

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Knowledge and practice of impression techniques of distally extended Denture bases.

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ABSTRACT

To assess the knowledge and practice of impression techniques used for distally extended denture bases among dental practitioners. To assess the effects of final impression techniques and materials used for fabrication of removable partial dentures in partially edentulous patients for stability, comfort, overextension and quality of life in partially edentulous patients. Partially edentulous mouths with distal-extension ridges present the challenge of correctly registering two tissues as dissimilar as teeth and edentulous ridges. A technique is described that makes it possible to make impressions with a combination of different impression materials within the same tray and have a firm support that assures even distribution of the impression material and faithfulness of reproduction. The functional impression technique that aims to equalize the masticatory load between teeth and edentulous areas thus reducing the instability of the partial denture during function and preserving the residual teeth.

Keywords: Distal extension, dental impression, removable partial denture.

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INTRODUCTION

The construction of a removable partial denture in distal extension cases is a delicate procedure since the prosthesis is supported by two different tissues, namely teeth and mucosa. The difference in resiliency of these supporting tissues may lead to the instability of the prosthesis.

Different techniques have been proposed for the construction of removable partial dentures in distal extension cases where the management of the difference of resiliency in the supporting tissues is an issue (1-4). The purpose of these techniques is to decrease the surrounding forces on the abutment teeth (5).

McCracken proposed the altered cast technique with the selective tissue placement impression technique (3).

Christensen, in a less complicated technique, suggested to take the impression of the edentulous arch with an elastomeric material in a custom tray, then to cover this initial layer and the dentate areas with an elastomeric impression material of lighter viscosity (6,7).

Hindels introduced his functional technique in order to equalise the load between the teeth and the edentulous ridges (8,9). His technique consisted of making a mucostatic impression of the edentulous ridges followed by a pick-up impression with digital compression of the first through holes prepared on the impression stock tray.

A removable partial denture (RPD) acts as a substitute for rather than a replacement of missing teeth and oral tissues. Thus, patients must adapt to both the presence of the prosthesis and any movement that occurs during function. Although not supported by any standard of patient satisfaction, we traditionally assume that the basic requirements of support, retention and stability must be met at the delivery appointment.

Careful planning and optimisation of the condition of abutment teeth and supporting tissues before taking the definitive impression should result in a relatively retentive prosthesis overlying a healthy foundation.

However, achieving ideal stability (i.e., no movement during function) in a distal extension RPD may be impossible. The purpose of this article is to discuss factors that might influence the need for a direct, chair side hard reline at time of delivery of a newly fabricated distal extension RPD and to recommend techniques.

The prevalence of partial edentulousness also increases with age and is more prevalent than complete edentulousness (12). The partial loss of teeth may be replaced by fixed or removable treatment options based on number of teeth lost and condition of the residual ridge of the patient. The loss of teeth correlates with an increase in obesity and a decrease in people's nutritional status, psychological self image and quality of life (13).

The distribution of the occlusal forces varies based on the condition of the partially edentulous state in removable cast partial dentures (RPD). In a tooth-supported partial denture, the occlusal forces are mainly distributed to the abutment teeth and less onto the edentulous ridge, so the final impression is used to record the tissues in their anatomic state in order to produce an accurate master cast (14).

The materials and techniques used for recording final impression in tooth-supported conditions are alginate and elastomers, either with a custom tray or a stock tray. In tooth and tissue-supported partial dentures, a special or dual impression procedure is indicated due to the relative discrepancy in the degree of movement occurring between the tooth and mucosa covering the ridge in response to occlusal forces (15).

The different techniques are classified into physiologic and selective pressure impression techniques (16). The physiologic impression techniques are the McLean-Hindels technique, the functional reline method and the fluid wax impression (altered cast) techniques. In the selective pressure technique, the ridge is selectively relieved to redirect forces to stress-bearing areas during impression (17).

Cast partial removable dental prosthesis or cast partial denture are based on the theory of broad stress distribution and aim to preserve the remaining dentition (18). In a distal extension partially edentulous situation, due to the compressibility of the mucosa of the edentulous ridge relative to the remaining tooth under occlusal load, a destructive class-I lever is created, which tends to overload the abutment tooth (19). The various dual final impression techniques used in the fabrication of cast partial denture and semiprecision attachments help reduce the transfer of excessive stress to the abutment tooth during occlusal loading, thereby improving support and preserving the health of the remaining oral tissues (20). Hence, the choice of final impression technique and material is very pertinent in treating partially edentulous patients based on the individual patient's conditions and needs.

Types of interventions

1. Tooth-supported conditions, using the same materials with different techniques and different materials with the same technique.
2. Tooth-tissue-supported conditions, using the same material with different dual impression technique and different dual impression techniques with different materials.

Different types of final impression material that will be included-

- Alginate.
- Zinc oxide eugenol.
- Elastomeric impression materials.
- Green stick.
- Fluid Wax.

Expected primary outcomes-

1. Patient-reported oral health-related quality of life with any pre validated questionnaire (inclusive of all domains in Oral Health Impact Profile Questionnaire OHIP/OHIP- Edent, 14,20, 49, GOHAI (Geriatric Oral Health Assessment Index))
2. Patient-reported quality of the denture assessment by any pre-validated questionnaire inclusive of stability, comfort, chewing ability, satisfaction and denture dislodgement during function, for one or all of the factors

Secondary outcomes-

1. Number of border and intaglio adjustments up to one month after insertion of denture. We will not include sore spots as an outcome for removable partial dentures as this may occur due to other components of the partial denture, such as poor design or placement of the components during fabrication, and not always due to overextension of the borders of the denture
2. Number of years of service after which a reline is required
3. Abutment mobility, gingival health and denture base adaptation assessed quantitatively by operators

Procedure:

1. An individual resin tray is constructed with the self-curing acrylic resin (Formatray; Sybron/Kerr Co, Romulus, Mich) on the edentulous ridges areas of a preliminary cast. Compound occlusal rims (Impression Compound, Kerr (Europe) Co AG CH-4051 Basel) are fixed on the outer surface of the individual tray. Care is taken so that the height of the occlusal rims surpasses the height of the residual teeth in order to ensure a positive and sole contact between the occlusal rims and the impression stock tray later on during the pick-up impression phase. The tray is selectively relieved and covers the edentulous areas up to the border tissue attachment including the retromolar pads [3, 8, 10, 11].

2. The individual tray is loaded with zinc oxide-eugenol impression paste (Cavex Outline by Cavex Holland BV) and brought to position without any compression while the soft tissues are left in their passive state.
3. When the material sets, the tray is removed and the impression inspected. The excess material is trimmed away and teeth are freed from any residual impression paste. The tray is tested in the mouth for stability
4. A metallic rim-lock perforated stock tray (Coe Stainless Steel Trays no. 264008, GC America Inc., Alsip, IL) covering the whole arch is chosen. The mucostatic impression of the soft tissue areas, already taken, is inserted in the mouth.
5. While the metallic tray is being loaded with an alginate impression material (Jeltrate, Dentsply Caulk, Milford, DE), this same material is used to fill the space between the soft tissue impression and the remaining teeth.
6. The loaded metallic tray is inserted into position over the teeth and the acrylic tray. The index fingers are positioned on the tray facing the edentulous areas, and a positive pressure is exerted upon the metallic tray until the alginate impression material sets. The completed impression is removed. This maneuver permits to relate the edentulous ridge to the residual teeth in a functional state.

Factors Influencing the Support of A Distal Extension Base

Because one of the stated objectives of prosthodontic treatment is the restoration of function and comfort in an aesthetically pleasing manner, maintenance of occlusal contact in distal extension removable partial dentures demands an understanding of the factors that influence residual ridge support. Support from the residual ridge becomes more important as the distance from the last abutment increases and will depend on the following several factors:

1. Contour and quality of the residual ridge
2. Extent of residual ridge coverage by the denture base
3. Type and accuracy of the impression registration
4. Accuracy of the fit of the denture base
5. Design of the removable partial denture framework
6. Total occlusal load applied

Impression Methods:

There are basically two dual impression techniques. The physiologic, or functional, impression technique records the ridge portion by placing an occlusal load on the impression tray as the impression is being made.

For this dual impression a custom impression tray was constructed over a preliminary cast of the arch, a function impression of the distal extension ridge was made, and then hydrocolloid impression was made with the first impression held in its functional position with finger pressure. The underlying soft tissues will be displaced because displacement will normally occur under function.

The physiologic impression techniques that discussed are as follows: Mc Lean's and Hindel's methods, the functional relining method, and the fluid wax method.

The selected pressure impression technique not only equalises the support between the abutment teeth and the soft tissue, but has the added advantage of directing the force to the portions of the ridge that are most capable of withstanding the force.

This is accomplished by providing relief in the impression tray in selected areas and permitting the impression to be recorded. The need for physiologic impressions was first recognised by McLean and others. They realised the need of recording the tissues of the residual ridge that would eventually support a distal extension denture base in the functional or supporting form and then relating this functional impression to the remainder of the arch by means of a second impression.

Inclusion criteria-

Participants who are partially edentulous and require rehabilitation with permanent removable partial denture for one or both arches.

Exclusion criteria-

Participants with implant-supported or retained dentures, with any form of intracoronal or extracoronal attachments excluding Akers, and bar clasp transitional partial denture, treatment partial denture, temporary partials, over denture and immediate partial denture in the study.

Methodology- A preformed questionnaire with demographic and objective oriented questions were distributed among 300 undergraduates and postgraduates of saveetha dental college and hospitals. Results were tabulated and analysed.

CONCLUSION

For the production of accurate master cast the impression technique far out weights the selection of the impression material. No available knowledge of the person making the impression material will produce results greater than the skill and knowledge of the person making the impression

There is not much of information about distally extended denture bases amongst students. There is a need for better understanding of various impression techniques and to improve the quality of the process.

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