

FABRICATION OF AN ACRYLIC INTERIM DENTURE EMPLOYING TWO-PART IMPRESSION TECHNIQUE FOR DISTAL EXTENSION BASES – KENNEDY CLASS 1 WITH MODIFICATIONS

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ABSTRACT

Impression procedure forms the basis of a successful Removable Partial Denture however, in distal extension bases the residual ridge must be recorded in functional form and the remaining natural teeth in an anatomic form. Zinc oxide eugenol impression paste is a material of choice for functional impression whilst irreversible hydrocolloid is suitable for an anatomic impression. Therefore two-part impression technique is a suggestive impression technique that enables the operator to make an impression utilizing two different types of impression materials loaded in two different trays, one of which is a special tray and other a stock tray, so as to control the differential support predicament.

Key words: Interim denture, Partial denture, Two-part impression, Distal extension bases

INTRODUCTION

Correct impression procedure forms the basis of a successful and functional oral prosthesis. There are different impression techniques for recording the impression for distal extension denture bases i.e sectional custom impression tray technique, altered cast impression technique and Applegate impression technique depending upon the type and number of trays.¹⁻³

Sectional custom impression tray technique has been documented more than 40 years ago but is mostly reserved for immediate denture cases in which both the impression trays are custom made.¹

In altered cast impression technique an individual custom tray is fabricated on the metal framework to make a second impression of the edentulous tissues. This second impression is then used to alter the cast in the laboratory.²

In Applegate's impression technique primary impression is taken in reversible hydrocolloid. A special

tray is made on the cast that covers the occlusal surface of the teeth and the ridge. The resin tray is spaced in the area of edentulous ridge with single sheet of wax and then correctable impression is recorded in this tray.³

HISTORY

A detailed treatment protocol for edentulous patients have been outlined over the last century and formed the foundation of philosophies for occlusion^{4,5}, esthetics⁶⁻⁸, mandibular movement⁹, maxillofacial prosthodontics¹⁰⁻¹¹ and fixed and removable prosthodontics.¹²

The most important consideration in designing a removable partial denture (RPD) for optimum function is stated by Devan 1936, to "strive to preserve that which remains, rather than to meticulously replace that which is missing".¹³

Impressions are considered to form the basis of successful RPD therefore, a lot of emphasis is placed on impression making.¹⁴⁻¹⁶

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From 1845-1900 basic principles of impression making were based on the concepts of atmospheric pressure, maximum extension of denture bearing area, equal distribution of pressure and adaptation of denture bearing tissues. Preliminary impression of gutta percha, beeswax or modeling compound was followed by a secondary wash impression made of plaster within the preliminary impression.¹⁷⁻¹⁹

From 1900-1929 accuracy was given importance and thus closed mouth impression technique was introduced. Release/escape vents were advocated within the final impression trays to prevent buildup of excessive pressures. Proper denture extension through border molding to record the anatomy of tissues was also emphasized.^{20,21}

1930-1950 was the era that recognized the anatomy of the denture bearing area and muscle physiology as related to impression procedures. Border molding, by moving peripheral musculature in the direction of its fibers and covering of retro-molar pad completely for stability was stressed. Construction of an individual tray from a preliminary cast was emphasized and final impression made in this individual or customized tray. Closed mouth technique was advocated with correct vertical and centric relation. Development and advent of impression materials like reversible hydrocolloid and zinc oxide eugenol impression paste materialized in this era.^{21,22}

In 1951, attempt was made to classify various impression techniques using impression making procedures as guidelines:

- Use of actual anatomy of the individual patient or arbitrary landmark.
- Mouth position while impression making (closed/ open-mouth).
- Relative amount of pressure exerted on the tissues by the impression material. (Pressure, non-pressure, negative pressure/selected pressure).²³

In 1952, alginate impression technique was described as a non-pressure type of impression²⁴ followed by minimum pressure denture impression technique in 1956²⁵ and later on in 1979, dynamic impression technique was described which is based on the assumption

that every patient has a steady and characteristic oral functional pattern.²⁶ All these impression techniques were practiced in the following years in patients requiring simple to complex prosthesis.

In 1955 polysulphide, in 1956 silicone based and in 1966 polyether impression materials were introduced. In subsequent years these materials were refined as their properties were improved and in 1980's these materials were the material of choice for impression making but with the introduction of rubber base materials emphasis was shifted towards these materials.^{27,28}

Requirements for successful RPD service include maximal coverage of the edentulous residual ridge, stress control and cross-arch stability of the framework to minimize movements of the denture base. The prosthesis can be stabilized in response to vertical stresses by means of favorable load distribution between supporting bone and abutment teeth.²⁹ All components when used effectively aid in reducing stresses to the underlying supporting tissue. For maximum support, maximum coverage of the basal seat area is required which is possible by proper impression procedure with suitable impression materials.^{30,31}

TWO-PART IMPRESSION TECHNIQUE

A 45 years female patient presented in dental outpatient department of Fatima Memorial Dental Hospital Lahore. Medical history was insignificant. Extraoral examination revealed collapsed facial curtain and aged appearance with decreased lower anterior facial height. Intra orally the patient was Kennedy's class I modification 1 in upper arch and class 1 modification 2 in lower arch. The maxillary arch had only 1st molars present in each quadrant. Mandibular arch had 2nd premolar, lateral and central incisor in right quadrant. In left quadrant central incisor and 1st premolar were present. 1st premolar was endodontically treated and used as an over denture abutment.

A primary impression was made with thermoplastic impression material (Metrodent impression compound) in a flanged stock tray. The wash impression was taken in irreversible hydrocolloid (Cavex CA37 alginate impression material) and the cast was made in vacuum mixed die stone. Single sheet of modeling wax was used as a spacer for the construction of customized special tray using auto-polymerizing resin. Cut-outs

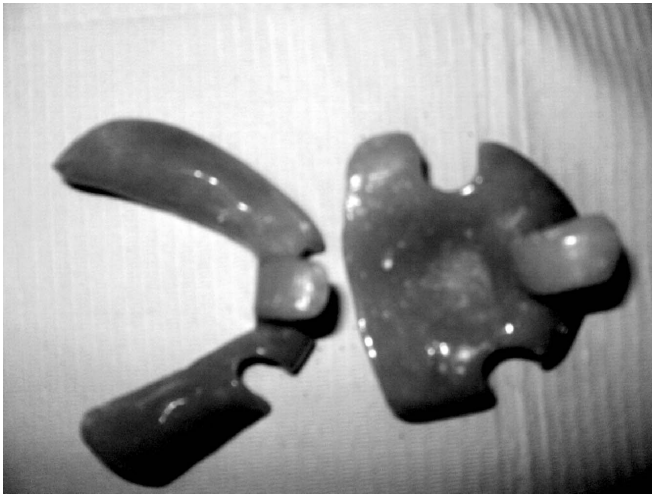


Fig 1: Upper and lower customized special trays.



Fig 4: Maxillary tray handle removed.



Fig 2: Upper and lower wash impression in customized special impression trays.

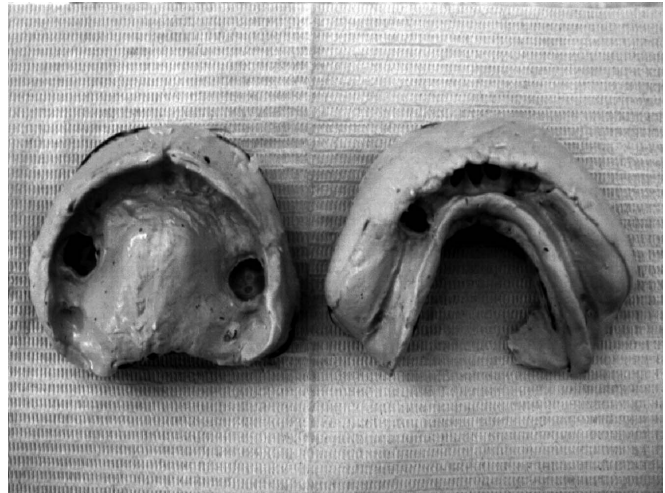


Fig 5: Mandibular and maxillary pick up impression in alginate with customized special tray in situ.



Fig 3: Mandibular tray handle removed.

were made for natural teeth present in the arch. The trays were examined for its extensions and corrected. (Figure 1). To check the over-extensions and

under-extensions the diagnostic periphery was recorded.

A wash impression was taken using zinc oxide eugenol impression paste (cavex outline impression paste) as an impression material (Figure 2). Excess impression material was removed with the help of a sharp scalpel.

The handles of customized special trays were removed using a steel fissure bur (Figures 3, 4).

A stock tray of suitable size was selected. The customized special tray was reseated in the patient's mouth. The stock tray was loaded with alginate and inserted in the patient's mouth over the special tray, border molding was repeated and a pick up impression was removed from the mouth. (Figure 5). The impres-

sion was disinfected using alcohol based disinfectant and poured with extra hard die stone. Subsequently the conventional laboratory procedures were carried out and the dentures processed.

DISCUSSION

This two-part impression technique is a suggestive alternate for recording free end saddles in two different impression trays loaded with two different materials, one of which is a special tray and other is a stock tray.

In contrast to sectional custom tray impression technique^{1,32}, altered cast impression technique² and Applegate impression technique³, this two-part impression technique is better indicated in acrylic dentures with free end saddles when only few teeth are remaining. This two-part impression technique is relatively simple and less time consuming than altered cast impression technique as the laboratory time is reduced, lesser amount of precision is needed because focus is on the impression technique rather than altering the cast.^{3,4}

Holmes³⁰ and Leupold³¹ showed that when the distal extension bases are recorded in functional form least amount of movement of the denture base occurs at the time of placement and forms the most favorable ridge-to-denture-base relationship which results in proper stress distribution over residual ridge. This intimate ridge to denture base relationship also results in decreased food impaction below the dentures. This technique is in agreement with Holmes and Leupold as the distal extensions denture bases are recorded in functional form in a special tray, utilizing zinc oxide eugenol paste as an impression material.

Support for tooth and mucosa supported RPD is derived from structures with different viscoelastic responses to loading resulting in differential support problem. Therefore, the impression of the ridges should be taken in the functional state and the impression of the teeth in anatomic state. Abutments and tissues over the residual ridge distort approximately 20 µm and 500 µm, respectively under less than 4 N of force.³³ Recognition of this disparity has led to use of impression procedures that attempt to accommodate the difference in resiliency between hard and soft tissue support. In order to achieve this differential support predicament the final impression was divided in two parts. In part 1 the functional impression of the re-

sidual ridge was recorded in customized special tray with cut-outs for the existing teeth, using zinc oxide impression paste as impression material and in part 2 the impression of the existing teeth was done in the stock tray loaded with alginate.

The material used to register the ridge in its functional state may not be useful for the registration of the teeth.³⁴ Zinc oxide eugenol impression paste has been a material of choice for recording the edentulous ridges in their functional state but as it is brittle and non-elastic when set, is contra-indicated for impression of the abutments and other remaining teeth.³⁵⁻³⁷ Therefore in this two part impression technique only the edentulous ridges were recorded using zinc oxide eugenol impression paste in customized impression tray.

The material for making the final impression of the dentition must possess extreme accuracy. Applegate³ recommended hydrocolloids due to its very accurate nature and ease of manipulation. Therefore in this two-part impression technique the remaining natural teeth were recorded using irreversible hydrocolloid. Hence the authors have devised a technique to utilize zinc oxide eugenol paste and irreversible hydrocolloid simultaneously for impression of distal extension acrylic removable partial dentures.

In this two-part impression technique it is possible to control the basic objectives for impression making. Therefore this technique is time saving and cost effective good alternative to record impressions of distal extension RPD in Kennedy class 1 modification cases specially with few teeth remaining in the arch.

This is a suggestive alternate to altered cast technique especially in remote dental centers where casting facilities are not available. It is useful in the construction of free end saddle provisional acrylic dentures especially when the prosthesis are to be worn for a relatively longer period of time so as to minimize the residual ridge resorption.³⁸

CONCLUSION

The two-part impression technique is a good alternative to altered cast technique. The materials required are commonly available and routinely used in clinical practice. In this two-part impression technique all the objectives of impression making are achievable.

With the accurate impression a favorably extended denture base will provide proper stress distribution, favorable ridge to denture base relationship, stimulation to the underlying bone and decreased food impaction.

In addition the two-part impression procedure is less time consuming, easy to perform and economical. Hence all of which lead to well formed, well-functioning prosthesis contributing to increased patient satisfaction.

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