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Efficacy of videofluroscopy in diagnosing upper airway obstruction at level of nasopharynx in obstructive sleep apnea patients - a prospective study of 35 cases

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Abstract

Aim: The aim of the study was to evaluate the anatomical and structural changes in the upper airway in cases of obstructive sleep apnoea using Videofluroscopy and to evaluate its efficacy.

Study design: Prospective analysis

Patients: 35 adults patients Patients who were diagnosed as cases of obstructive sleep apnea on the basis of nocturnal polysomnography and has not undergone any surgical operation for obstructive sleep apnea were included in study.

Methodology: All patients were subjected to detailed history taking and clinical examination. Majority of the patients that is 28 (80%) in our study were males whose mean age was 49.1 years. There were 7 females (20%) whose mean age was 57.5 years. The mean age of the study population was 50.8 years.. The patients then underwent Videofluroscopy.

Result: In our Study out of the 35 patients Videofluroscopy showed significant change in length of softpalate in inspiration and expiration amounting to collapse of Nasopharynx in all the patients (Mean % change is 12.55 and SD is 3.23 $p< 0.001$).

Conclusion: Videofluruoscopy is very useful in studying the dynamics of upper airway and depicting the changes that occur during apneic events. It is 100 percent sensitive in detecting obstruction at Nasopharynx in apneic patients.

Keywords: Obstructive sleep apnoea**,** Nocturnal Polysomnography, Videofluroscopy

Introduction

Snoring and Obstructive sleep apnea (OSA) are the two commonest respiratory sleep disturbances which have gained importance in the recent years.They are commonly seen in our population. Although Charles Dickens is credited with the classic description of a typical OSAS patient in Pickwick papers in 1837, not much was known about the disorder until Guilleminault and colleagues [1,2] described the syndrome more accurately in 1970s. This has led to a further understanding of the serious health problems associated with this disorder and currently an increased awareness exists in our country too currently.

It is a common form of sleep breathing disorder characterised by repetitive episodes of partial or complete upper airway obstruction. It usually causes sleep fragmentation , reduced blood oxygen levels, and excessive day time sleepiness. Cognitive deficits, reduced driving competence, cardiovascular morbidity and mortality have also been reported. Because the clinical significance of OSA is increasing, more exact diagnosis for successful treatment is required. It has been suggested that patients with OSA have narrower pharyngeal airways than normal persons because of fat infiltration, the weight of the soft tissue of the neck, and reduced pharyngeal muscle tone. Common abnormalities leading to airway narrowing include: soft palate elongation, adenotonsillar hypertrophy, macroglossia, retrognathia and micrognathia. Obesity has been identified as the major risk factor in adults for development of obstructive breathing. These patients chiefly present with the complaint of snoring and excessive daytime sleepiness. Meticulous general survey, otolaryngological examination as well as systemic examination is necessary. Since obesity is one of the major risk factors for obstructive sleep apnea syndrome. A complete life style change is needed as it is often difficult for patients to maintain the weight loss overtime.

To precisely localise the site of the obstruction in obstructive sleep apneic patients we performed Videofluoroscopy and then we evaluated its efficacy in pinpointing the level of obstruction.

Materials and methods

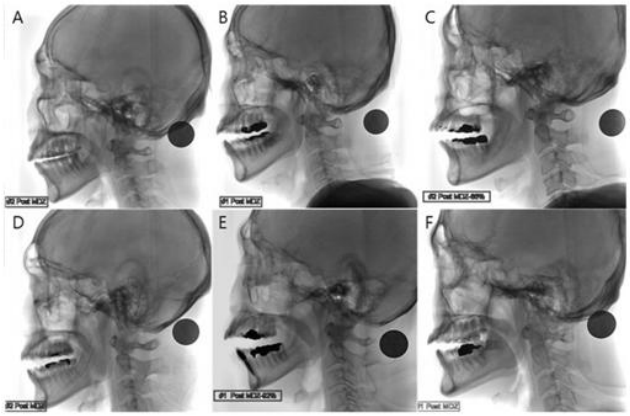
We undertook a prospective study in the Department of Otorhinolaryngology at Dr. Ram Manohar Lohia Hospital, PGIMER, NEW DELHI. 35 adult patients who were diagnosed as obstructive sleep apnea on the basis of nocturnal polysomnography, who were regular in follow up and gave their consent but has not undergone any surgical operation for obstructive sleep apnea were included in the study. A detailed sleep history was obtained from the patient and his bed partner. History included details about yawning throughout the day, falling asleep while watching TV, while sitting up, while eating, during work, during conversation, while driving, pauses during sleep, nocturia, restless sleep.

Symptoms of morning headache, unre-freshening sleep, poor concentration, decreased attention, reduced dexterity, drooling, dry mouth, personality change, depression was also significant.

Other key points included history of blood pressure, hypothyroidism, smoking, alcohol, sedative,recent increase in weight and snoring. All the patients were then subjected to Videofluroscopy.

Videofluroscopy was carried out either in LISTEM or ITLARY fluoroscopy machine available in our hospital setup. The subjects were placed on a table in supine position with the head on a pillow. They were instructed to breathe in and out naturally.The obstruction sites were classified as the SP, tongue base, or both. The length of the SP is defined as the distance from the posterior nasal spine to the uvula tip. The angle of the SP is defined as the angle between the extension of the nasal floor and the uvula tip. The percentage change in the SP length or elongation is calculated as follows:

$$\frac{\text{SP Length (Inspiratory Effort)} - \text{SP Length (Expiratory Effort)}}{\text{SP Length (Expiratory Effort)}} \times 100$$



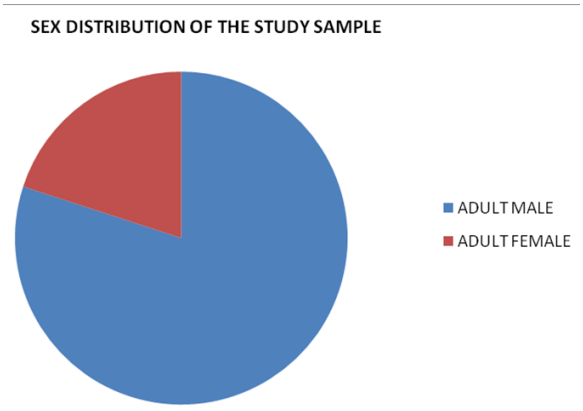
Upper airway obstruction pattern in videofluoroscopy([3,4]). Images show upper airway obstructions due to the soft palate at the oropharyngeal level (A), the tongue base at the oropharyngeal level (B), both the soft palate and tongue base at the oropharyngeal and hypopharyngeal levels at the same time (C), the tonsils at the oropharyngeal level (D), the epiglottis at the hypopharyngeal level (E), and the soft palate at the Nasopharyngeal level (F).

Statistical analysis

The paired *t* test will be used to analyze SP elongation and angulation in Video-fluoroscopy.

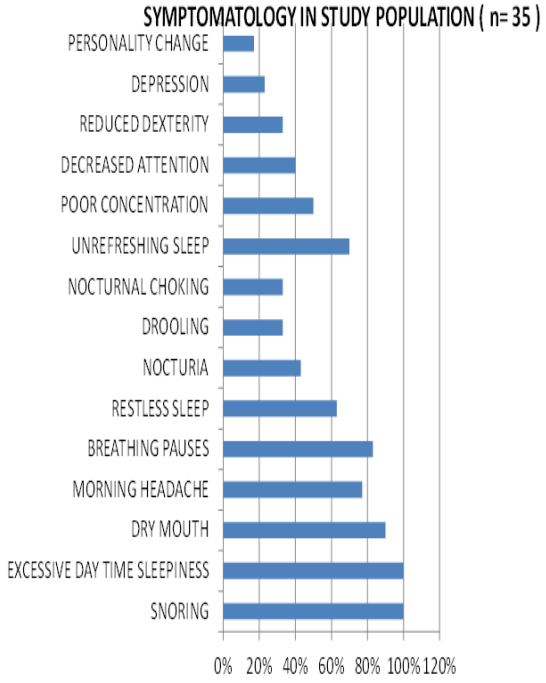
Observation

Majority of the patients that is 28 (80%) in our study were males whose mean age was 49.1 years. There were 7 females (20%) whose mean age was 57.5 years. The mean age of the study population was 50.8 years.



In our Study, Snoring and Excessive daytime sleepiness was complained by all the patients (100%). Dry mouth was also very common, 32 patients (90%) had complained of it , is basically due to mouth breathing and constant opening of the mouth.

The following illustration explains the symtomatology:



VIDEOFLUROSCOPY-PAIRED SAMPLES TEST									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	SPLENINSP – SPLENEXP	2.89000	.80702	.14734	2.58866	3.19134	19.614	29	.000

The Mean % change in soft palate length in inspiration and expiration is 12.55 and SD is 3.23.

VIDEOFLUROSCOPY – PERCENTAGE CHANGE IN SP LENGTH					
	N	Minimum	Maximum	Mean	Std. Deviation
PERCENT CHANGE	35	7.50	19.70	12.5567	3.23938

On analysing in detail the upper airway clinically in all the 35 patients, it was found that high Mallampati grading (GRADE III-IV) was seen in 23 (66.0%) patients and correlates well with obstruction of upper airway.

Videofluroscopy was carried out either in LISTEM or ITLARY fluoroscopy machine available in our hospital setup. Then the percentage change in the SP length or elongation was calculated. Following observations were made:

Mean SPL length during inspiration (n=35) is 25.76mm and SD is 3.03.

Mean SPL length during expiration (n=35) is 22.87mm and SD is 2.55.

Minmum % change in every subject was more than 5%. So all 35 patients who underwent this test had significant change in soft palate length. Therefore Video-fluroscopy was able to detect abnormality in upper airway in all the 35 subjects.

Videofluroscopy showed significant change in length of softpalate in inspiration and expiration amounting to collapse of Nasopharynx in all the patients (Mean % change in soft palate length in inspiration and expiration is 12.55 and SD is 3.23 $p< 0.001$ in our study). Our findings support the study of Chul Hee Lee, MD, PhD et al[8] who analysed a total of 63 consecutive patients with snoring or sleep apnea (53 with obstructive sleep apnea [OSA] and 10 simple snorers) and concluded that Sleep videofluroscopy quantitatively showed that the SP was considerably elongated and angulated in patients with OSA even in an awake state..

Conclusion

In conclusion we have observed that Videofluruoscopy is very useful test in evaluating the dynamics of upper airway and depicting the changes that occur during apneic event in the upper airway in the patients of Obstructive Sleep Apnea. It is 100 percent efficient in detecting the airway collapsibility at Nasopharyngeal level. It is useful for rapid clinical evaluation of obstruction sites in Apneic patients.

In view of the above findings we feel that Videofluroscopy is an important tool in the diagnosis of Obstructive Sleep Apnea in patients having Level I obstruction.

Conflict of interest

No Conflict of Interest**.**

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