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RESEARCH ARTICLE

MORPHOLOGIC VARIATIONS IN POSTERIOR PALATAL SEAL AND ITS VIBRATING LINES: A CLINIC-RADIOGRAPHIC STUDY

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ABSTRACT

Background of the Problem: The recording of posterior palatal seal (PPS) is of great significance, because it contributes significantly to the retention of a maxillary complete denture. Hundreds of dentures have failed due to the improper establishment of the distal limit and to improper PPS.
Aim of the Study: to study the individual variations in the shape and size of PPS and its vibrating lines. The objective is to study the correlation PPS with palatal angulation.
Materials and Methods: The PPS area was measured in patient's mouth. A lateral cephalogram was made to trace the hard and soft palatal contour, and the angle of the palatal contour was measured. The data was analysed statistically to study the relation between width of PPS and the angle of the palatal contour at the junction of the hard and soft palate.
Results: Correlation of the angle of the palatal contour to PPS width, showed perfectly positive value while correlation of angle between anterior nasal spine, posterior nasal spine (ANS-PNS) and PNS, Uvula (U) to PPS width showed partially positive value.
Conclusion: The correlation of angle between hard tissue and soft tissue to PPS width, and the angle.

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INTRODUCTION

Patient's expect a good prosthesis which is well-retained in mouth for a long duration and work efficiently during stomatognathic function (mastication, phonation, etc). Importance of extension of complete dentures has been well-established for various reasons. Hardy and Kapoor emphasized the fact that retention and stability obtained by adhesion and cohesion resist the forces, which are directed in vertical direction. (Hardy and Kapoor, 1987) A well-fitting and retentive complete denture requires a well-fitting tissue surface, a peripheral border compatible with the muscles and tissues which make up the mucobuccal and mucolabial spaces so that a peripheral seal is created by the soft tissue draping over them. It is usually obtained by labial and buccal seal. In the posterior region, it is mainly by the posterior palatal seal. (Ettinger and Scandrett, 1980) At the posterior extension of the maxillary denture, where the tissues are less compliant, special attention is required to make the seal effective. This is the postdam region, where the denture is designed to affect a posterior palatal seal. (Schwarz, 1991) Its location and preparation on the master cast are unfortunately most neglected and often done by the dentist or dental technician without reference to anatomical landmarks of the mouth. This clinic-radiographic study is an attempt to explore the individual variation in PPS area and highlight the forgotten significance of marking PPS.

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MATERIALS AND METHODS

Prior to the initiation of the study, ethical clearance was taken from the Ethical Committee of the Institute. Forty healthy dentulous subjects who were willing to participate were randomly selected. Each subject was instructed by the study investigator to rehearse the valsalva maneuver until both the investigator and the patient were acquainted, confident and comfortable with it. The anterior and posterior vibrating lines were marked in the patient's mouth using indelible pencils.

Table 1. Pearson correlation and p values

Variable	Angle between hard tissue and soft tissue		Angle between ANS‑PNS and PNS‑U	
	Pearson COR	p value	Pearson COR	p value
Difference between ant vibrating line	0.140	0.461	0.194	0.217
Difference between post vibrating line	0.152	0.631	0.424	0.036*
Width of PPS	0.924	0.000*	0.360	0.019*

The PPS width was measured using Vernier calipers and recorded. A lateral cephalogram was made and following points were traced anterior nasal spine (ANS), posterior nasal spine (PNS), Uvula (U), and shadow of the hard and soft palate. The data was tabulated and subjected to SPSS version 16 for statistical analysis. Statistical tes employed were Pearson Correlation analysis, the level of significance was 95% and p value was significant at 0.05.

RESULTS

This study included forty patients (26 male and 14 female) with mean age of 28.3±1.5 years. Correlation of the angle between hard tissue and soft tissue to PPS width showed a perfectly positive value. It implies that on increasing angle between hard tissue and soft tissue, there was also an increment of PPS width (Table 1). The correlating angle between ANS‑PNS and PNS‑U tissue to PPS width showed partially positive value. It means that increasing angle between hard tissue and soft tissue leads to increment of PPS width (Table 1).

DISCUSSION

According to *Glossary of Prosthodontic Terms-8*, "posterior palatal seal is the seal at the posterior border of a maxillary prosthesis. Posterior palatal seal area is the soft tissue area at or beyond the junction of the hard and soft palates on which pressure, with in physiological limits, can be applied by a denture to aid in retention." (The Glossary of Prosthodontic Terms 8 th ed. 2005) Posterior palatal seal consist of two components, namely, pterygomaxillary seal area and postpalatal seal. Pterygomaxillary seal extends through pterygomaxillary notch continuing 3-4 mm anterolaterally, approximating the mucogingival junction. (The Glossary of Prosthodontic Terms 8 th ed. 2005) Ettinger and Scandrett summarized function of posterior palatal seal as it, (1) to provide retention, (2) prevents ingress of fluid, air, and food between denture and tissue, (3) diminishes gagging reflex, (4) provides embedded sunken distal border which is less conspicuous to tongue, (5) supplies a thick border to counteract denture warpage due to dimensional changes during the polymerization shrinkage of methyl methacrylate resin. (Ettinger and Scandrett, 1980) Weintraub described added functions of posterior palatal seal as it, (6) adds confidence and comfort to the patient by enhancing retention, (7) establishes a positive contact posteriorly, and therefore prevents the final impression material from sliding down into the pharynx. (Weintraub, 1977) Pendleton's anatomical dissections and histological and clinical examination have shown PPS area to vary greatly in size, form, and character. (Pendleton, 1936) Marks has shown the tissue in this area to be variable in character. (Marks, 1978) These findings are in accordance with the results of our study. Though it is universally accepted that PPS is essential for denture retention, unfortunately it is the most neglected procedure during denture fabrication. Avant *et al*. (1973) carried out a study to test retention of five maxillary denture bases that were identical in all aspects except for PPS. One had no PPS, while each of the other four had differently designed PPS. The study concluded that the presence of PPS was required for optimum denture retention and that the types of PPS had varying effects on retention.

Learning points

In the present study we found that there are observer differences in marking the vibrating lines and recording the PPS area, thus in order to correctly locate these lines, careful observation and palpation of the tissue are necessary, as their locations vary with the contour of the soft palate. In addition, the palatal tissues anterior to the posterior border need to be palpated with a blunt instrument to determine their compressibility in width and depth. The termination of the glandular tissues usually coincides with the anterior vibrating line. Thus, a combination of the palpatory and visual methods as used in the present study can be better tool in assessing the exact location of PPS area.

Conclusion

The results of this study demonstrate a directly proportional relationship between

- Angle between hard tissue and soft tissue to PPS width.
- Angle between ANS‑PNS and PNS‑U tissue to PPS width.

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