VOLUME-6 | ISSUE-2 | FEBRUARY-2017 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 78.46

Radiographic indicators of obstructive sleep apnea: a clinico-radiographic study.

Dental Science

KEYWORDS: sleep apnea, snoring, cephalometry, obesity, soft palate

Dr. Hemant kumar halwai — MDS ; Associate professor, Department of orthodontics and Dentofacial orthopedics, UCMS college of dental surgery, Bhairahawa, Nepal

Dr. Vanita Gautam — MDS ; Associate professor, Department of Conservative dentistry and endodontics, UCMS college of dental surgery, Bhairahawa, Nepal

ABSTRACT

Background: Obstructive Sleep Apnoea (OSA) is a common disorder seen in young and adults. It is a potentially life-threatening condition in which periodic cessation of breathing occurs during sleep in the presence of inspiratory effort. This affects not only the quality of life but also has a significant morbidity. **Aim:** is to correlate types of soft palate in healthy and patients suffering from obstructive sleep apnea. The objective is to study the effect of change in BMI over prevalence of OSA. **Materials and methods:** This study comprised of 20 diagnosed patients of obstructive sleep apnoea and 20 normal subjects whose Digital lateral cephalograms were made and body mass index calculated. **Results:** Butt type of soft palate was common in sleep apnoea patient while leaf type was more common in normal population. High BMI index were commonly seen with butt type of soft palate in apnoea patients. **Conclusion:** Dentist and radiologist who observes hooked/ butt appearance of soft palate on lateral cephalogram should suspect the strong possibility of the presence of OSAS.

Introduction

Obstructive sleep apnoea (OSA) is an increasingly prevalent disease with a considerable social burden with the pathophysiology based on the interaction of multiple factors. [1]Review of relevant literature suggests that this condition is caused due to increased collapsibility and reduction of size of structures in upper airway(UA), alterations in craniofacial structure and enlargement of surrounding soft tissue structures (i.e., tongue and lateral pharyngeal walls).[2,3]

Various investigations like conventional and electron beam computed tomography (CT), magnetic resonance imaging (MRI),acoustic reflection, nasal pharyngoscopy, cephalometry, and fluoroscopy have been employed to diagnose OSA.. These techniques provide information about anatomic abnormalities and the levels of pharyngeal narrowing or collapse while the patient is awake or asleep. Since individual patients have different patterns of UA narrowing; the best method for evaluating obstruction during obstructive events remains controversial.[4]

In this article authors have used cephalometry to identify the signs of OSA. In a study conducted by Pepin et al, they found the "hooked" appearance of the soft palate in awake patients, which indicated a high risk for obstructive sleep apnoea syndrome (OSAS).[5] Lateral cephalographs were employed owing to their easy availability, technique and economical advantages.[5,6]

Material and methods

Study design

In this prospective, parallel, single blinded study the aim was to correlate the type of soft palate in OSA patients and healthy population. The objective was to study the effect on body mass index (BMI) on the prevalence of OSA. This study comprised of 20 diagnosed patients of sleep apnoea and 20 normal subjects between the age ranges of 12 to 60 yrs in universal college of dental sciences, Bhairahawa, Nepal.

Patients with congenital anomalies (cleft palate) and having diseases or fracture of the head and neck were excluded from study. The exclusion criteria for OSA group were patients having less than 10 teeth in each jaw, temporomandibular disorders and severe periodontitis.

·Study protocol

Prior to the start of the study, the institutional ethical clearance and written informed consent was taken from all the subjects participating in this research. Detailed case history and dental examination was carried out and recorded in specialized performa.The morphology of the soft palate were studied on Digital lateral cephalograms (using Kodak software-72kvp, 12mA, 1sec exposure). BMI index, was calculated by dividing the weight of subject (in kg) by height of subject (in m2).

- **Statistical analysis**

The results were tabulated and subjective to descriptive statistics. Al the values were represented in mean, standard deviation and percentage. Statistical test Employed was chi-square test and p value less than 0.05 was considered to be significant.

Results

In the OSA group, the age of the patients varied from 32 to 74 years, with a mean age of 51.5 ± 11.01 years. The age range in the control group was 33-63 years, with a mean age of 48.6 ± 9.74 years.

Dental examination showed that there were no differences between the position of the teeth in the OSA and control groups. The axial inclination of the lower incisor to its respective plane was normal, whereas the upper incisor was significantly protrusive (P<.05).

In this study, butt type of soft palate was common in sleep apnoea patient while leaf type was more common in normal population though statistically it is not significant. High BMI index were commonly seen with butt type of soft palate in apnoea patients.(Table1)

Table1: comparison of soft palate patters and BMI in OSA and control group

S.NO	PATTERN OF SOFT PALATE	CONTROL GROUP		OSA GROUP		BMI
		Count	%	Count	%	
1	Butt	05	25	8	40	Obese-05 Overweight-02 Underweight-01
2	Leaf	12	60	6	30	Obese-02 Overweight-04
3	Rat	03	15	4	20	Obese-02 Overweight-02
4	S- Shaped	00	–	1	5	Obese-01
5	Crook	00	–	1	5	Overweight-01
6	Straight	00	–	0	–	–
Chi- square value(χ2)=0.38; p>0.05 : non- significant ; p<0.05 : significant						

Discussion

Sleep induces an unnatural and unusual increase in upper-airway resistance in about 2-5% of the adult population; this condition is

known as obstructive sleep apnea (OSA).[7,8] OSA is characterized by frequent episodes of airway obstruction associated with a reduced diameter of the upper airway, which is vulnerable to further narrowing and collapse.[9] Acute and repeated effects of apnea and hypopnea include oxygen desaturation, reduction in intrathoracic pressure, withered executive function and central nervous system arousals, and excessive daytime sleepiness.[10] The main symptoms of the obstructive sleep apnoea (OSA) are heavy snoring, excessive daytime somnolence, and disturbed sleep.[3,6,8]

Lateral cephalometric radiographs have been used by several investigators in an attempt to identify morphological parameters that might be characteristic of OSA. The advantages of Lateral cephalometric radiographs are their ease, low cost, normative data available and also they may identify patients with less favorable outcomes after first-line procedures.[5,8]

The soft palate is the posterior fibromuscular part of the palate that is attached to the posterior edge of the hard palate. It participates in most oral functions, especially velopharyngeal closure which is related to the normal functions of sucking, swallowing and pronunciation. Body mass index (BMI) provides a simple numeric measure of a person's "fatness" or "thinness". Hooking of the soft palate was defined by pepin et al as an angulation of about 30° between the distal part of the uvula and the longitudinal axis of the soft palate. They hypothesized that soft palate-hooking plays a key role in pharyngeal collapse, since hooking results in a sudden and major reduction in the oropharyngeal dimensions, which therefore dramatically increases upper airway resistance and the transpharyngeal pressure gradient.[5]

The risk of OSA rises with increasing body weight, active smoking and age. In addition, patients with diabetes or "borderline" diabetes have up to three times the risk of having OSA. Present study showed that obese patients with OSA show increased upper airway soft tissue dimensions and the results are similar to that, reported by Pépin[5] and Matilde valencia-flores[11].

According to J. M. Battagel [12] the soft palate is longer, larger and in contact with a wider area of the tongue in OSA subjects. P. Mayer [13]also found, an increased base of the tongue and soft palate width in more obese patients. These finding are in accordance with the present study which suggests that there is correlation between BMI and butt type of soft palate.

Present study results are similar to that, reported by M you [6] that leaf type of soft palate is more commonly seen in normal population.

Conclusion

Based on the results of present study we can conclude that hooked/ butt appearance of soft palate on lateral cephalogram should suspect the strong possibility of the presence of OSAS. The variation of the soft palate morphology may be a new explanation for surgical failure and the soft palate may need to be repaired in various patterns.

References

1. Rodenstein DO, Dooms G, Thomas y, Liistro G, Stanescu DC, Culee C, Aubert-Tulkens. Pharyngeal shape and dimensions in healthy subjects, snorers, and patients with obstructive sleep apnoea. Thorax 1990; 45 : 722-7.
2. Ciscar MA, Juan G, Martinez V, Ramon M, Lloret T, MinguezJ,et al. Magnetic resonance imaging of the pharynx in OSA patients and healthy subjects. Eur Respir J 2001; 17 : 79-86.
3. Schwab RJ. Imaging for snoring and sleep apnea patients. Dent Clin North Am 2001; 45:759-96.
4. Georgalas C, Garas G, Hadjihannas E, Oostra A. Assessment of obstruction level and selection of patients for obstructive sleep apnoea surgery: an evidence-based approach.J Laryngol Otol 2010; 124 : 1-9.
5. Jean Louis D. Pépin.Obstructive Sleep Apnea Syndrome: Hooked Appearance of the Soft Palate in Awake Patients—Cephalometric and CT Findings. American Journal of Orthodontics and Dentofacial Orthopedics 1987;91(5):414-426
6. M You, X Li, H Wang Morphological variety of the soft palate in normal individuals: a digital cephalometric study Dentomaxillofacial Radiology 2008;37:344-349
7. Kim J, In K, Kim J, You S, Kang K, Shim J, Lee S, Lee J, Lee S, Park C, Shin C. Prevalence of sleep-disordered breathing in middle-aged Korean men and women. Am J Respir Crit Care Med 2004;170:1108-1113
8. Young T, Palta M, Dempsey J, Skatrud J, Weber S, Badr S. The occurrence of sleep-disordered breathing among middle-aged adults. N Engl J Med 1993;328:1230-1235.
9. Sunitha C, Kumar SA. Obstructive sleep apnea and its management. Indian J Dent Res 2010;21:119-124.
10. Sunitha C, Aravindkumar S. Obstructive sleep apnea: clinical and diagnostic features. Indian J Dent Res 2009;20:487491.
11. Matilde Valencia-Flores, Arturo Orea, Violeta A. Prevalence of Sleep Apnea and Electrocardiographic Disturbances in Morbidly Obese Patients .Obesity Research 2000; 8: 262–269
12. J. M. Battagel and P. R. L'Estrange. The cephalometric morphology of patients with obstructive sleep apnoea (OSA) European Journal of Orthodontics1996;18:557-569
13. P. Mayer, J-L. Pépin, G. Bettega, D. Veale, G. Ferretti, C. Deschaux, P. Lévy. Relationship between body mass index, age and upper airway measurements in snorers and sleep apnoea patients. Eur Respir J 1996;9: 1801–1809