

A Viable Treatment Alternative in Distal Extension Cases: A Case Report

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Abstract Dentures requiring support from teeth, the mucosa and the underlying alveolar ridges are subjected to many forces that adversely effect the abutment teeth and the residual ridges during functional and parafunctional activity. A number of designs of the framework and the direct retainers were used to improve the comfort and acceptance of the patient wearing a removable partial denture. Attachment retained removable partial denture is one of the viable treatment alternative through which significant number of patients could be benefited. In this particular case of distal extension, attachment retained removable partial denture was chosen as a treatment modality. This article provides an overview and a simplified approach to this treatment through a case report and the criteria followed for selection of the particular attachments for treating the patient.

Keywords Attachment retained denture · Precision attachments · Removable partial denture · Distal extension cases

Introduction

The treatment and maintenance of bilateral and unilateral distal extension partial denture (Kennedy's class I and Kennedy's class II) presents a challenge for clinicians. In these cases acrylic or cast partial denture was largely preferred, with barely satisfactory esthetical results and poor satisfaction of patients. These partial dentures were also subjected to adverse forces during function leading to the rotational tendency of removable partial denture (RPD) after long term use.

Implant retained restorations are also a widely chosen option in these situations, but is sometimes not possible due to insufficient amount of bone or economic reasons. A number of reports have been published regarding the framework and the direct retainer designs to improve the comfort and acceptance of the patient wearing RPD [1]. Towards the end of 19th century Parr, Peeso, Chayes, designed precision attachments which can facilitate both esthetic and a functional replacement of missing teeth and oral structures.

Precision attachment is an interlocking device, one component of which is fixed to an abutment or abutments, and the other is integrated into a removable dental prosthesis in order to stabilize or retain it. These attachments take the place of damaging clasp arm. Based primarily on the function of these attachments they are classified as rigid or passive. OT CAP Attachment (rhein 83inc, USA) a passive type of attachment consists of a matrix (a sphere available in preformed plastic patterns, which is cast to the abutments and a patrix which are preformed housings which are casted into the framework and contains retentive caps made of nylon or rubber in different colours corresponding to different retentive degrees, both in normal and micro sizes.

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Case report

A 23-year-old male reported with chief complaint of missing teeth, inability to masticate and unaesthetic facial appearance. On clinical examination teeth present were 11, 21, 12, 22, 14, 24, 34, 44 with good periodontal condition (Fig. 1). Radiographic evaluation, showed adequate bone support around the teeth present.

After the clinical examination the diagnostic casts were studied and different treatment plans, ranging from conventional removable partial dentures to implants were made, to rehabilitate and restore function and esthetics.

The option of implants was ruled out because of inadequate bone in the edentulous areas and the economic reasons. The crown height of the abutments being good enough a removable partial denture with extracoronal attachment for upper distal extension and lower overdenture were planned. Treatment plan included root canal treatment of the abutment teeth chosen for over denture and fixed partial denture to replace the missing canines, with the matrix of the attachment on the distal abutment.

After the endodontic treatment of the overdenture abutments, they were prepared for short copings with a post. Tooth preparation was done 12, 14, 22, 24 to receive bridge in relation to 12, 13, 14:22, 23, 24 replacing the missing canines (Fig. 2). Temporisation was done with protemp (3 M ESPE Dental products, St. Paul, USA). Gingival displacement was done using double cord technique (ultradent products inc.). Definitive impressions were made with an addition silicone (reprosil soft putty/regular set and reprosil LV, Dentsply, caulk, Germany.) working casts were generated from diestone type IV (kal-rock, kalabhai karson Pvt Ltd., Mumbai).

The crowns have been waxed to full contour and milled in wax for maxillary guiding plane surface. The matrices were added to the axial surfaces (distal) of the distal abutment using a dental surveyor, lingual to the centre of proximal contour. Lingual shoulder for the lingual bracing was also provided. (Fig. 3).



Fig. 1 Preoperative view



Fig. 2 Tooth preparation i.r.t 12, 14, 22, 24



Fig. 3 Trial of the Bridge with matrix part on the distal surface of the bridge. Lingual shoulder also seen

Following which casting, finishing and veneering of the fixed component was done.

The fixed component with matrices were tried in patient mouth and a pick up impression was made (Reprosil soft putty/regular set and reprosil LV, Dentsply, caulk, Germany.) (Fig. 4). The matrices of the attachment was placed in the receptacle (matrix of the attachments which were in the bridge on the refractory cast.) (Figs. 5, 6).

The waxup of the framework of the RPD was done, invested and casted. The framework was evaluated for fit and adaptation intraorally. Yellow coloured rubber rings were placed in the female counter part slots present in the Cast partial dentures using inserting tool. These rubbers make the cast partial denture retentive and stable and at the same time act as stress breakers.

The abutment teeth for overdenture were treated with topical fluoride gel (Fluorovil Gel, Vishal Dentocare Pvt. Ltd., Gujarat, India) and cementation of copings was done with light cure resin cement (RelyX U200, 3 M ESPE Dental products, St. Paul, USA). Primary, secondary impressions were made and occlusal rims fabricated. The



Fig. 4 Pick up impression



Fig. 5 Fixed component on the cast with matrix and the receptacle housing matrix, placed on matrix



Fig. 6 Cast framework with matrix attachment embedded on to it with acrylic

jaw relations were recorded. After the trial, acrylicisation of RPD was done along with lower complete denture.

Crown and bridges were cemented with light cure resin cement (RelyX U200, 3 M ESPE Dental products, St. Paul,



Fig. 7 Attachment retained removable partial denture, intraorally

USA) with the cast partial denture attached. Extra care was taken during cementation by applying petroleum jelly to the attachments and all parts of cast partial denture to make removal of access cement easy (Fig. 7).

After the final check up, routine checkup were performed in every 3 months for 1 year. The final result satisfied the patient who produced a stable occlusion with good mastication and aesthetics.

Discussion

There are several treatment options for rehabilitation of partial edentulism including the use of conventional or implant retained fixed prosthesis. Newer technologies like CAD CAM, precision milled attachments, impression materials have been improving the quality of RPD [1].

Dr. Herman Chayes first reported the invention of attachment in early 20th century. Removable partial denture with semiprecision or precision attachments for retention and support are best prosthesis available to dentistry where fixed restorations are contraindicated [2]. To the late 20th century, with growing technology the attachment has been applied to the superstructure of implant. Precision attachment has feature of being removable prosthesis with improved aesthetics, less post-operative adjustments and better patient comfort [3].

The stress on the abutment due to the difference in nature and behavior of the tissues supporting RPD is critical for long term success of prosthesis. The stress control on this abutment is achieved through dual impression technique, broad coverage and stable denture base, rigid design, splinting of dentition, proper selection of attachments and clasp design.

An appropriate attachment is to be selected for each individual case depending on many factors like periodontal condition, amount of space available, quality of bone

support, location of abutment, angulation of the roots to occlusal plane and patient desire [4].

Short clinical crowns prove to be the foremost contra-indication to use of attachments in the construction of RPD'S. The tooth must have adequate crown height to house the attachment components and effectively offset the leverage forces exerted on the crown. In addition adequate height must be present for the corresponding attachment components to be housed within the RPD framework or supportive acrylic resin while allowing an optimal artificial tooth replacement [5–8]. In this case abutments were of adequate clinical crown height to receive attachments.

Kapur et al. [9] has suggested that splinted 1st and 2nd premolar by full coverage crown, has provided good support and improved the prognosis of cast partial denture.

Staubli [10] has categorized attachments into six classes from rigid to universal resiliency. The greater the degree of resiliency suggests less torque transfer to the root and implant abutment. Attachments for Kennedy's I and II which are increased tissue supported should be considered resilient as resilient attachment allow for a spectrum of movements, hence reducing the stresses on abutment. They also permit vertical movement during mastication reducing stress transfer to the abutments (stress breaking function) and direct the forces to the residual ridge acting as stress redirectors [11]. The attachments used in this case were extracoronal OT Cap, which are castable attachments with elastic retention. With its elasticity it is possible to control the flexure and constrict a resilient and shock absorbing prosthesis.

Conclusion

Cast partial dentures with precision attachments are the viable options for patients where other treatment alternatives

like implants and fixed partial dentures are contraindicated. They provide not only with functional ability, but also with good satisfactory esthetics. Proper diagnosis, systematic treatment planning, proper selection of attachments and periodic recall preventive therapy would result in a successful treatment and patient satisfaction.

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