

The effect of storage time of removable partial denture wax pattern on the accuracy of fit of the cast framework

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Statement of problem. Situations may arise in dental laboratories that could result in a time lapse between preparing the wax pattern of the removable partial denture framework and its casting into the cobalt-chromium alloy.

Purpose. This study investigated the effect of storage time of the wax pattern before casting and the influence of the palatal major connector design on the accuracy of its fit on the master casts.

Material and methods. Forty-two frameworks were prepared with two designs of major connectors, which were divided into three subgroups according to the storage time of the wax patterns: 24 hours, 1 week, and 1 month. Discrepancies in the fit of the connectors to their respective casts were measured at specific locations for both connector designs.

Results. In both framework design groups, there was a significant deterioration in fit ($p < 0.0005$) of the major connectors with the increase in storage time of their wax patterns on their respective refractory casts. Gap discrepancies were more pronounced towards the center of the palate.

Conclusions. The greatest discrepancies appeared at the middle sections of the connectors more than at the lateral sections ($p < 0.0005$). Furthermore, frameworks with modified palatal plate major connectors exhibited greater inaccuracies in their fit than those with the anterior posterior palatal strap design, as evidenced by the increase in mean gap discrepancies under the palatal plate design ($p < 0.0005$). (*J Prosthet Dent* 1997;77:375-81.)

CLINICAL IMPLICATIONS

In this study the storage time of the wax patterns on the refractory casts had a significant effect on the accuracy of fit of the connectors. From the results, it would seem mandatory to emphasize the importance of investing the RPD wax patterns as soon as possible on completion of the wax-up procedure, preferably within 1 hour or less.

When designing removable partial denture (RPD) frameworks, an essential component that needs to be carefully planned and selected is the major connector. Maxillary major connectors in particular can fulfill various functions and influence the success of the RPD. The intimate contact between the metal connectors and the palatal tissues, in addition to their wide mucosal coverage, enhances the support, retention, and stability of the denture.¹

Various studies have reported inaccuracies in the fit of palatal major connectors and other components of the metal frameworks on master casts and also inside the patient's mouth.²⁻⁷ Spaces were found between the

reciprocal clasp arms and the palatal surface of the abutments; the buccal aspects of occlusal rests, the vertical wall and deepest points of the respective rest seats³⁻⁴; and cingulum rests and their rest seats on the master casts.⁵

Structural flaws in frameworks and inaccuracies in fit could range from slight, requiring minor modifications in the clinic, to serious enough to necessitate the construction of new frameworks.^{3,6-7}

The inability to accurately adapt the framework on the cast and in the patient's mouth has been attributed to several factors such as the casting contraction and the type of alloy used. An average casting contraction of 2.3% has been reported for cobalt-chromium alloys, in comparison to the lower contraction of nickel-containing base metal alloys (2%) and gold alloys, the latter being the most accurate.⁸ The surface area of the casting in relation to its volume, manipulation of the alloy under different casting temperatures, mold temperatures, and burn-out procedures were also reported as causative factors leading to shrinkage and lack of fit of the final castings.^{8,11}

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