

Velum Versus Skeletal Pattern: A Cephalometric Study

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ABSTRACT

Background: The literature describes variation in the morphology of the soft palate and ignores its diversity in different skeletal patterns, but in our clinical work on lateral cephalometry we had confirm variable presentation in the morphology of the soft palate in different skeletal patterns. The aim of our study was to investigate the variation of the velar morphology in the various skeletal patterns.

Methods: In this study, the sample comprised 120 normal subjects whose ages ranged from 18-21 years. According to the skeletal pattern, all lateral cephalogram were divided into 3 groups. The morphology of the soft palate were examined and Classified into six types.

Results: Different morphology of soft palate had found in different skeletal patterns. Subjects, with Skeletal Class I pattern, tends to show LEAF shaped Soft palate; Skeletal Class II tends to show BUTT shaped Soft palate, Skeletal Class III tends to show CROOK shaped soft palate.

Conclusion: For the research of velopharyngeal closure in cleft palate individuals and for etiological research of OSAS and other conditions these findings can be used as reference.

Keywords: Soft palate, skeletal pattern, cephalometrics.

INTRODUCTION

The soft palate, is the posterior muscular portion, attached to the posterior edge of the hard palate.¹ It involves in velopharyngeal closure that are related to the normal functions of swallowing, sucking and pronunciation.² The two palatal processes and the primitive palate that are formed from the frontonasal process, fuses to form the palate. The intramembranous ossification of mesoderm in the palate forms hard palate but this ossification does not extend into the most posterior portion that remains as

the soft palate. The objective measurements of the soft palate in the speech, function and the upper airway structures have been contributed by few authors.³⁻⁵

Continuous efforts have been made towards soft palate dimension and its surrounding structures but morphological variation and configuration of soft palate is unseen. The configuration of the soft palate on lateral cephalometry was presented variously in normal individuals.⁶ "Hooked" shaped soft palate has been indicated as risk factor for developing

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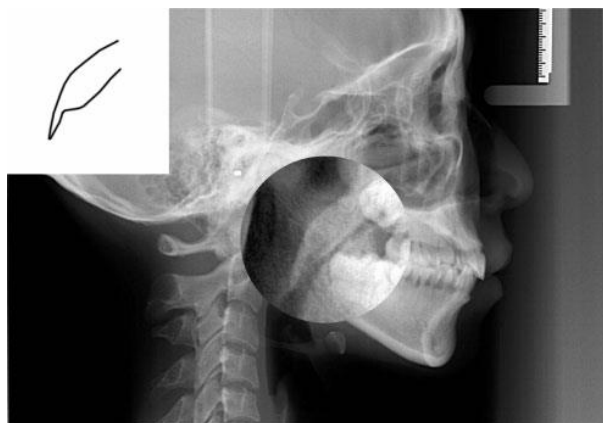


Fig 1: Type 1: “leaf-shaped” (lanceolate); the middle portion of the soft palate is elevated to both the naso- and oro-side.

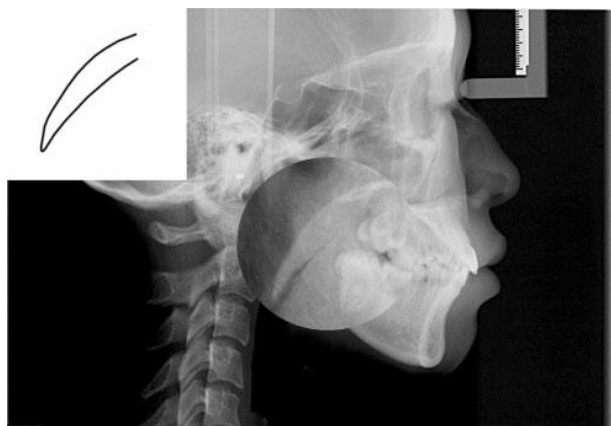


Fig 2: Type 2: “rat-tail shaped”; the anterior portion is inflated and the free margin has an obvious coarctation.

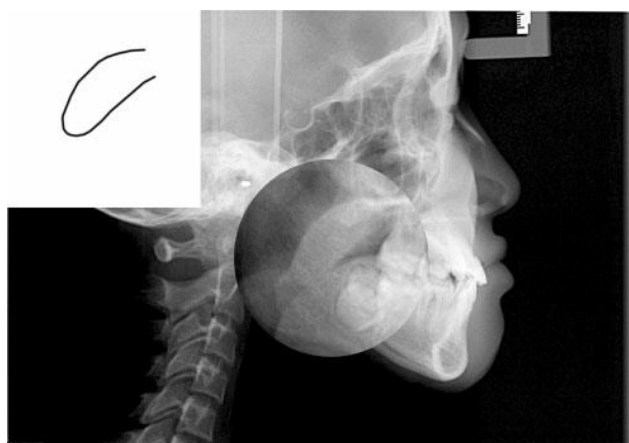


Fig 3: Type 3: a “butt-like shape”; the length of the soft palate in this type is about a third to three-quarters of that of the leaf shape. The width has almost no distinct difference from the anterior portion to the free margin.

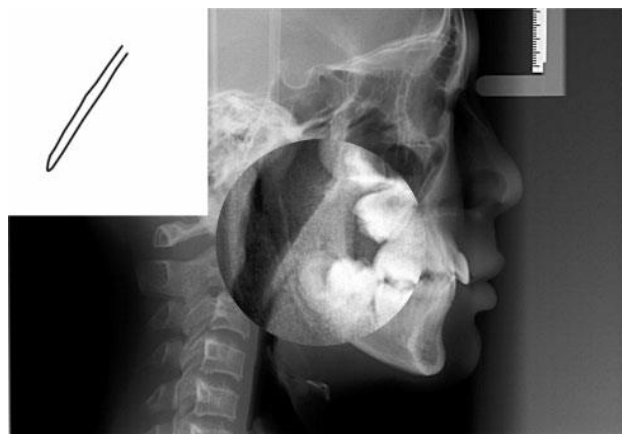


Fig 4: Type 4: “straight line”.

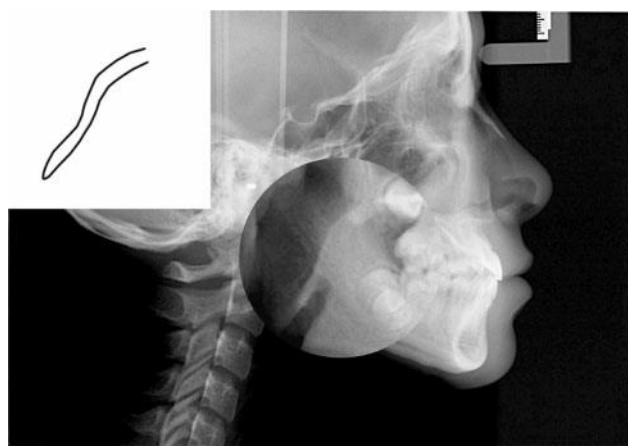


Figure 5: Type 5: distorted soft palate, which presents the “S-shape”.



Fig 6: Type 6: “crook-shaped” appearance of the soft palate, in which the posterior portion of the soft palate crooks anterosuperiorly.

obstructive sleep apnoea syndrome (OSAS) in awake patients by Pepin et al.⁶ In our study, hooked appearance of the soft palate has been

Table 1: Morphology of soft palate in different skeletal pattern.

Soft palate	Type I	Type II	Type III	Type IV	Type V	Type VI	Total
Class I	40(80%)	2(4%)	5(10%)	0(0%)	0(0%)	3(6%)	50(100%)
Class II	15(30%)	3(6%)	25(50%)	7(14%)	0(0%)	0(0%)	50(100%)
Class III	0(0%)	4(20%)	0(0%)	7(35%)	0(0%)	9(45%)	20(100%)

observed as it was described “Crook-shaped” in Classification given by M You et al.⁷

In humans, the uvula is a conic projection from the posterior edge of the middle of the soft palate hangs from the end. Uvulectomy procedures confirmed non-involvement of the uvula in snoring patients through inconsistent results. In most people touching the uvula or the end of the soft palate evokes a strong gag reflex. A speech sound made with the tongue (dorsum) against the soft palate is called as a velar consonant. Separation of oral cavity (mouth) from the nasal cavity by retracting and elevating soft palate is possible to produce the oral speech sounds and incomplete separation i.e. if air escapes through nose, perceives nasal speech. So we had conducted a study to investigate the variation of soft palate morphology in various skeletal patterns.

MATERIAL AND METHOD

Lateral cephalograms of 120 subjects (65 men and 55 women, with ages ranging from 18–21 years) were included in the study. Subjects exhibiting cleft palate, diseases or syndromes of the head and neck were excluded from the study. SIRONA ORTHOPHOS XG5 (Sirona Dental Systems, Germany) was used to take all the lateral cephalograms. For optimization of the hard and soft tissue contrast, tube potential was adjusted (85 kV). The radiographs were traced and categorized according to skeletal pattern and according to their morphological Classification as given by M You et al.⁷

Type 1: “Leaf-shaped” (lanceolate); the middle portion of the soft palate is elevated to both the nasal- and oral-side. (Fig.1)

Type 2: “Rat-tail shaped”; the anterior portion is inflated and the free margin has an obvious coarctation. (Fig.2)

Type 3: “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. (Fig.3)

Type 4: “Straight line”. (Fig.4)

Type 5: Distorted soft palate, which presents the “S-shape”. (Fig.5)

Type 6: “Crook-shaped” appearance of the soft palate, in which the posterior portion of the soft palate crooks anterosuperiorly. (Fig.6)

RESULTS

Significant difference in the soft palate morphology in different skeletal pattern has been found (Table 1). Out of 50 Subjects with Skeletal Class I pattern, 40 subjects tends to show Type I or LEAF shaped Soft palate, 2 subjects tends to show Type II or RAT-TAIL shaped Soft palate, 5 subjects Type III soft palate and 3 subjects shows Type VI or CROOK shaped soft palate. In Skeletal Class II pattern subjects, Type I or LEAF shaped Soft palate found in 15 subjects, Type II or RAT-TAIL shaped Soft palate in 3 subjects, Type III or Butt-Like Shaped Soft palate in 25 subjects and remaining 7 subjects shows Type IV or Straight line shaped soft palate. Out of 20 Subjects with skeletal Class III pattern, 9 subjects show Type VI or Crook-shaped soft palate, 4 subjects shows Type II or RAT-TAIL shaped Soft palate and 7 subjects show shows Type IV or Straight line shaped soft palate. Type I or Leaf shaped soft palate is common in subjects with skeletal Class I and II pattern.

DISCUSSION

Differentiating the soft palate and its surrounding structures in normal and cleft palate individuals, the cephalometric analysis is

the most accepted and inexpensive technique. On lateral cephalogram, depth and height of the nasopharynx in the sagittal plane can be defined.⁸ Many investigators studied the dimensional analysis of the soft palate and its surrounding structures, especially the velar length and width but the relationship with Skeletal pattern was not yet obtained.³⁻⁸

The cephalometric technique, used in the current study, is based on the principle of slit radiography. The images were scanned from posterior to anterior in the sagittal plane and the contrast adjusted and optimized with Sidexis iX software (Sirona Dental Systems, Germany). By this the soft palate image was enhanced and elicited, which helps us to study the morphological variation of soft palate. In our study, the most common type of soft palate was the leaf-shaped (65 cases), which was also previously described by M. You et al.⁷ Pepin et al.⁶ had defined hooking of the soft palate as an angulation of about 30° between the distal part of the uvula and the longitudinal axis of the soft palate which was found in 12 cases in our study. Hooking of the soft palate results in a sudden and major reduction in the oropharyngeal dimensions which increases upper airway resistance and the transpharyngeal pressure gradient. Pepin et al.⁶ therefore concluded that hooking of the soft palate in awake patients indicates a high risk for OSAS.

In this study, we included the subjects having age 18-21 years. But longitudinal studies have shown an increase in the length of the soft palate in all time periods.⁵

CONCLUSION

Leaf shaped soft palate is more common type amongst all six types.

Subjects having skeletal Class III pattern are more prone to develop OSAS.

Soft palate morphology and its variation can be used further as a reference in the research of

velopharyngeal closure in cleft palate individuals and in etiological research of OSAS and other conditions.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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