

Predominant Shapes of Soft Palate in Chitwan district of Nepal: A Radiographic Study

Deepanshu Garg¹, Deepika Kapoor²

ABSTRACT

Introduction: Soft palate is such a part of nasopharynx and oropharynx which helps in speech, swallowing and breathing. Failures in apposition of soft palate and pharyngeal walls results in velopharyngeal incompetence. Aim: To study various shapes of soft palate on lateral cephalograms in both pediatric group and adult group in Chitwan population. Objective: To find out the predominant shape in pediatric group and adult group in Chitwan population.

Material and Methods: The study comprised of 100 patients at random that included 50 adult patients group of age between 15-28 yrs and 50 pediatric patients group of age between 7-14 yrs. Shape of soft palate was seen on lateral cephalograms and were assigned a pattern based upon criteria given by You M et al.

Results: We found out that type 2 and type 5 patterns were predominantly significant in both adult and pediatric population.

Conclusion: Findings of this study can be indulged in studies for closure of palate in cleft palate patients and for the etiological study of OSAS.

Keywords: Soft Palate, Lateral Cephalogram, Chitwan, Shape

INTRODUCTION

Soft palate is such a part of nasopharynx and oropharynx which helps in speech, swallowing and breathing. Soft palate being a part of velopharyngeal apparatus has a major role in maintaining velar and pharyngeal competence. During velopharyngeal closure, there is sphincteric mechanism where in the velar component of the soft palate and posterior and lateral pharyngeal walls come in apposition thereby separating oral cavity from nasal cavity during deglutition and speech. Failures in apposition of soft palate and pharyngeal walls results in velopharyngeal incompetence. The morphology of soft palate that is its shape, thickness and length play an important role in normal functional anatomy of upper airway and velopharyngeal incompetence. According to Patni V et al (2011) short soft palate is one of the important etiologies of velopharyngeal incompetence.¹

Similarly the shape of soft palate may play a role in upper airway obstruction in patients with obstructive sleep apnea syndrome (OSAS). Obstructive sleep apnea is a sleep related breathing disorder that involves cessation of airflow when a person tries to breathe. This happens due to the blockage of upper airway because of relaxation of muscles during sleep. Due to this, there will be partial pauses and sometimes complete pauses in breathing that lasts atleast 10 seconds during sleep.²

Study aimed to record the various shapes of soft palate on lateral cephalograms in both pediatric group and adult group in Chitwan population with the objective to find out the predominant shape in pediatric group and adult group in Chitwan population.

MATERIAL AND METHODS

After taking informed consent, examination of patient was done using: electrically operated dental chair with illumination, a pair of sterile disposable gloves, disposable mouth mask, mouth mirror (No.5), straight probe, tweezers and X Ray of the patient was done using: conventional X ray machine.

Methodology

The patients duly informed about the study and were comfortably seated on an electrically operated dental chair and using sterile gloves, all these patients were examined. The clinical examination was done to see any intraoral or extraoral pathology. The study comprised of 100 patients at random that included 50 adult patients group of age between 15-28 yrs and 50 pediatric patients group of age between 7-14 yrs. After explaining the procedure to the patient and taking proper consent, the patient was directed to the department of radiology where the lateral cephalogram was taken. Patients were instructed to maintain head in natural position and teeth in occlusion so that tongue is behind upper central incisors so that soft palate is in rest position. The patient was instructed to wear the lead apron. Radiographic exposure was obtained by the machine using horizontal scanning of the patient. All lateral cephalograms were taken using conventional X ray machine. The tube potential was adjusted to optimize the contrast of both hard and soft tissues.

The shapes of soft palate were categorized according to the criteria given by You M et al in 2008.³ The various types of soft palate are:

Type 1: Leaf shaped/Lanceolate shaped—the middle portion of the soft palate elevated to both the naso- and the oro-side.

Type 2: Rat-tail shaped—the soft palate which showed inflated anterior portion and free margin with an obvious coarctation.

Type 3: Butt-like—soft palate which showed a shorter and fatter velum appearance with no distinct difference of width of the anterior portion to the free margin.

Type 4: Straight line shaped.

Type 5: S-shaped/distorted soft palate.

Type 6: Crooked appearance—the soft palate in which the posterior portion of the soft palate crooks antero superiorly.

¹Lecturer, Department of Oral Medicine and Radiology, ²Lecturer, Department of Pedodontics, College of Medical Sciences, Nepal

Corresponding author: Dr. Deepanshu Garg, Lecturer, Department of Oral Medicine and Radiology, College of Medical Sciences, Nepal

How to cite this article: Deepanshu Garg, Deepika Kapoor. Predominant shapes of soft palate in chitwan district of nepal: a radiographic study. International Journal of Contemporary Medical Research 2017;4(4):897-899.

STATISTICAL ANALYSIS

Chi Square Test was used to find the comparison and calculate the p value. $p \leq 0.05$ = Significant

Chi-Square Formula

$$\chi^2 = \sum \frac{(\text{Observed value} - \text{Expected Value})^2}{\text{Expected Value}}$$

Degrees of freedom (df) = n-1 where n is the number of classed.

RESULTS

Six types of velar morphologies were traced by observing the image of the velum on lateral cephalograms.

- *Type 1*: 'Leaf shape' lanceolate, indicated that the middle portion of the soft palate elevated to both the naso- and the oro-side. In our study it was observed that type 1 was found in 9 cases (18%) in pediatric patient group and in 5 cases (10%) in adult patient group with p value of 0.564.
- *Type 2*: 'Rat-tail shape' soft palate showed that the anterior portion was inflated and the free margin had an obvious coarctation. In our study it was observed that type 2 was found in 18 cases (36%) in pediatric patient group and in 18 cases (36%) in adult patient group with p value of 0.402.
- *Type 3*: A 'butt-like' soft palate with a shorter and fatter velum appearance, and the width had almost no distinct difference from the anterior portion to the free margin. In our study it was observed that type 3 was found in 3 cases (6%) in pediatric patient group and in 3 cases (6%) in adult patient group with p value of 1.00.
- *Type 4*: 'Straight line shape'. In our study it was observed that type 4 was found in 4 cases (8%) in pediatric patient group and in 4 cases (8%) in adult patient group with p value of 0.655.
- *Type 5*: The distorted soft palate, presented the S-shape. In our study it was observed that type 5 was found in 10 cases (20%) in pediatric patient group and in 16 cases (32%) in adult patient group with p value of 0.0423.
- *Type 6*: 'Crook' appearance of the soft palate, in which the posterior portion of the soft palate crooks anterosuperiorly. In our study it was observed that type 6 was found in 6 cases (12%) in pediatric patient group and in 4 cases (8%) in adult patient group with p value of 0.736.

In comparison between the shapes of soft palate in both pediatric patient group and adult patient group it was observed that type 2 (rat tail shape) showed predominant shape of soft palate in both pediatric patient group and adult patient group in Chitwan population (table 3).

DISCUSSION

Analysis by cephalogram is one of the most accepted techniques to evaluate the soft palate in both normal individuals and those patients who suffer from a cleft palate. This technique is cost effective and provides a good view of soft palate and the normal anatomy around the palate.⁴ Soft palate is such a part of nasopharynx and oropharynx which helps in speech, swallowing and breathing. Soft palate has a distinguished role to maintain the competence of velar and pharyngeal part.⁵ The dimensions of the soft palate and its adjacent anatomy, especially the velar length and width. In past the shape of soft palate was ignored but

it is very helpful in deciding the length and width of soft palate. We took the anteroposterior view in sagittal plane and were able to adjust the settings. Thus we can easily see the measurements of soft palate which can be of great help to the diagnosis.⁶ Satoh K et al (1997) compared the growth characteristics in cephalogram of the structures of nasopharynx between in an individual with cleft lip and palate and those without cleft. They observed that the length of soft palate was less in cleft patients. Also they given the importance of velar length in maintaining velopharyngeal closure and harmonious growth of nasopharyngeal structures.⁷

In our study, 100 patients were included that comprised of 50 adult patient group of age between 15-28 yrs and 50 pediatric patient group of age between 7-14 yrs, out of which type 2 (rat tail-shaped soft palate) was found in 18 cases (36%) in pediatric patient group and in 18 cases (36%) in adult patient group, which was an unusual finding. According to the study done by You M et al (2008) they stated that it was type 1 (lanceolate shape) that was described as a classic velar morphology. The S-shape was said to be as a hooked appearance of the soft palate by Pepin et al (1999). Angle of 30° between longitudinal axis of soft palate and distal part of uvula is known as hooking of soft palate. They found out that the main reason for collapse of pharynx is hooking of soft palate because hooking leads to decrease in dimensions of oropharynx thus increasing the airway resistance and pressure of pharynx. They found out that hooking of the soft palate in patients indicated a high risk for obstructive sleep apnea syndrome (OSAS).⁴ In our study type 5 (S shape) was found in 10 cases (20%) in pediatric patient group and in 16 cases (32%) in adult patient group.⁸

Akcam MO et al (2002) evaluated the soft palate and the nasopharyngeal airway relationship in different rotation models of mandibular growth. They observed that soft palate showed a linear increase in all groups but it was maximum in posterior mandibular rotation group. They concluded that measurements of soft palate and their anatomy according to adjacent structures need to be seen to plan the treatment so that there are no speech problems after treatment.⁹

Johnston CD et al (1999) found out that small airway opening and smaller bones in pharynx is the foundation of OSA in adults.¹⁰

Since the relationship of soft palate and pharynx is very important for velopharyngeal closure, so it is important to see the shapes of different structures involved.¹⁰

In this regard, the present study may be considered as an attempt to discuss the various types of shapes of soft palate along with their prevalence in both children and adults. However more studies with a higher sample size are required to see the patterns of soft palate and set new guidelines for orthodontics. As we have seen that even after the surgery of cleft palate patients, he/she is not able to achieve normal function and this could be due to the variation on shapes of soft palate.

CONCLUSION

The present study was carried out to investigate the variation of soft palate morphology and its prevalence in pediatric group and adult group in Chitwan population as described by You M et al (2008). We observed that type 2 (rat tail shape) was the most common of all the variants. We also found that type 5

(S shaped soft palate) with P value of 0.0423 was significant among pediatric and adult group. Findings of this study can be indulged in studies for closure of palate in cleft palate patients and for the etiological study of OSAS.

REFERENCES

1. Garg Shaveta et al: Prevalance of soft palatemorphology- a unique cephalometric study: Journal of pearIdent. 2014;5: no.3.
2. Praveen BN et al: Various Shapes of Soft Palate: A Lateral Cephalometric Study: World Journal of Dentistry. 2011;2:207-210.
3. You M et al: Morphological variety of the soft palate in normal individuals: a digital cephalometric study: Dentomaxillofacial Radiology. 2008;37:344-349.
4. Kumar D. Kalyan, Gopal K. Saraswathi: Morphological Variants Of Soft Palate in normal Individuals: A Digital Cephalometric Study: Journal of Clinical and Diagnostic Research. 2011;5(6) (Suppl-1):1310-1313.
5. Verma Pradhuman et al: Correlation of morphological variants of the soft palate and Need's ratio in normal individuals: A digital cephalometric study: Imaging Science in Dentistry. 2014;44:193-8.
6. D Samdani et al: Correlation of morphological variants of soft palate and types of malocclusion: A digital lateral cephalometric study: J Indian Acad Oral Med Radiol. 2015;27:366-71.
7. Satoh K, Wada T, Tachimura T, Fukuda J, Shiba R, Sakoda S, et al. Comparison of the nasopharyngeal growth between patients with clefts (UCLP) and those with non-cleft controls by multivariate analysis. Cleft Palate Craniofac J. 1997;34:405-9.
8. Kumar DK, Gopal KS. Morphological variants of soft palate in normal individuals: a digital cephalometric study. J Clin Diagn Res. 2011;5:1310-3.
9. Akcam MO, Toygar TU, Wada T. Longitudinal investigation of soft palate and nasopharyngeal airway relations in different rotation types. Angle Orthod. 2002;72:521-6.
10. Johnston CD, Richardson A. Cephalometric changes in adult pharyngeal morphology. Eur J Orthod. 1999;21:357-62.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 28-03-2017; **Accepted:** 30-04-2017; **Published:** 09-05-2017