International Journal of Research in Medical Sciences
Khan A et al. Int J Res Med Sci. 2017 Dec;5(12):5283-5286
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20175441

Original Research Article

Comparison of different cephalometric variables in patients with and without history of snoring

Azhar Khan[1], Mohamad Imran[1]*, Mohammed Imran[2], Shoib N. Parkar[3], Mueed U. Islam[4], Shayan Nazir[1]

[1]Department of Maxillofacial Surgery and Dentistry, SKIMS Medical College/Hospital, Srinagar, Jammu and Kashmir, India
[2]Department of Dentistry, Sri Rajiv Gandhi College of Dental Sciences, Bangalore, Karnataka, India
[3]Private Practitioner, Bangalore, Karnataka. India
[4]Department of Dentistry, Oxford Dental College, Bangalore, Karnataka. India

Received: 10 September 2017
Accepted: 06 October 2017

***Correspondence:**
Dr. Mohamad Imran,
E-mail: imranmaxfac@gmail.com

ABSTRACT

Background: Obstructive sleep apnea syndrome has a high prevalence among adults. Cephalometric variables can be a valuable method for evaluating patients with this syndrome. The objective of this study is to evaluate and compare the craniofacial variables in subjects with and without snoring by cephalometric analysis.
Methods: 40 patients were included in the study who were divided into two groups; group 1 of 20 snoring patients and group 2 control group of 20 non-snoring patients and were evaluated and compared for various cephalometric variables.
Results: The distance from the hyoid bone to the mandibular plane (MP-H) was the only variable that showed a statistically significant correlation between two groups.
Conclusions: Cephalometric variables are useful tools for evaluating the patients with snoring who are predisposed to obstructive sleep apnoea. The distance from the hyoid bone to the mandibular plane showed a statistically significant correlation between two groups.

Keywords: Cephalometry, Obstructive Sleep Apnoea, Polysomnography

INTRODUCTION

The obstructive sleep apnea syndrome (OSAS) is characterized by pauses in breathing during sleep, micro-arousals and daytime sleepiness. These symptoms are caused by repeated episodes of obstruction at one or more upper airway levels during sleep.[1] This syndrome has a high prevalence in the adult population, affecting 4% of men and 2% of women.[1] Affected patients have a higher risk of cardiovascular disease, motor vehicle accidents due to daytime sleepiness and may present a significant neurocognitive function.[2] The pathogenesis of OSAS has been investigated through several structural and physiological methods.[3] An increase in pharyngeal collapse has been postulated as a factor of OSAS physiopathology. Furthermore, it is known that craniofacial abnormalities and soft tissue characteristics are involved in upper airway patency. However, it is unclear how much the morphology of the craniofacial skeleton and soft tissue characteristics may affect the pharyngeal collapse and contribute to episodes of apnea. Skeleton and soft tissues of the oropharynx in OSAS is still controversial.[3-8]

In this context, cephalometry and 3D-CT scanning can assess craniofacial skeleton abnormalities and the

characteristics of oropharyngeal soft tissues. Although cephalometry has a limited two-dimensional view, it is a simple and affordable assessment method with less radiation exposure than computed tomography.[3-6]

METHODS

A sample of 40 patients was taken and divided into two groups: Group 1 of 20 patients with history of snoring and Group 2 of 20 patients without any history of snoring.

Lateral cephalograms were taken under standard conditions in both the groups at a film focus distance of 1.50m, a cathode voltage of 75 to 80kV depending on the age of the patient. Lacquered Polyester Single Matte Acetate tracing paper of 50microns thickness was used for tracing the cephalograms and a sharp 0.3mm Staedtler Mars micro mechanical pencil to register the important cephalometric landmarks onto the acetate sheet. All the films were traced and measured by the same examiner to avoid examiner bias and evaluated for the following cephalometric variables (Figure 1).

SNA: Angle formed between the point sella, nasion and point A. This angle shows the position of the maxilla relative to the cranial base, therefore it defines the degree of protrusion or retrusion of the maxilla in the anteroposterior direction. Reference value (RV): 82º.[9,10]

SNB: Angle formed between the point sella, nasion and point B. The magnitude of this angle indicates the position of the mandible relative to the anterior cranial base. Thus, it demonstrates the degree of protrusion or retrusion of the mandible in the anteroposterior direction. Reference value (RV): 80º.[10]

ANB: Angle formed between point A and point B. Reference value (RV):0-4^0.

PAS: Lower pharyngeal space related to retrolingual airspace. Linear distance between a point on the base of the tongue (BT) and another point on the posterior pharyngeal wall at the level of Me-Go line. Reference value (RV): Men-19mm/ Women-15mm.[10]

PNS-U: Soft palate length, measured from the posterior nasal spine (PNS) to the tip of the uvula (U). Reference value (RV): Men-34mm/ Women-35mm.[10]

MP-H: Linear distance along a perpendicular line from point H to the mandibular plane (MP). Reference value (RV): Men-19mm/ Women-15mm.[10]

RESULTS

The results of the study were subjected to statistical analysis using student t test. All the patients in the study were males with mean age 40.5 years in group 1 and 38.8 years in group 2. The mean SNA in group 1 and group 2 was 82.2^0 and 83.4^0 respectively which was statistically insignificant. The SNB mean angle in group 1 though smaller (79.5^0) than group 2 (81.0^0) but was statistically insignificant. PAS values showed no statistically significant correlation between two groups with group 1 having 9.0mm and group 2 with 9.8mm mean values.

The analysis of MP-H values, on the other hand, showed greater length values in groups 1 than in groups 2 which is statistically significant (Table 1). These results are in agreement with most of the studies where the mandibular plane and hyoid bone distance has been shown to be one of the important factors associated with obstructive sleep apnea and history of snoring.

Table 1: Showing results of different cephalometric variables used in the study.

Group	SNA (^{0})	SNB (^{0})	ANB (^{0})	PAS (mm)	PNS-U (mm)	MP-H (mm)
Group 1	82.2	79.5	3.3	9.0	37.9	22.3
Group 2	83.4	81.0	2.4	9.8	38.4	18.9

DISCUSSION

In the medical literature, several predictors of OSAS have been identified and studied including body mass index), older age, increased cervical and abdominal circumference, in addition to the craniofacial disposition and pharyngeal soft tissues.[3,10,11] These predisposing and/or etiological factors of OSAS have been extensively investigated by polysomnography, flexible nasal endoscopy, sleep endoscopy and cephalometry. However, even with the use of all available methods, the precise identification of the airway obstruction site is limited because of the inability to reproduce the sleep state in awake patients.[12]

It is known that airway patency is influenced by craniofacial configuration, pharyngeal soft tissue characteristics pharyngeal muscle contraction. There are two hypotheses that attempt to explain upper airway collapse: the neural hypothesis, which implies reduction of the oropharyngeal dilator muscle activity, and the anatomical theory which explains the collapse through the relationship of boney anatomy and soft tissues relaxation during sleep.

Therefore, the structural relationships of the craniofacial skeleton and pharyngeal soft tissue may contribute to airway compromise. After a comprehensive review, Miles et al indicated that a direct and causal association between the relationship of craniofacial structures and the presence and severity of OSAS is very difficult to find in literature. In this context, several studies have attempted to establish such a direct association between cephalometric measurements and the presence and severity of OSAS.[3-8]

In our series, the analysed cephalometric variables were SNA, SNB, PAS, PNS-U and MP-H. The values of the SNA, SNB, PAS and PNS-U showed no significant difference between the two groups. In our study the only variable that correlated with OSAS was MP-H. Therefore, attention should be given to the increased distance from the hyoid bone (MP-H), as the muscles of the tongue are partially anchored to the hyoid bone and their height can influence the relationship of soft tissues in the oropharynx.

The study may not fit correctly in the clinical scenario as there are many factors which are not taken into account in this study. First, cephalometry is obtained while the individual is awake and standing, which does not reflect changes that occur during sleep with the subject lying down and with relaxed pharyngeal muscles.

Second, cephalometry provides information on the anteroposterior pharyngeal dimensions, but not on the laterolateral dimensions and recent studies with magnetic resonance imaging showed a reduction in lateral pharyngeal space in OSAS patients when compared with snoring patients only. Finally, it is possible that the configuration of upper airway which is elliptical, may predispose to pharyngeal collapse during sleep and this configuration may be more important than the absolute size of the airway.[13-15]

CONCLUSION

Cephalometric variables are useful tools for evaluating the patients with snoring who are predisposed to obstructive sleep apnoea. The distance from the hyoid bone to the mandibular plane showed a statistically significant correlation between two groups.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. 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;328:230-5.
2. Shamsuzzaman ASM, Gersh BJ, Somers VK. Obstructive sleep apnea: Implications for cardiac and vascular disease. JAMA. 2003;290:1906-14.
3. Cillo JE, Thayer S, Dasheiff RM, Finn R. Relations between obstructive sleep apnea syndrome and specific cephalometric measurements, body mass index, and Apnea-Hypopnea index. Int J Oral Maxillofac Surg. 2012;70:278-83.
4. Gulati A, Chate RAC, Howes TQ. Can a single cephalometric measurement predict obstructive sleep apnea severity? J Clin Sleep Med. 2010;6:64-8.
5. Kitamura T, Sakabe A, Ueda N, ShimoriT, Udaka T, Ohbuchi T, et al. Usefulness of cephalometry and pharyngeal findings in the primary diagnosis of obstructive sleep apnea syndrome. Nippon Jibiinkoka Gakkai Kaiho. 2008;111:695-700.
6. Monteith BD. Altered jaw posture and occlusal disruption patterns following mandibular advancement therapy for sleep apnea: A preliminary study of cephalometric predictors. Int J Prosthodont. 2004;17:274-80.
7. Naganuma H, Okamoto M, Woodson BT, Hirose H. Cephalometric and fiberoptic evaluation as a case selection technique for obstructive sleep apnea syndrome (OSAS). Acta Otolaryngol Suppl. 2002;547:57-63.
8. Battagel JM, L'Estrange PR, Nolan P, Harkness B. The role of lateral cephalometric radiography and fluoroscopy in assessing mandibular advancement in sleep-related disorders. Eur J Orthod. 1998;20:121-32.
9. Miles PG, Vig PS, Weyant RJ, Forrest TD, Rocketti HE. Craniofacial structure and obstructive sleep apnea syndrome: A qualitative analysis and meta-analysis of the literature. Am J Orthod Dentofacial Orthop. 1996;109:163-72.
10. Macedo MM, Colombini NE, Silva AC. Cefalometria. Neto SC, Júnior JFM, Martins RHG, Costa SS. Tratado de Otorrinolaringologia. 2011;1:1019-48.
11. Pinto JA, Godoy LB, Marquis VW, Sonego TB, Leal Cde F, Artico MS. Anthropometric data as predictors of obstructive sleep apnea severity. Braz J Otorhinolaryngol. 2011:77:516-21.
12. Kim SJ, Kim YS, Park JH, Kim SW. Cephalometric predictors of therapeutic response to multilevel surgery in patients with obstructive sleep apnea. Int J Oral Maxillofac Surg. 2012;70:1404-12.
13. Sforza E, Bacon W, Weiss T, Thibault A, Petiau C, Krieger J. Upper airway collapsibility and cephalometric variable in patients with obstructive sleep apnea. Am J Respir Crit Care Med. 2000;161:347-52.
14. Riha RL, Brander P, Vennelle M, Douglas NJ. A cephalometric comparison of patients with the sleep apnea/hypopnea syndrome and their siblings. Sleep. 2005;28:315-20.

15. Partinen M, Guilleminault C, Quera-Salva MA, Jamieson A. Obstructive sleep apnea and cephalometric roentgenograms. Chest. 1988;93:1199-205.

Cite this article as: Khan A, Imran M, Imran M, Parkar SN, Islam MU, Nazir S. Comparison of different cephalometric variables in patients with and without history of snoring. Int J Res Med Sci 2017;5:5283-6.