Original Article

PHARYNGEAL AIRWAY ANALYSIS IN DIFFERENT SKELETAL MALOCCLUSIONS – A RETROSPECTIVE CEPHALOMETRIC STUDY

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ABSTRACT

Aims & objectives: To determine the mean of upper & lower pharyngeal airway widths in different skeletal malocclusions using lateral cephalograms, which would be very useful in the early detection of nasopharyngeal constriction which may lead to sleep apnea & other related disorders.

Materials & Methods: 90 lateral cephalograms of the age group of 18 to 25 years were retrieved from our radiology records, of which 30 were of class I malocclusion, 30 were of class II and 30 class III & those devoid of any pharyngeal pathology.

Methodology: The lateral cephalograms are traced & upper & lower pharyngeal airway widths are measured by using Mc. Namara airway analysis.

Results: In class I, the mean for upper pharyngeal airway width is 13.33 mm & that of lower is 10.21 mm. In class II, upper is 12.93 mm & lower is 10.05 mm. For class III, upper is 15.64 mm & that of the lower is 13.76 mm.

Conclusion: The data provides preliminary details of upper airway assessment in normal individuals with different (Class I, Class II, Class III) malocclusions. Further correlations can be drawn with the studies comparing airway dimensions in normal individuals and in subjects with sleep-related disorders.

KEYWORDS

Pharyngeal airway, Skeletal malocclusions, Lateral cephalograms.

INTRODUCTION

Normal airway is one of the important factors for the normal growth of the craniofacial structures. The close relationship between the pharynx, dentofacial & craniofacial structures determine their mutual interaction. According to functional matrix theory proposed by Moss, the association of respiratory and masticatory functions act on craniofacial development.[5] Nasal obstruction secondary to hypertrophied inferior turbinates, adenoidal pad hypertrophy & hypertrophy of the faucial tonsils can cause chronic mouth breathing, loud snoring, obstructive sleep apnea & excessive daytime sleepiness. In this situation, a number of postural changes, such as open mandible posture, downward & forward positioning of the tongue, and extension of the head, can take place.[4] If these postural changes continue for a long period, especially during the active growth stage, dentofacial disorders at different levels of severity can be seen, together with the inadequate lip structure, long face syndrome & adenoidal facies. Clinical detection of structural narrowing of the upper airway may facilitate early recognition of obstructive sleep apnea (fig 1).[4] The aim of this study is to determine the upper and lower pharyngeal airway width in different skeletal malocclusions (i.e., class I, class II and class III) using lateral cephalograms.

METHODOLOGY

This included cephalometric radiographs of both males and females within the age group of 18 to 25 years. A total of 90 lateral cephalograms were retrieved from our radiology record, of which 30 cephalograms belong to class I malocclusion, 30 of class II malocclusion & 30 belong to class III

malocclusion. Skeletal malocclusions without any pharyngeal pathology & within the age group of 18 to 25 years have been included in this study.

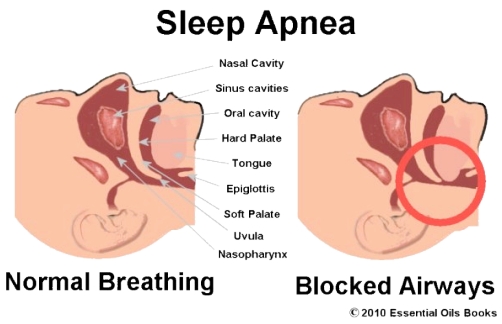

Fig 1: Picture showing the blocked airways in Obstructive Sleep Apnea

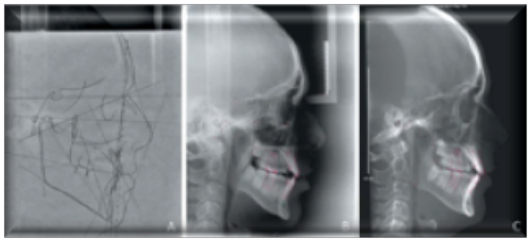

Fig:2 Traced lateral cephalogram using Mc. Namara Airway analysis

Clinical record suggestive of Pharyngeal pathology & those radiographs with poor

Fig 3: Lateral Cephalogram with the arrows showing upper & Lower pharyngeal airway

visualization of pharyngeal areas have been excluded from the study. Radiographs were obtained with an Orthophos XG (Sirona Corp., Germany) were viewed using sidexis version 2.5 software on a DELL desktop PC & are traced (fig 2). Upper and lower pharyngeal airway widths are measured using Mc. Namara airway analysis (fig 3). All the measured values are calculated for mean, standard deviation and calculated t value.

RESULTS

In cephalograms with class I malocclusion, the mean for upper pharyngeal airway width is 13.33 mm & that of lower is 10.21 mm (table 1). For class II malocclusion, the mean for upper

	Upper	Lower
Mean	13. 33	10. 21
Standard deviation	1. 96	0. 78

Table 1: Table showing Airway width in millimeters in skeletal class I

	Upper	lower
Mean	12.93	10.05
Standard deviation	1.65	1.52

Table 2: Table showing Airway width in millimeters in skeletal class II

	Upper	lower
Mean	15.64	13.76
Standard deviation	1.57	1.42

Table 3 : Table showing Airway width in millimeters in skeletal class III

pharyngeal airway width is 12.93 mm & lower is 10.05mm (table 2). For class III malocclusion, the mean for upper pharyngeal airway width is 15.64 mm & that of the lower is 13.76 mm (table 3).

DISCUSSION

The lateral cephalogram is a routinely used radiograph for orthodontic treatment purposes. It is a two dimensional representation of sagittal aspect of head and neck region. Over the years,

various techniques like cephalograms, cine-computed tomography, fluoroscopy, acoustic reflection, fibreoptic pharyngoscopy, MRI have been employed for the assessment of pharyngeal airway. These techniques for assessment are more expensive & may not be available at dispense in all places. In view of ease of availability of previous radiographic data & patient records the present study utilized the available radiographic records & a retrospective analysis was done to establish normal values of airway in subjects. The aim of the present study is to assess the width of the upper & lower pharyngeal airway using Mc Namara airway analysis in different malocclusions according to their ANB angles. All the measured values are calculated for mean, standard deviation, and calculated t value. The mean value of upper & lower pharyngeal airway width has been evaluated. If the pharyngeal airway width is less than that of the mean value, we can suspect nasopharyngeal constriction which may lead to sleep apnea and other related disorders. Acc to Mc. Namara, the width of upper pharyngeal airway is 15 to 20mm and that of lower is 11 to 14mm

CONCLUSION

The data provides preliminary details of upper airway assessment in normal individuals with different (Class I, Class II, Class III) malocclusions. The pharyngeal airway widths of Class II patients is less when compared with Class I and Class III patients. It is observed that mandibular position with respect to cranial base had an effect on the pharyngeal airway width. The only significant difference for the pharyngeal width was between the Class I and Class II groups, with a smaller volume observed for the Class II group. Further correlations can be drawn with the studies comparing airway dimensions in normal individuals and in subjects with sleep-related disorders.

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