

Rotational Path Removable Partial Denture: Esthetic Treatment Option for the Edentulous Maxillary Anterior Region: A Case Report.

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Abstract

Rotational path is limited primarily to tooth borne partial dentures, although it may also be applied to some extension base partial dentures. Its advantages are the elimination of anterior clasps to improve esthetics, and reduction of tooth coverage to minimize plaque accumulation. The rotational path design concept uses a rigid portion of the framework as the retentive component. Either a minor connector or proximal plate provides retention through its intimate contact with proximal tooth surfaces below the height of contour or survey line. These rigid retentive components must gain access to their infrabulge portion of the tooth by rotating into place. A specially designed rest in conjunction with this retentive component satisfies the basic requirements of clasp design. When correctly designed and fabricated, the rotational path RPD provides improved esthetics, cleanliness, and retention for patients who are not suitable candidates for implants or fixed partial dentures in tooth supported edentulous regions.

Keywords: Rotational path, Esthetics, Tripoding

Introduction

The rotational path of insertion is an alternative to the conventional methods for attaining the retention of removable partial dentures.¹ By exploring many clinical applications that is provided by this technique, emphasis is laid on its use in then esthetic replacement of missing teeth.² The customary approach to partial denture design involves the use of path of insertion relatively perpen-dicular to the existing occlusal plane. This normal straight path of insertion requires all the rests to be seated simultaneously^{2,3}, but the rotational concept permits the rigid retentive components to gain access to the undercut areas of the abutment teeth through a rotational path of insertion.^{2,3} The rigid retentive components are the minor connectors and proximal plates that substitute for certain conventional clasp retainers^{1,2} and in each case, one or two rigid retainers are used on one side of the framework in conjunction with one or two clasps on the opposite side of the framework. Rigid retainers as any direct retainers must satisfy six biomechanical requirements: retention, bracing, support, encirclement, passivity and reciprocatio¹ but the last requirement cannot be considered in the absence of flexible retentive component.³ Whenever a rotational path is used, the segment that sits first uses a rigid retainer and the second segment uses a conventional clasp for retention.⁴

Clinical History

A 34 year old male reported to the Department of Prosthodontics, Crown and Bridge and Implantology, Bharati Vidyapeeth Dental College & Hospital with missing 11,12,21,22. The patient's goal was to receive a comfortable and functional prosthesis without any surgical intervention. It was noted that, the patient presented with Seibert's class III ridge

defect in the edentulous area. Keeping this in mind, a removable partial denture treatment was decided as the treatment of choice for functional and esthetic reasons. The patient decided to accept removable partial denture treatment option. Before opting for any prosthodontic procedures, patient was sent for the oral prophylaxis. His medical history revealed no significant medical findings and his general health was good.

Clinical examination was done and the findings were as follows: (Refer to fig. 1,2 &3)

- Missing 11,12,21,22 with Seibert's class III ridge defect.
- Class II cavity with 46.
- Amalgam filling with 36.
- Extrusion of mandibular anteriors.
- Generalised recession seen.

The patient exhibited canine guidance occlusal relationship bilaterally and exhibited no parafunctional habits. His acceptance to the removable prosthesis treatment plan was very philosophical according to the House's classification, and the treatment was projected to have a good long term prognosis.

Clinical Procedure

1. Diagnosis and treatment plan

A facebow was used to help relate the diagnostic casts, which were mounted onto a semiadjustable articulator (Hanau Wide Vue-Articulator). It was important to have mounted casts to evaluate the available inter-arch space and to determine the appropriate surfaces to place occlusal rest seats.

2. Surveying and tripoding of the casts

The maxillary cast was placed on a surveyor table and was surveyed at a zero degree tilt. The analysing rod was used to determine the amount of undercut present on the mesial surface of canines and mesio-buccal undercut on the molars. The teeth 17 and 27 were chosen for indirect retention. Three separate marks were placed on

the cast to orient it at zero-degree tilt (refer to fig 4). Then the cast was tilted straight back from the initial survey lines until the undercuts on the mesial surfaces of the canines were eliminated. Once the tilt on the surveyor was determined, three additional lines were drawn other than the marks placed on the cast at zero degree tilt and surveying was accomplished at this new position (Refer to fig 5). The distance between the two heights of contour on the canine should be as far apart as possible for better retention. Following modification areas were indicated on the cast: rest seats, retentive areas, undercuts, and guiding planes.

3. Mouth preparation

Mouth preparation was accomplished as guided by the surveying. Cingulum rest seats on lingual surfaces of canines i.e 13 and 23 and disto-occlusal rest seats were prepared with an inverted cone diamond bur on the teeth 17 and 27

4. Impression making

Border molding was performed in the edentulous region using green stick compound (DPI PINNACLE TRACING STICKS). The definitive impression was made using Aquasil Monophase impression material (Dentsply Caulk). (Refer to fig.6)

5. Framework fabrication

After the master cast was poured, trimmed, and resurveyed, the framework was fabricated. Care was taken not to provide relief around the mesial guide planes of the abutment teeth 13 and 23, as this was critical for allowing rigid retainers to engage in undercuts (Refer to fig 7). It is important not to electro-polish the guide plane areas in order to prevent the loss of retention. For rotational path removable partial dentures, each retainer consists of a rest and a guide plane as the retentive element, which avoids the use of clasps, especially in the esthetic zone.

6. Framework trial, jaw relation and setting of selected teeth according to shade and shape

The framework was tried in the mouth to check for retention and to evaluate the proper seating of the removable partial denture around the rest seats, guide plane, and clasps and the fit of major connectors. (Refer to fig 7). Jaw relation was recorded and mounting was accomplished. Correct shade and shape of the teeth were selected by evaluating the patient's remaining dentition as a guide and teeth arrangement was accomplished.

7. Esthetic try-in and processing of removable partial denture

Teeth were set and waxed up for the esthetic try-in appointment. The removable partial denture was gently placed in the mouth, and the following criteria were evaluated: height of the teeth, occlusal interferences, esthetics, and phonetics. After obtaining the patient's approval for the wax-up and tooth setup, the removable partial denture was processed using heat cured acrylic resin (DPI, Mumbai, India).

8. Placement of definitive removable partial denture

The processed removable partial denture was placed in the mouth, and the following criteria were re-evaluated: adaptation of the clasps and rests, retention of the removable partial denture, esthetics, and occlusion. (Refer to fig 8 & 9).

9. Patient education

The patient was instructed in placing the prosthesis by seating the anterior part of the removable partial denture first and then seating the posterior section until it clicked into the edentulous area by utilizing the antero-posterior rotational path. Oral hygiene instruction was provided, which stressed the importance of recall maintenance appointments to evaluate the prosthesis as well as the health of the remaining dentition.

Conclusion

With partially edentulous patients, clinicians are challenged to improve on treatment plans and utilize alternative removable partial denture designs to provide comfort and to meet the current esthetic dental standards. The rotational path of insertion concept satisfies this current need of patients opting to receive a removable treatment plan.⁵ Rotational path removable partial denture can provide an alternative treatment option to implants for medically compromised patients who cannot go through the surgical phases of implant therapy. Long term clinical success in the rotational path technique has been demonstrated in several patients. Various authors have discussed the advantages of the rotational path technique in relation to the reduction of the clasps within a prosthesis and enhancing esthetics.^{2,3,6,7,8}

Rotational path removable partial denture is clinically significant in that it can deliver satisfactory esthetics and function for patients that is comparable with fixed partial denture or implant therapy.^{9,10} By utilizing the existing undercuts present in the dentition, rotational path removable partial dentures can be inserted using a dual path placement. One of the main advantages of rotational path removable partial dentures is the clasplless design in the esthetic region. Because of the close adaptation requirements of retentive components, an intimate tooth contact by the rests allows very little room for error while the removable partial denture is fabricated.¹⁰ The long-term success of an removable partial denture can be very predictable with the proper attention to oral hygiene, periodontal considerations, basic design concepts, and judicious fabrication of partial denture

construction.¹¹

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Legends of figures

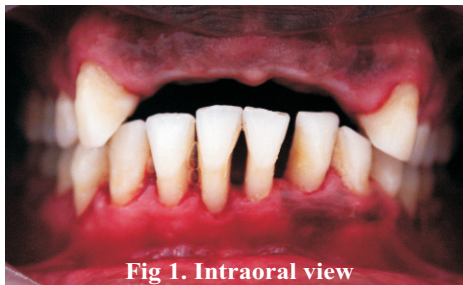


Fig 1. Intraoral view

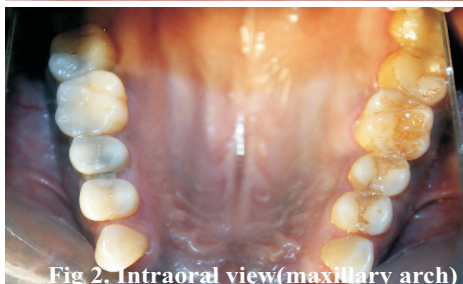


Fig 2. Intraoral view(maxillary arch)

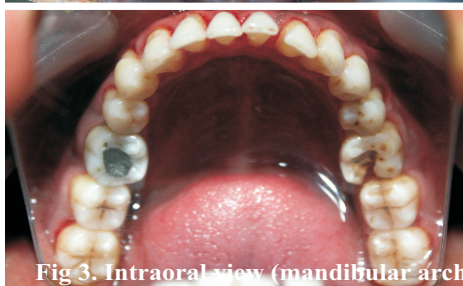


Fig 3. Intraoral view (mandibular arch)

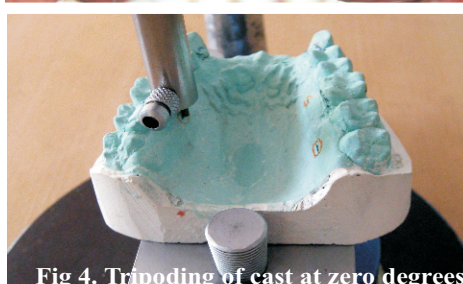


Fig 4. Tripodding of cast at zero degrees

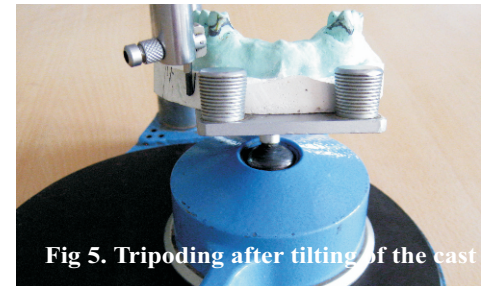


Fig 5. Tripodding after tilting of the cast

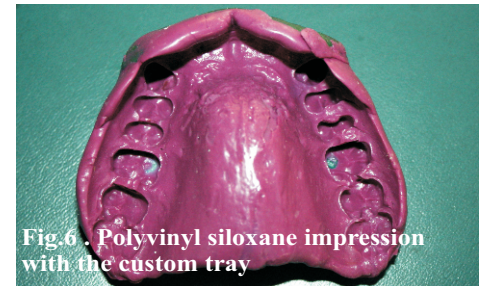


Fig 6. Polyvinyl siloxane impression with the custom tray



Fig 7. Framework Trial



Fig 8. Insertion of definitive RPD(labial view)



Fig 9. Insertion of definitive RPD (palatal view)