - III
{ Mesopharyngometry }

Sl. No	Mesopharyngometry	Number of Pts.	Percentage
1.	Tongue	Appx. (400)	(100)
a.	Grade I	051	12.75%
b.	Grade II	120	30 %
c.	Grade III	229	57.25%
2.	Tonsils		
a.	Grade I	143	35.75%
b.	Grade II	232	58 %
c.	Grade III	035	8.7 %
3.	Inter Pillar Distance < 20mm	269	67.25%
4.	Distance Palate and PPW	089	22.25%
5.	Uvula > 10mm Length	169	42.25%
6.	Uvula > 5mm Width	042	10.5%
7.	Low Lying Palate	135	33.75%
8.	Small Thin Palate	069	17.25%
9.	Lateral Pharyngeal Bands	139	34.75%

department were examined in the out patient section of the department. Various investigations were carried out to study the physical attributes of these patients. All the patients attended the ENT OPD and the OPD of pulmonary medicine, for complaints of snoring and associated symptoms like daytime sleepiness, hypertension, lack of concentration etc. A proforma was given to all the patients to be filled in the clinic and all the findings were noted down in the respective headings. The patients were first examined in the OPD and the mesopharyngometry was carried out in all patients. Then the patients were taken to the endoscopy room and a fibro-laryngoscopy was performed. A lateral soft tissue neck skiagram was asked for in all cases. The current paper takes into account only the characteristics and pattern of snoring in these cases and their mesopharyngometric findings. The findings of Endoscopy and Cephalometry will be published elsewhere. Nasal effects on snoring, by way of it being a cause for it or just exaggerating it further, is very well established and known. We have excluded all cases with any nasal disease. We performed anterior rhinoscopy in all and ruled out all cases of deviated nasal septum, hypertrophic rhinitis, polyps or even complaints of allergy. Since we believe that the pharynx has a significant role to play in cause and effect of snoring, we are only publishing the physical attributes of the oral cavity (Mesopharyngometry). Correlation of snoring intensity and pattern with the physical attributes will also be discussed elsewhere. A simple compass and a six-inch ruler measured various measurements which were taken in the OPD. The patients were explained about the procedure and in some cases there was a need to use local anaesthesia (Xylocaine 4 %) as most of these cases were found to have a hypersensitive throat (prominent gag reflex). The grading of the tongue, tonsil and the lateral pharyngeal bands were done in the same way in all cases as described by Fujiwara.(Table 1). The notings were done by the same surgeon in all the cases, as far as possible, to rule out any errors due to variation in observation.

RESULTS AND OBSERVATIONS

The snoring pattern of the patients was noted, based on the inference derived from the sound and the response of the family to snoring. We divided the snoring pattern into three types, purely based on the sound and intensity heard by the author and the technician during polysomnography. Objective analysis of the snoring pattern was not possible as the machine could pick the sound but could not measure the intensity. A snoring index was calculated dividing the

snoring events by the total time the patient slept, but the significance could not be elicited due to non-ratification by the statistician. The technique of snoring index needs to be further studied and is not in the scope of this paper. The grading of snoring is purely subjective and has given a fair amount of accuracy, when all the results of the relatives, author and the sleep technician were compared. This reduced the individual variation to minimum. It was found that a larger number of cases (58%), had loud and high pitched snoring and the rest had (42%) lower intensity snoring with various accompanying characters. The snoring history that was taken from the patient and the relatives was also categorized into grades for our convenience.(Table II). The disparity between the patient and the relative's history was sorted out by inviting some other relative and recording his statement on snoring but caution was maintained, that the relative slept in the same house. It was found that 43 % cases were in category III (severe) and 17% in category IV (profound), which suggested a snoring of high grade types and the rest (mild) type I -15%, type II 24%.

Mesopharyngometry findings in the patients revealed a characteristic finding of a large tongue of grade III (57%), matching with a grade II tonsil in 58% cases. Grade I tongue was seen in 13% cases followed by 30% of grade II tongue. Large tonsils of grade III and above were surprisingly low, only 9%, suggesting involvement of some other structures beside tonsils, which give rise to snoring, unlike their higher percentage in children. 5% cases showed no change in their mesopharyngometric findings of oral cavity (Table III). One of the most striking features that we encountered was the hypertrophy of the lateral pharyngeal bands (35%). They were seen jutting behind the posterior pillars. Small palate was seen in 17% cases and a large thick palate in 34%. Correspondingly some of the palates had a long (42%), wide (10%) or a short (24%) uvula. Oropharyngeal depth was measured as the distance between the palatal edge and the posterior pharyngeal wall. It was found that only 22% had a shallow one, compared to 42% long palates. The distance between the two posterior pillars is significant from the surgical point of view, and this means a more pliable mucosa, which will require more trimming during UPPP. This kind of picture was seen in 68% of cases.

DISCUSSION

Theoretical aspect of snoring:

1. Origin : origin in the collapsible part of airway where

there is no rigid bony support i.e. from epiglottis to the chaona.

2. Contributors to snoring: Soft palate, uvula, tonsillar pillars, tongue base, pharyngeal muscles and mucosa (lateral pharyngeal bands).

It is evident from the above paragraph that any change in the size or the static position of the above structures can lead to partial obstruction of the airway. A partial airway obstruction always leads to snoring and total obstruction to apneas.(Kakitsuba N, 1990). When the obstruction sets in, some portion of the airway vibrates and it is this vibration that gives rise to the sound of snoring. During the course of our study of the cases of Obstructive Sleep Apnea, we decided to examine the structures vibrating during sleep. We tried but failed, as all patients got up during insertion of the scope. This disturbed the pattern of the sleep on polysomnography. International Studies have been done elsewhere on sleeping patients, but the scope is a lighter one and it inserted before sleep along with the sensor for snoring. The patient is allowed to fall asleep on his own and the findings noted on the videoscope. Since a monitor was not available in the sleep lab, this test was abandoned. However, in awake patients during our routine fibroscopy, we used to ask them to mimic a sound akin to snoring and thus watch the vibrating surfaces. In majority of cases, the edge of the soft palate was found to be the prominent structure vibrating. The thicker the palate, the more sluggish the movement. The lateral pharyngeal bands were found to be vibrating too. These movements used to hide the view of the base of tongue and any attempt to pass the scope through the opening, would reduce the sound of snoring. But in number of cases, we could see the base of tongue contributing very little to the vibrating column.(Harper RM, 1978). It vibrated as a column, along with the surrounding structures. This prompted us to postulate that the intensity of snoring was inversely proportional to the column of the vibrating surface. A shorter column would mean, less involvement of the base of tongue structures and hence more vibration of the palatal edge and the supporting column. The sound in such cases was found loud and high pitched. Whereas, in a state of the whole column upto base tongue vibrating, the sound was less and more muffled. The tip of the scope was kept in the retropalatal area and the patient was asked to try producing the sound of snoring again. This time we found that the sound had become less and muffled. Thus, we decided to see if the mesopharyngometric findings

matched with the pattern of snoring. That is to say that if a case had a long and bulky palate, with grade III tongue and large lateral pharyngeal bands, he would have a long vibratory column and a distinct character of snoring. And conversely, the patient with only a long palate and normal tongue would have a high pitched and loud snoring. All these facts are important to know if these patients have a low RDI (Respiratory Disturbance Index), then chances are that a UPPP alone would completely rid them of snoring (Fujita S, 1981). It is a known fact that in review, all failed UPPP have proved that more than one site was involved and that single modality of surgery was not too helpful in these cases (Ryan CF, 1990). Therefore during a clinical examination, the character of snoring can give some idea of the number of sites involved. It will take some more data evaluation, to correlate the snoring character to the suspicion of severity of disease. This is beyond the scope of this paper and will be discussed in detail in a subsequent publication. The aim of this study was to correlate the mesopharyngometric data of these patients and to see if the character of snoring matched with our hypothesis of vibrating column segment contribution. It is evident that the series has more loud and high pitched snoring types (58%) and on history 43% were found in the severe category grade, suggesting that there may be some matching, though overlapping and individual variation will not give accurate acceptance rate. But what is intriguing is that nearly 57% cases had a large tongue (grade III) and presuming that nearly all of these had some tongue contribution, then the character of snoring should have been different. Only 24% had low pitched, low intensity snoring which matches with the grading done on history basis (15%), but owing to the large number of cases with large grade III tongue (57%). this percentage should have been higher. The disparity can be explained by presuming that since 34% of cases had large palates and 42% had a uvula of more than 10mm, then the maximum vibratory column dominates the character of snoring. And in these cases (58%), the snoring was largely due to large, bulky palate and it dominated the large tongue's involvement. One thing to be noted is the large percentage of patients (68%) with large posterior pillars, which means that contribution of loose and lax posterior pillar mucosa may have a lot to do with the character of snoring. Patulous posterior pillar is attached to the soft palate and it will be contributing to the snoring sound being produced. All this requires individual mapping of data and then adding all of them together. There is evidence that vibratory column

may contribute to the sound of snoring (Surratt et al, 1983). All one needs to find out is the effect of each anatomical part that vibrates on snoring. This will require sophisticated tools, sensors and possibly dynamic fluoroscopic study to reach to each site.(Weitzman et al, 1978). Our study shows a definite character and typical anatomical variation in the oral cavities of snorers. There are some very typical findings that are not seen in normal individuals.(Hill MW et al, 1978). Gross compilation of data does suggest a relationship between the soft palatal length, tongue size and snoring character but individual variation has not been taken into account. Some of these cases may have an accompanying nasal obstruction contributing to the pitch of snoring, however further study needs to be done to map individual data and then classify and predict the outcome of this relationship. All variations have to be taken into account.

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