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Preoperative Intraoral Evaluation of Planned Fixed Partial Denture Pontics Using Silicone Putty

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Abstract

A preoperative visualization and evaluation of fixed partial denture (FPD) pontics in the anterior dentition is necessary for both the patient and the dentist. Such an evaluation allows patients to decide whether the esthetic and functional parameters of the restoration meet their requirements and expectations. To facilitate such an assessment, a method that allows stable intraoral positioning of the pontics is required. This article describes a technique to achieve this in a simple and effective way before the abutments are prepared. In addition, it also allows the operator to modify the pontics intraorally for esthetics and later incorporate the same pontics into the interim prosthesis. The integration of this pretreatment pontic evaluation procedure into FPD restorations assures better results and patient satisfaction.

Treatment with fixed partial dentures (FPD) in the esthetic zone is usually preceded by a trial setup of the planned restoration followed by its evaluation in the oral cavity at the provizionalization stage. The usual procedure for evaluation of the planned FPD pontics during provisionalization involves an acrylic resin replica of the trial setup that needs support from prepared abutments for evaluation and correction.[1] Thus, the procedure necessitates preparation of the abutments before intraoral evaluation of the pontics by the operator and the patient. This method obviously has a disadvantage, as irreversible damage to abutments has already been done before the patient can visualize and approve the planned restoration(s).

Preoperative, intraoral evaluation of proposed fixed restorations has not been given much consideration in the literature. Such an assessment would prove beneficial in visualization of the treatment plan and would serve as a diagnostic tool. The intraoral transfer of these planned restorations before beginning the actual treatment will help in assessing the esthetic integration of the restorations into the dental arch and allow necessary modifications to be made in the trial setup. Limited functional assessment such as cervico-occlusal dimensions of the pontics, incisal edge positions, and cusp tip and fossa positions can also be made.

A technique using a thermoplastic matrix fabricated over a cast duplicated from the trial setup filled with tooth-colored acrylic resin in the pontic region has been proposed for such an evaluation.[1,2] This transparent matrix with the pontics reproduced in tooth-colored acrylic fits over the unprepared or prepared teeth and allows evaluation of the pontics before/during the treatment. This method is not without disadvantages. The technique needs a separate step for fabrication of the transparent matrix and more importantly does not allow direct intraoral corrections except on the intaglio surface of the pontics as they are enclosed by the thermoplastic material. Thus, esthetic corrections cannot be made, and assessments of cervico-occlusal dimensions of the pontics are difficult because of the extra layer of thermoplastic material over them. Also, accurate intercuspation of the remaining dentition is hampered because of the presence of the thermoplastic material. The technique presented here describes the use of silicone putty attached to the planned restorations (pontics) to aid in direct intraoral, preoperative evaluation and correction of planned restorations for a case requiring replacement of multiple anterior teeth (Fig 1).

Technique

(1) A trial setup of the desired restoration is carried out on the diagnostic cast, and tooth-colored acrylic resin pontics are fabricated using a silicone putty (Aquasil, Dentsply DeTrey, GmbH, Konstanz, Germany) matrix of the trial setup.
(2) A thin layer of tray adhesive (Caulk Tray Adhesive, Dentsply Caulk, Milford, DE) is applied on the palatal/lingual aspect of the pontics and allowed to dry.
(3) The pontics are then stabilized on a duplicate cast (identical to the one on which the trial setup was made) using modeling wax on the labial/ facial aspect. The components of the silicone putty (Aquasil) are kneaded into a single

Figure 1 Preoperative intraoral view.

Figure 2 Palatal extension of putty for retention.

uniform mass and adapted onto the lingual surface of the pontics, against the area where the tray adhesive has been applied. The putty is extended over the palatal or lingual alveolar mucosa (in a manner similar to a record base) to achieve maximum stability and retention (Fig 2). An effort is made to extend the putty into as many tooth undercuts as possible to maximize retention.

(4) The pontics are then evaluated intraorally for esthetics (Fig 3), phonetics (Fig 4), and compatibility with the occlusal scheme. Corrections and adjustments are made if necessary.

(5) The corrected pontics are then separated from the putty by peeling the putty off the pontics. The adjusted pontics can later be incorporated into the interim prosthesis.

Discussion

The proposed technique allows both the patient and the dentist to evaluate the esthetics of the planned restoration before any irreversible reduction of tooth structure. From the point of view of patient understanding and participation, this technique provides enough flexibility to incorporate and demonstrate all the details proposed by the patient. Thus, patient concerns (especially esthetic) are addressed before any intervention has been initiated. Tooth reduction procedures are carried out only after the approval of the patient. In case gross changes are to be incorporated, a repeat trial setup of the restoration is easily obtained, and all changes can still be made when the case is in its diagnostic stages.

Figure 3 (A) Esthetic trial of the planned pontics: lips parted. (B) Esthetic trial of the planned pontics: smile evaluation.

This technique allows a comprehensive range of esthetic evaluations to be carried out on the planned pontics. Evaluation of the position of the incisal edges with respect to the resting lip position can be made using the norms prescribed by Vig and Brundo.[3] An assessment regarding individual mesiodistal dimensions and inclinations of anterior pontics according to prescribed norms (recurring esthetic dental proportion, golden proportion) and anatomical findings (tooth width measurements and ratios) can be made.[4-6] Thus, the individual pontics can be distributed in the available space using these standard recommendations. Esthetic positioning of the gingival zenith with respect to individual pontics[7] can be assessed and modified if necessary. The suitability of the edentulous ridge in providing ovate pontic sites can be determined by evaluating the width of the ridge available at the cervical area and correlating it to the cervical dimensions of the pontics.[8,9] Connector location and location of contact points can be planned and evaluated to predict the probability of interdental papilla formation according to values prescribed by Tarnow et al.[10] In case unfavorable situations for papillary growth are encountered, there may be a necessity for the application of pink or gingival ceramic in certain areas. In such a situation the areas needing the gingival shade ceramic can be built up in modeling wax around the planned pontics, and its effect demonstrated to the patient (Fig 3).

Figure 4 (A) Phonetic trial of the planned pontics (F and V sounds). (B) Phonetic trial of the planned pontics (E sound).

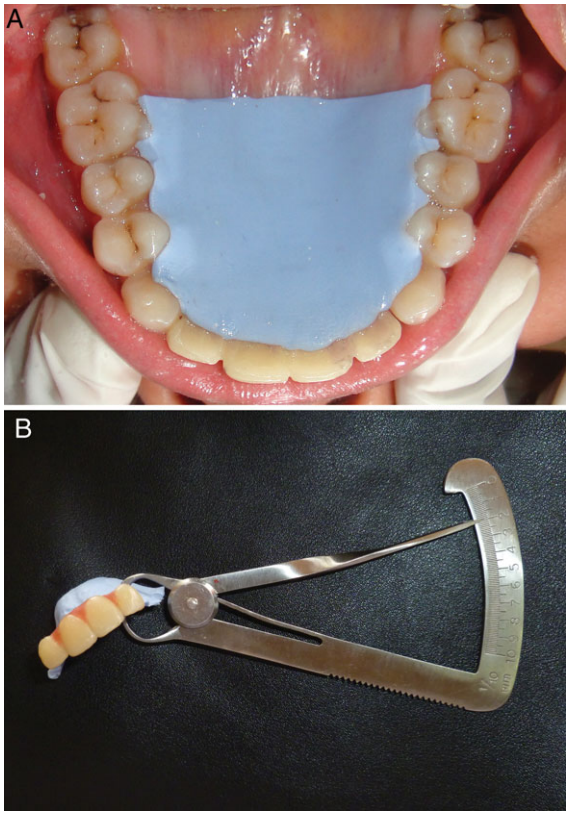

Figure 5 (A) Occlusal view of the device. (B) Thickness of the putty in the palatal area (2 to 4 mm).

Once the esthetic parameters of pontics and associated gingival tissues have been established, an assessment of the dental composition with respect to the lips and the dynamics of the smile are evaluated. Parameters regarding maxillary incisal edges and their parallelism with the lower lip, assessment of lip lines (high, average, or low), and related exposure of the planned pontics and visibility of interdental papillae on smiling can be assessed.[11]

The technique also aides phonetic analyses to ensure precise maxillary incisal position using F and V sounds (Fig 4A).[12] The E sound can additionally be used to confirm the positions of the maxillary incisal edges and length as suggested by Spear.[13] The percentage of interlabial space occupied by the maxillary and mandibular incisors (in profile view) when the patient says "E" can be used as a guide to finalize and refine maxillary incisal edge positions (Fig 4B). The device basically allows labiodental pronunciations to be confirmed. The closest speaking space can also be assessed to confirm the precision of incisal edge location and vertical dimension.[12]

The technique also aids in determining the configuration of the pontics within the available cervico-occlusal space and location of incisal edges, cusp tips, and fossae on the pontics. The trial pontics do not serve to evaluate complete occlusal function. They provide an approximate guide to the positioning of the occlusal surfaces. The technique helps in determining whether the pontics would be suitably positioned within the existing or planned occlusal plane. The device does allow a limited extent of excursive movements to be assessed, and an approximate idea of the incisor positions and their effect on disclusion can be determined. The thickness of the putty in the device is 2 to 4 mm (Fig 5A). With use of the device being restricted to evaluation procedures only, patients generally have no complaints regarding the bulk of the prosthesis (Fig 5B). The bond of the putty to the acrylic pontics is considerable and requires forceful separation before being incorporated into the interim prosthesis.

Shortcomings of the proposed technique include a limitation in determining a complete range of occlusal movements and functions in relation to the pontics. Complete occlusal function will have to be executed and refined in the interim prostheses. All excursive movements, tooth contacts, and disclusions will have to be perfected in the interim prostheses. Some patients may object to the bulk of the putty, and in such cases only an esthetic evaluation for a short duration and a demonstration of the same to the patient will be possible. Patients unable to tolerate the device even for short durations are rarely encountered. Another limitation would be an absence of adequate tooth undercuts to retain the putty. In such cases, the evaluation of pontics using removable partial dentures (RPDs) may be used instead of the proposed technique because of its better retention. But the fabrication of an RPD is a time-consuming process that also involves laboratory procedures and costs.

The proposed technique helps the patient to evaluate the restorations in an intraoral environment and offers an improvement over other techniques that use casts or computer-generated images to display the planned restorations.[14] Patient comprehension is enhanced by allowing them to experience the proposed restorations first hand.

Conclusion

A time-saving and easy technique for evaluation of planned, fixed partial restorations has been presented. The restorations generated by this method can easily be stabilized intraorally, and adjusted to suit the requirements of the patient and the dentist. The technique allows complete control over the form of the restorations and facilitates decision making at the diagnostic stages of the treatment. This concept of pretreatment pontic evaluation is thus proposed as a routine procedure for FPDs in the esthetic zone.

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