

Comparative Study of Pattern of Soft Palate in Obstructive Sleep Apnea Patient with Normal Class I Person: A Cephalometric Study

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Abstract

Background: Sleep apnea, and particularly obstructive sleep apnea (OSA), is a common disorder that is characterized by repetitive partial or complete cessation of airflow, associated with oxyhemoglobin desaturation and increased effort to breathe. The present study aims to find the morphological variations of soft palate in OSA patients and its reliability as prediction factor in early diagnosis of OSA. **Materials and Methods:** A Prospective study was conducted on total of 60 lateral cephalographs. Out of which 30 were normal individuals and 30 were of OSA. Patients who complained of snoring, difficulty in breathing while sleeping, dyspnea were considered as OSA patients after performing polysomnography. Soft palates of all this were traced and compared for the shape variation. **Results:** The result of this study showed that crooked shape followed by rat tail was more frequent type among OSA patients. In normal individuals, Crooked was the most frequent shape of the soft palate followed by Leaf shape. **Conclusion:** There is a significant correlation between the variants of the soft palate and OSA.

Keywords: Lateral cephalograph, Obstructive sleep apnea, Orthodontics, Soft palate.

INTRODUCTION

Obstructive sleep apnea (OSA) is a common disorder characterized by repetitive collapse of the pharyngeal airway during sleep. Afflicted individuals generally breathe quite normally during wakefulness, but cannot maintain airway patency during sleep.^[1] The site of collapse is most often behind the uvula, soft palate, tongue, or some combination of these structures.^[2] Arousal from sleep is usually observed at the time of airway opening. In association with these pauses in respiration, hypoxia and hypercapnia generally develop and can be severe.^[3] Individuals with sleep apnea often present with complaints of loud snoring, witnessed gasping, choking, or apnea, and daytime sleepiness.^[4] They may also have morning headaches, sexual dysfunction, and depression. The number of apneas plus hypopneas per hour of sleep is called the apnea-hypopnea index (AHI). By convention, an AHI greater than 5 is considered abnormal. The combination of an AHI >5 plus daytime symptoms is required for a diagnosis of OSA syndrome. An AHI of 5–15 is considered mild, 15–30 moderate, and >30 severe OSA. The specialty of orthodontics involves much more than just moving teeth, and the management of sleep apnea bears witness to this.^[1,5,6]

In OSA patients soft palate and tongue blocks the throat which results in difficulty in breathing, Snoring and dyspnea.^[4,7] As OSA develops in older patients while growth of soft palate gets completed by 12 weeks of IUL and muscles by 16–17 weeks of IUL.^[8] so this study was undertaken to find if any association of morphology of soft palate and OSA exist and whether soft palate morphology can be used as predictor of OSA.

MATERIALS AND METHODS

A prospective study was conducted on patients seeking orthodontic treatment with the age group of 21–30 years. Screening of patients who reported to outpatient department section of the Department of Orthodontics and Dentofacial

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Orthopaedics, CSMSS Dental College, Aurangabad, Maharashtra was done. Patients who complained of snoring, difficulty in breathing while sleeping, dyspnea were sent to chest physician for polysomnography.

30 patients with positive polysomnography results were later sent for lateral cephalograph recording. Lateral cephalographs of 30 orthodontic patients with no history of snoring or difficulty in breathing (normal patients) were also collected. All the lateral cephalograph were recorded in a standardized protocol. Their soft palates were traced and compared for the shape variations as given by You *et al.*^[9] (Figures 1-6).

The soft palate morphology and shape variations of all the 60 cephalographs were collected and segregated as per the group

- Group 1 – Control group- consisted of 30 orthodontic patients with no history of snoring or difficulty in breathing

Table 1: Classification of shape of soft palate for malocclusion type

Mal occlusion	Shape of soft palate			Total
	Crooked	Leaf	Rat tail	
Class I				
Count	3	21	6	30
%	10.0	70.0	20.0	100.0
OSA				
Count	22	0	8	30
%	73.3	26.7	0.0	100.0
Total				
Count	25	21	14	60
%	41.7	35.0	23.3	100.0

OSA: Obstructive sleep apnea

Table 2: Chi-square test for significance of difference in proportion

Test	Value	df	P-value
Pearson's Chi-square	26.268a	2	0.000



Figure 1: Type 1: "Leaf-shaped (Lanceolate)"; the middle portion of the soft palate is elevated to both the naso- and oro-side. Soft palate shape: Leaf

- Group 2- Experimental group- consisted of 30 orthodontic patients with a history of snoring or difficulty in breathing and with positive polysomnography report.

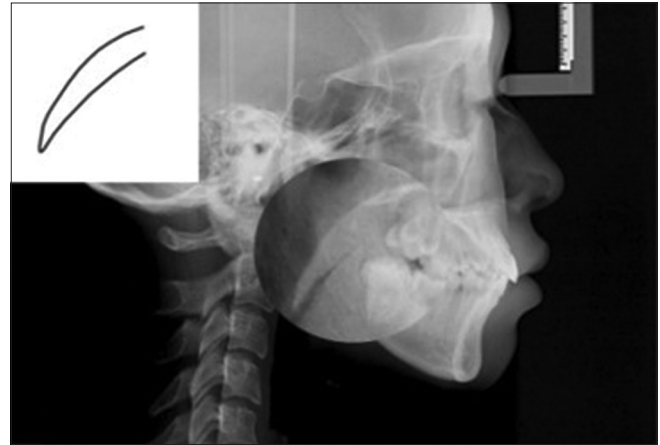


Figure 2: Type 2: "Rat-tail shaped"; the anterior portion is inflated and the free margin has an obvious coarctation. Soft palate shape: Rat tail

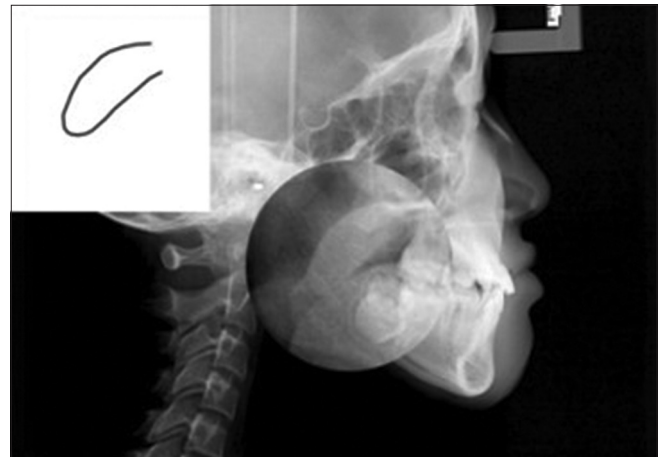


Figure 3: Type 3: A "butt-like shape"; the length of the soft palate in this type is about a third to three-quarters of that of the leaf shape. The width has almost no distinct difference from the anterior portion to the free margin. Soft palate shape: Butt like



Figure 4: Type 4: "Straight line". Soft palate shape: Straight line

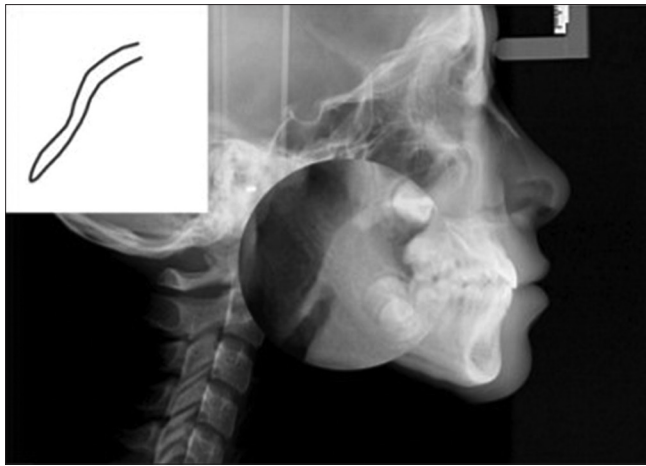
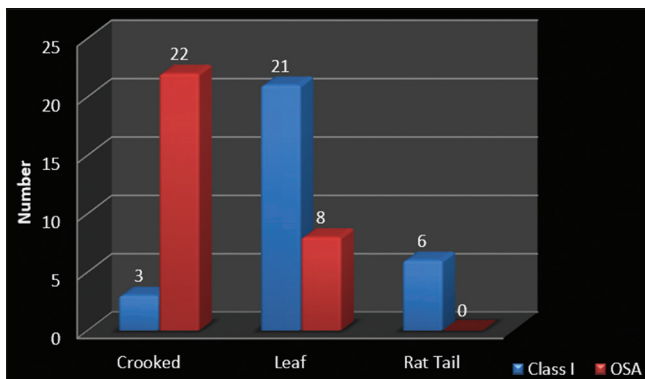


Figure 5: Type 5: Distorted soft palate, which presents the “S-shape”. Soft palate shape: S shape



Figure 6: Type 6: “Crook-shaped” appearance of the soft palate, in which the posterior portion of the soft palate crooks anterosuperiorly. Soft palate shape: Crooked



Graph 1: Comparison of soft palate shape in malocclusion

RESULTS

All the data were collected and analyzed to compare the correlation between various shapes of soft palate among the two groups. Pearson chi square test was used to compare the

groups and descriptive statistics was portrayed for frequency distribution. Level of significance was set at $P < 0.05$. All the analysis was done by using SPSS version 20 (Tables 1 and 2).

The result of this study showed that the leaf shape of soft palate is the most frequent type among the skeletal class I persons of the Marathwada region followed by rat tail shape. whereas in OSA patients, crooked shape was most common followed by leaf type (Graph 1).

DISCUSSION

The lateral cephalograph is the most common diagnostic radiograph used in clinical orthodontics. Cephalometric analysis is a commonly accepted technique for the evaluation of soft palate in normal individuals and in patients with cleft palate and OSA. It can be considered as a valid preliminary screening method to study the craniofacial hard and soft tissue morphology in snoring patients who are at risk for developing OSA. It is used because of its easy availability and cost-effectiveness. The morphology of soft tissues such as soft palate can be clearly observed on lateral cephalograph.^[10,11]

In the present study, crooked shape (Type 6) was the most frequent type (35.0%) among OSA patients, which is similar to study done by Samdani *et al.*^[12] However the results of this study is not in accordance with few others, who found S shape to be more prevalent among OSA patients.^[13,14] In this study, we found leaf shape soft palate morphology among 20.2% of OSA patients, being the second most prevalent shape found.

Among the normal patients, (control group), the leaf shape soft palate morphology was found in 70% and was the most common. In literature, this shape is considered as the classic velar morphology. This was followed by rat tail-shaped morphology, which was found in 20% of normal patients investigated.

CONCLUSION

Soft palate is an important structure in velopharyngeal closure. Soft palate morphology can be an important predictor factor in detecting OSA patients. However, this study was conducted on limited sample size, further studies in this aspect are warranted.

REFERENCES

- White DP, Younes MK. Obstructive sleep apnea. *Compr Physiol* 2012;2:2541-94.
- Young T, Skatrud J, Peppard PE. Risk factors for obstructive sleep apnea in adults. *JAMA* 2004;291:2013-6.
- Tripathi A, Melnik AV, Xue J, Poulsen O, Meehan MJ, Humphrey G, *et al.* Intermittent hypoxia and hypercapnia, a hallmark of obstructive sleep apnea, alters the gut microbiome and metabolome. *MSystems* 2018;3:e00020-18.
- Punjabi NM. The epidemiology of adult obstructive sleep apnea. *Proc Am Thorac Soc* 2008;5:136-43.
- Şimon IM, Băciuş M, Todea D. Orthodontic appliances in the management of obstructive sleep apnea syndrome-types and therapeutic indications. *Pneumologia* 2018;67:62-6.
- Behrents RG, Shelgikar AV, Conley RS, Flores-Mir C, Hans M, Levine M, *et al.* Obstructive sleep apnea and orthodontics: An American

- association of orthodontists white Paper. Am J Orthod Dentofac Orthop 2019;156:13-28.
7. Banabilh SM. Orthodontic view in the diagnoses of obstructive sleep apnea. J Orthod Sci 2017;6:81.
 8. Kaurani HJ, Suchita TD. Correlation of soft palate shape with skeletal malocclusion. Int J Orthod Rehabil 2021;12:103.
 9. You M, Li X, Wang H, Zhang J, Wu H, Liu Y, *et al.* Morphological variety of the soft palate in normal individuals: A digital cephalometric study. Dentomaxillofac Radiol 2008;37:344-9.
 10. Upadhyaya C, Neupane I, Sapkota B, Srivastava S. Morphological diversity of soft palate in Nepalese population: A retrospective cephalometric study. Orthod J Nepal 2017;7:18-22.
 11. Battagel JM, Johal A, Kotecha B. A cephalometric comparison of subjects with snoring and obstructive sleep apnoea. Eur J Orthod 2000;22:353-65.
 12. Samdani D, Saigal A, Garg E. Correlation of morphological variants of soft palate and types of malocclusion: A digital lateral cephalometric study. J Indian Acad Oral Med Radiol 2015;27:366.
 13. Subramaniam N. Correlation of morphological variants of soft palate and types of occlusion in patients seeking orthodontic assessment. Int J Sci Res 2015;6:1923-6.
 14. Pépin JL, Veale D, Ferretti GR, Mayer P, Lévy PA. Obstructive sleep apnea syndrome: Hooked appearance of the soft palate in awake patients-cephalometric and CT findings. Radiology 1999;210:163-70.