

Radiographic Evaluation of Soft Palate Morphology and Correlation with Gender on Lateral Cephalograms

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ABSTRACT

Objective: To investigate the variation of the soft palate morphology and the proportional differences of the morphology of soft palate between males and females.

Materials and methods: We conducted a cross-sectional study in department of oral medicine and radiology. Lateral cephalometric radiographs of individuals subjected to radiographic examination for orthodontic purpose were retrieved. A total of 100 digital lateral cephalograms of normal healthy individuals (50 males and 50 females) who were aged 15 to 45 years were retrieved.

Results: Type 1 was most commonest shape of the soft palate (30%) followed by type 6 (19%), types 2 and 3 (17 and 17%), type 4 (11%) with least being type 5 (6%). There was no significant difference in the distribution of shape of soft palate between males and females ($p = 0.312$).

Conclusion: This classification can help us better understand the diversity of the velar morphology and can be used as references for the research of velopharyngeal closure in cleft palate individuals, obstructive sleep apnea syndrome (OSAS) and other conditions.

Keywords: Cephalometry, Morphology, Soft palate.

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INTRODUCTION

The soft palate is the posterior fibromuscular part of the palate that is attached to the posterior edge of the hard palate.¹ It participates in most of the oral functions like velopharyngeal closure aiding in sucking, swallowing and pronunciation.² Prior studies of the soft

palate have been done by investigators for assessment of speech, function and the upper airway structures.³⁻¹¹ Many studies have evaluated the dimensional analysis of the soft palate, while little attention has been paid to the variety of soft palate morphology and configuration. Images of the soft palate on lateral cephalometric radiographs appear to have various morphologies in normal individuals. Pepin et al found the 'hooked' appearance of the soft palate in patients who were awake and associated it with obstructive sleep apnea syndrome (OSAS).¹⁶ Considering the variations in the morphology of soft palate and its implications in various conditions, we aimed to investigate the variations in the soft palate morphology and the proportional differences in the morphology of soft palate between males and females.

MATERIALS AND METHODS

We conducted a cross-sectional study in Department of Oral Medicine and Radiology, Manipal College of Dental Sciences, Manipal, Karnataka. Prior approval of the institutional ethical committee was obtained. Lateral cephalometric radiographs of individuals subjected to radiographic examination for orthodontic purpose were retrieved from the archives of departments of oral medicine and radiology and orthodontics. A total of 100 digital lateral cephalograms of normal healthy individuals (50 males and 50 females) who were aged 15 to 45 years were retrieved from November 2014 to February 2015.

Radiographs of good quality and visibility of soft palate were included. Patients with facial or palatal deformities or facial trauma were excluded. Poor quality radiographs and radiographs with incomplete details were also excluded.

All lateral cephalograms were taken using orthopantomograph (planmeca) with a tube potential adjusted to optimize the contrast. All the images on the radiographs were observed and classified into 6 types by 2 radiologists independently according to You et al (2008).¹

The pattern of the soft palate on the digital lateral cephalograms was highlighted with curve tool in microsoft power point. The assessment of the soft palate morphology was carried out twice by two radiologists. Since there were no differences in classification

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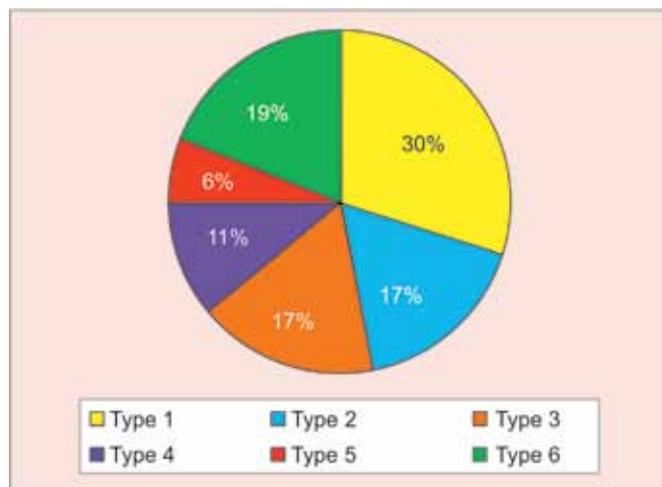
between the two radiologists, reliability was considered to be acceptable.

All the analysis was done using statistical package for the social sciences (SPSS) version 18. A p-value of <0.05 was considered statistically significant. Comparison of variation of soft palate morphology between males and females was done using Chi-square test.

RESULTS

A total 100 radiographs were studied for shapes of soft palate out of which 50 were males. The age of the subjects was 20.91 ± 3.63 with age range of 18 to 45 years. Type 1 was most commonest shape of the soft palate (30%) followed by type 6 (19%), types 2 and 3 (17 and 17%), type 4 (11%) with least being type 5 (6%) (Graph 1).

A total of 50 males and 50 females radiographs were used for our study. Among males, type 1 was the commonest (38%) followed by type 6 (22%), types 2 and 3 (14 and 14%) with least being types 4 and 5 (6 and 6%) respectively. In females, type 1 (22%) was the commonest followed by types 2 and 3 (20 and 20%), type 4 (16%), type 6 (16%) with least being type 5 (6%). However, there was no significant difference in the distribution of shape of soft palate between males and females (p = 0.312) (Table 1).



Graph 1: Distribution of soft palate morphology

Table 1: Comparison of shape of soft palate between males and females

	Males n (%)	Females n (%)	p-value
Type 1 (leaf shape)	19 (38.0)	11 (22.0)	0.312
Type 2 (rat tail shape)	7 (14.0)	10 (20.0)	
Type 3 (butt like)	7 (14.0)	10 (20.0)	
Type 4 (straightline shape)	3 (6.0)	8 (16.0)	
Type 5 (S-shape)	3 (6.0)	3 (6.0)	
Type 6 (crook appearance)	11 (22.0)	8 (16.0)	

Chi-square test

DISCUSSION

The most commonly accepted techniques for evaluating the soft palate in both normal individuals and those with cleft palate is by cephalometric radiographs. It is relatively inexpensive method aiding in the assessment of soft palate morphology and its surrounding structures.^{1,8}

Much of the former research that studied the soft palate and its surrounding structures was aimed at providing some information on diagnosis, prediction and treatment in individuals with cleft palate. The soft palate plays a large role in velopharyngeal closure, which refers to the normal apposition of the soft palate with the posterior and lateral pharyngeal walls. It is primarily a sphincteric mechanism consisting of velar and pharyngeal components. The movement separates the oral cavity from the nasal cavity during deglutition and speech. When the velum and lateral and posterior pharyngeal walls fail to separate the two cavities, velopharyngeal incompetence (VPI) occurs.¹

In our study, the leaf shaped soft palate was the most frequent type and was in accordance with literature where it was described as a classic velar morphology.^{1,12-14} However, type 2 (rat tail shaped) was reported to be commonest by Praveen et al 2011.¹⁵ While the S-shape was seen in only few cases, it can be supposed that the number of subjects in the investigation was not large enough. The S-shape, which was described as a hooked appearance of the soft palate by Pepin et al¹⁶ was found in 5.8% subjects in our study.

In our study, the difference between gender did not exist in the comparison of the proportion of the various morphology of soft palate. This was similar to that reported by Praveen et al 2011¹⁵ while previous study by You et al¹ reported gender differences, wherein types 2 and 3 were significantly less in females than males. Type 1 was the most common type among males and females in our study which was followed by types 2 and 3. This was similar to the study reported by Kruthika et al 2012.¹⁴

This classification can help us better understand the diversity of the velar morphology and can be used as references for the research of velopharyngeal closure in cleft palate individuals, OSAS and other conditions.

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