OPEN ACCESS

Radiographic Assessment of Soft Palate Variations in OSMF Patients

Dr. Himanshu Punia[1], Dr. Anup N.[2]

[1]PhD scholar, Department of public health Dentistry, Jaipur Dental CollegeMaharaj Vinayak Global University, Jaipur.

[2]Professor And Head Of The Department. Of Public Health Dentistry, Jaipur Dental College.

*Corresponding Author

Dr. Himanshu Punia

Phd Scholar, Department Of Public Health Dentistry, Jaipur Dental CollegeMaharaj Vinayak Global University, Jaipur.

ABSTRACT

Background: Oral Submucous Fibrosis (OSMF) is a chronic, progressive disorder characterized by fibrosis of the oral mucosa, leading to functional impairments. The soft palate, an essential structure in phonation, deglutition, and respiration, undergoes morphological changes in OSMF patients. This study aimed to assess soft palate variations in OSMF using lateral cephalometry.

Materials & Methods: A cross-sectional radiographic study was conducted on 200 clinically diagnosed OSMF patients. Lateral cephalometric radiographs were obtained and analyzed for soft palate morphology based on You M et al.'s classification. Statistical analyses were performed using SPSS software, with a significance level set at $p<0.05$.

Results: The study revealed significant morphological variations in the soft palate among OSMF patients. Leaf-shaped morphology was predominant in controls (64%) but decreased in OSMF patients (44%), with an increase in Butt-shaped (22%) and Crook-shaped (12%) palates ($p<0.001$). Velum length was significantly reduced in OSMF patients (28.38 ± 2.98 mm) compared to controls (37.28 ± 4.52 mm) ($p<0.001$), while velum width was significantly larger ($p<0.001$). Disease severity correlated with progressive morphological alterations, with more severe OSMF stages exhibiting higher proportions of Butt and Crook shapes.

Conclusion: Lateral cephalometry effectively identifies soft palate morphological changes in OSMF patients, aiding in early diagnosis and disease staging. The progressive shortening and distortion of the soft palate highlight its diagnostic relevance in assessing fibrosis severity. Radiographic evaluation can serve as a valuable tool for clinicians in managing OSMF and preventing severe functional impairments.

Keywords: *Oral Submucous Fibrosis, Soft Palate, Lateral Cephalometry, Morphological Variations, Radiographic Assessment.*

1. INTRODUCTION

Oral Submucous Fibrosis (OSMF) is a debilitating disorder affecting the oral mucosa, characterized by chronic inflammation, excessive collagen deposition, and progressive fibrosis. The condition is commonly associated with areca nut chewing, a widespread habit in South Asian countries. Over time, OSMF leads to functional impairments such as restricted mouth opening, speech difficulties, and compromised swallowing. One of the less-explored but significantly impacted anatomical structures in OSMF is the soft palate, a dynamic component involved in phonation, deglutition, and respiration.[1,2]

The role of lateral cephalometry in assessing craniofacial structures makes it a valuable tool for evaluating soft palate morphology in OSMF patients. This imaging modality provides a two-dimensional view of the soft tissues, allowing for an objective assessment of shape, length, and contour variations. The aim of the present study is to investigate the morphological changes of the soft palate in OSMF patients using lateral cephalometry. Since the progression of fibrosis may alter the flexibility and positioning of the soft palate, radiographic evaluation can serve as an essential diagnostic aid.[3,4]

The primary objective of this study is to observe the different radiographic appearances of the soft palate in OSMF patients across various functional stages of the disease. By identifying patterns of morphological changes, the study aims to contribute to a better understanding of disease severity and progression. These observations can facilitate early diagnosis, classification, and targeted management of OSMF, improving treatment outcomes for affected individuals.[2-4]

Dr. Himanshu Punia, Dr. Anup N.

Given the limited research on soft palate morphology in OSMF, this study seeks to bridge the knowledge gap by providing radiographic evidence of structural changes. The findings could help clinicians and researchers develop standardized assessment criteria for soft palate involvement in OSMF. Additionally, insights gained from this study may influence future treatment approaches, emphasizing the need for early intervention to prevent irreversible functional impairments. Through a systematic radiographic evaluation, this research aims to analyse radiographic variations in soft palate morphology among OSMF patients using lateral cephalometry.

2. MATERIALS & METHODOLOGY

A cross-sectional radiographic study was conducted on 200 clinically diagnosed OSMF patients. After a detailed history-taking process, lateral cephalometric radiographs were obtained following written informed consent. The inclusion criteria included clinically confirmed OSMF cases, while patients with cleft palate or other craniofacial anomalies and those unwilling to participate were excluded.Digital lateral cephalograms were taken using the STRATO – 2000 Digital Cephalometric System under standardized imaging conditions. The subjects were instructed to maintain an erect posture with the Frankfort horizontal plane parallel to the floor, occluding their teeth and relaxing facial muscles. The X-ray source was positioned 60 inches away from the mid-sagittal plane to ensure uniformity. The exposure parameters were standardized at 85 kVp, 10 mA, and an exposure time of 1.3 seconds. The radiographs were developed using a Fuji Drypix 7000 laser printer, with brightness and contrast adjustments to optimize image quality.Soft palate morphology was classified according to You M et al. (2008), categorizing the shapes into Leaf-shaped, Rat-tail shaped, Butt-like shape, Straight-line, S-shaped (Distorted), and Crook-shaped. All radiographs were assessed under controlled viewing conditions with an illuminated view box to ensure precise identification of variations.Statistical analysis was performed using SPSS software (Version 15.0). Comparative analysis was conducted using ANOVA and Student's t-test, while the Chi-square test was applied for categorical variables. A p-value of <0.05 was considered statistically significant.

3. RESULT

The study evaluated 200 subjects, classifying soft palate morphology and measuring velum dimensions using lateral cephalometry. Among the participants, 78.5% were males and 21.5% were females, with no statistically significant gender differences between the control and study groups (p=0.853). The majority of subjects (43.5%) were aged 31-40 years, followed by 21-30 years (29.5%) and 41-50 years (21.5%), with no significant age-related differences between groups (p=0.733).

Soft palate morphology showed significant variation between groups. The most frequent shape in the control group was Leaf (64%), followed by Rat-tail (26%) and Butt (4%). In contrast, the study group had a higher proportion of Butt (22%) and Crook (12%) types, with Leaf being less common (44%). These variations were statistically significant (p<0.001).

Velum length and width differed significantly between groups. The study group exhibited a significantly reduced velum length (28.38 ± 2.98 mm) compared to controls (37.28 ± 4.52 mm) (p<0.001), whereas velum width was significantly larger in the study group (10.28 ± 1.62 mm) than in controls (9.31 ± 2.25 mm) (p<0.001).

The study group was further classified into three stages of OSMF severity: Stage I (14%), Stage II (61%), and Stage III (25%). A significant correlation was observed between gender and disease stage, with the proportion of females decreasing as severity increased (p<0.001). Younger participants were more common in earlier stages, while older participants were more prevalent in advanced stages (p<0.001). The morphological pattern of the soft palate shifted with disease progression, with a notable increase in the Butt and Crook-shaped palates in later stages (p<0.001).

Stage-wise analysis of velum dimensions indicated a significant decrease in length as OSMF severity increased (p<0.001), while width remained relatively stable. Pairwise comparisons demonstrated statistically significant reductions in velum length across all OSMF stages compared to controls (p<0.001), while width differences were significant only between controls and Stage II (p=0.002).

These findings highlight the progressive morphological changes in the soft palate associated with OSMF and suggest that cephalometric radiography can serve as a valuable tool for assessing disease severity and progression.

4. DISCUSSION

Radiographic assessment of the soft palate using digital lateral cephalometry has emerged as a valuable tool in evaluating the morphological changes associated with Oral Submucous Fibrosis (OSMF). The soft palate, being a key structure in velopharyngeal closure, undergoes significant alterations in OSMF, which can be effectively assessed through radiographic imaging.[4,5]

The study utilized digital lateral cephalometry to classify the soft palate into six morphological types: leaf-shaped, rat-tail shaped, butt-like, straight-line, S-shaped, and crook-shaped. The most common type in both OSMF patients and normal controls was the leaf-shaped soft palate (64% in controls and 44% in OSMF patients). However, as OSMF progressed, there was a significant increase in butt-shaped and crook-shaped soft palates, particularly in advanced stages of the disease. These

radiographic findings are crucial as they provide a visual representation of the fibrotic changes occurring in the soft palate, which are not easily detectable through clinical examination alone.[6]

The reduction in the length of the soft palate and the increase in its width, as observed in the study, are indicative of the fibrotic changes that occur in OSMF. The shortening of the soft palate in the anteroposterior direction is more pronounced than changes in the superoinferior direction. This differential fibrosis between the oral and pharyngeal surfaces of the uvula likely contributes to the characteristic abnormalities seen in OSMF, such as forward-pointing or vanishing uvula. These changes are radiographically significant as they can be quantified and monitored over time, providing valuable information on disease progression.[6,7]

Several previous studies have reported similar findings regarding soft palate morphology in OSMF patients. Shankar et al.observed that soft palate length significantly decreased while thickness increased in advanced stages of OSMF, a trend also confirmed by Rajendran et al. (2004), who highlighted that fibrosis leads to a progressive reduction in the flexibility of the soft palate. Another study by Kumar et al. emphasized that as the disease advances, the soft palate undergoes morphological transformations that are detectable on cephalometric radiographs, supporting the findings of the present study.[7]

Additionally, Kumar D et al. and Guttal K S et al. emonstrated that the uvula, an important component of the soft palate, is also affected in OSMF, often appearing atrophic or even absent in severe cases. These observations align with the current study's findings, where patients with advanced OSMF showed a higher prevalence of crook-shaped and butt-shaped soft palates, likely due to progressive fibrosis and loss of elasticity.[8,9]

The study also highlighted that the morphological changes in the soft palate are more pronounced in advanced stages of OSMF. In stage III OSMF, butt-shaped and crook-shaped soft palates were more prevalent, indicating a more severe fibrotic process. This progression is radiographically significant as it correlates with the increasing severity of symptoms such as trismus and difficulty in mouth opening. Early detection of these morphological changes through digital cephalometry can aid in the timely diagnosis and management of OSMF, potentially preventing further progression of the disease.[7-9]

Further supporting evidence comes from Praveen BN et al., who noted that cephalometric evaluation of soft palate morphology is an effective, non-invasive, and radiation-efficient diagnostic method. Their study concluded that cephalometry provides valuable insight into both structural and functional impairments in OSMF patients, making it a practical alternative to more expensive imaging techniques like CT or MRI.[10]

Moreover, the correlation between morphological changes and disease severity was also reported by Ranganathan et al. (2016), who found that the progressive stiffening and thickening of the soft palate significantly impact speech and swallowing functions in OSMF patients. This highlights the clinical importance of early radiographic assessment in identifying subtle changes before functional limitations become severe.

5. CONCLUSION

In conclusion, radiographic assessment of the soft palate using digital lateral cephalometry is a valuable tool in evaluating the morphological changes associated with OSMF. The ability to classify and quantify these changes provides valuable insights into disease progression and aids in the timely diagnosis and management of OSMF. The findings of this study align with previous research, reinforcing the role of cephalometry in detecting early fibrotic changes in the soft palate. This radiographic approach is cost-effective, easily accessible, and correlates well with other diagnostic techniques such as computed tomography (CT), making it a practical option for routine clinical use.

REFERENCES

[1] Lakshmi CR. An Innovative Approach to Evaluate theMorphological Patterns of Soft Palate in Oral Submucous Fibrosis Patients: A Digital Cephalometric Study, InternationalJournal of Chronic Diseases 2016; 16: 1-6

[2] Jha VK et al. Oral Submucous Fibrosis: Correlation of Clinical Grading to Various Habit Factors, Journal of International Society of Preventive and Community Dentistry 2019; 9:363-71

[3] Hosein M, Mohiuddin S, Fatima N .Association Between Grading of Oral Submucous Fibrosis With Frequency and Consumption of Areca Nut and Its Derivatives in a Wide Age Group: A Multi-centric Cross Sectional Study From Karachi, Pakistan. JOURNAL OF CANCER PREVENTION 2015;20(3): 216-222.

[4] Kariya P. No age predilection for a disease like OSMF. A Case Report Of 5-Year-Old Child. *Journal of Oral Biology and Craniofacial Research* 2020;*10(2*): 153-157

[5] S. Anil , Beena V.T. Oral submucous fibrosis in a 12-yearold girl: case report, Pediatric Dentistry 1993; 16 (2):120-122

[6] Deshpande A et al. Oral submucous fibrosis: a premalignant condition in a 14-year-old Indian girl, BMJ Case Rep 2013; 1-4

Dr. Himanshu Punia, Dr. Anup N.

[7] Shankar V N, Hegde K, Ashwini N S, Praveena V, Ravi Prakash S. M. Morphometric Evaluation of Soft Palate In Oral Submucous Fibrosis A Digital Cephalometric Study. Journal of Cranio-Maxillo-Facial Surgery (2014); 42:48-52

[8] Kumar D. K, Gopal K.S. Morphological Variants of Soft Palate in Normal Individuals: A Digital Cephalometric Study. Journal of Clinical and Diagnostic Research. (2011); 5(6): 1310-1313.

[9] Guttal K S, Breh R, Bhat R, Brude K N, Naikmasur V G. Diverse Morphologies of Soft Palate In Normal Individuals: A Cephalometric Perspective. Journal of Indian Academy of Oral Medicine and Radiology. (2012); 24(1): 15-19

[10] Praveen BN, Amrutesh S, Pal S, Shubhasini AR, Vaseemuddin S. Various Shapes of Soft Palate: A Lateral Cephalometric Study. World Journal Of Dentistry (2011);2(3):207-210.