

Attachments in Cast Partial Denture: A Case Report

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Abstract

Retention of prosthesis is one of the key factors in the success of the prosthesis. Apart from retention, one of the major concerns in removable partial dentures has been stress transfer on the remaining tissue; particularly in distal extension cases. The use of attachment gained momentum in around late 1950s after considerable efforts by Steiger and Boilet. The need for extra retention and improved esthetics, lead to the development of intra-coronal and extra-coronal attachments. Attachment is a mechanical device for fixation, retention, and stabilization of prosthesis. The criteria that help in the selection of the attachments are location, function, retention, space and cost factors. The article presents a case report on attachment in cast partial denture.

Keywords: Retention; Stress Breaker; Cast Partial Denture; Attachment

Introduction

A removable complete or partial denture, overdenture, or maxillofacial prosthesis that replaces some or all missing teeth; the dental prosthesis can be readily inserted and removed by the patient is a removable prosthesis [1]. Retention of prosthesis is one of the key factors in the success of the prosthesis. Originally, the removable partial denture was retained with the help of the clasp assembly. The design of the clasp assembly has however always fallen into the pit of controversies. Their use has been esthetically less acceptable. Most of the extracoronal clasp assemblies are a modification of circumferential or bar clasp.

Apart from retention, one of the major concerns in removable partial dentures has been stress transfer on the remaining tissue;

particularly in distal extension cases. The use of attachment gained momentum in around late 1950s after considerable efforts by Steiger and Boilet [2]. The need for extra retention and improved esthetics, lead to the development of intra-coronal and extra-coronal attachments [3]. Attachment is a mechanical device for fixation, retention, and stabilization of prosthesis. It consists of a male receptacle and closely fitting part. The former is called the matrix and is contained within the normal or expanded contours of the crowns and latter is called the patrix and is situated within the denture base [1]. They permit the movement of the denture base during occlusal loading. This mechanical accommodation during function helps in reducing the stresses, particularly in the distal extension bases.

Attachments may be classified in a number of ways. It may be precision or semiprecision based on method of fabrication and tol-

erance of fit. Based on the relation to the abutment, it may be internal or external or radicular or bar type. Based on function or movement, it may be rigid/solid or resilient. Based on mode of retention, it may be frictional, mechanical, frictional + mechanical, magnetic or suction type. Depending on geometric configuration and design of the attachment system, it may be ball and socket, key and keyway, bar and clip/sleeve, telescopic, hinge, push button latch, screw units or interlock [4]. McMensor [5] in 1973 gave a classification according to shape, design and primary area of attachment. Gerardo and others [6] in 1987, classified the attachments as intradental attachment- frictional and magnetic; and extradental attachments- cantilever and bar attachment. Goodkind and Baker in 1976, intracoronal attachments- resilient and non-resilient; and extracoronal attachments- resilient and non-resilient [7].

The criteria that help in the selection of the attachments are location, function, retention, space and cost factors [4].

Case Report

A male patient aged 42 years old came to the department of prosthodontics with complain of failed prosthesis. He gave a history of accident a year back. He gave history of long span fixed partial denture with the fourth quadrant 2 years back.

On examination, chipped off ceramic was noted with fixed partial denture with respect to 41, 42, 43, 44, 45, 46, 47, and 48. Missing teeth were 44, 45, 46 and 47. 41, 42, 43 and 47 were root canal treated. The ridge was found to be thin and the overlying mucosa was keratinized.

The first line of treatment suggested to the patient was crowns with respect to 41, 42, 43 and 46 and implants with respect to 44, 45, and 46. However on CBCT evaluation, the bone dimensions were found to be inadequate for implant placement and required intensive grafting. Next option given to the patient was cast partial denture with attachments.

After diagnostic mounting, joint crowns were planned with 41, 42, and 43 with Rhein 83 OT strategy attachment and metal crown with 48 along with cast partial denture.

Tooth preparations were modified with respect to 41, 42, 43 and 48. 48 was prepared so as to incorporate space for the mesio-occlusal rest seat in the final crown. Impression was made with putty- light body condensation silicone impression material using 2 stage impression technique. Facebow transfer was done. Cast

was retrieved and mounted. Wax pattern was made on the abutment teeth. Rhein 83 OT strategy castable male attachment was attached on the distal surface of 43 and occlusal rest seat and guide plane was prepared on the wax pattern of 48 based on the selected path of insertion. Once the wax pattern was cast, metal trial was done to ensure the fit, integrity and passivity of the crowns. Ceramic trial was done. 46 and 47 were prepared to receive embrasure clasps. A pick-up impression of the final crowns was done and cast poured. Cast partial denture framework was fabricated with the female component. The frame work trial was done, bite recorded and Mandibular cast was remounted. Teeth arrangement was done and trial was done. After processing of the denture, delivery was done and oral hygiene and maintenance instructions given.

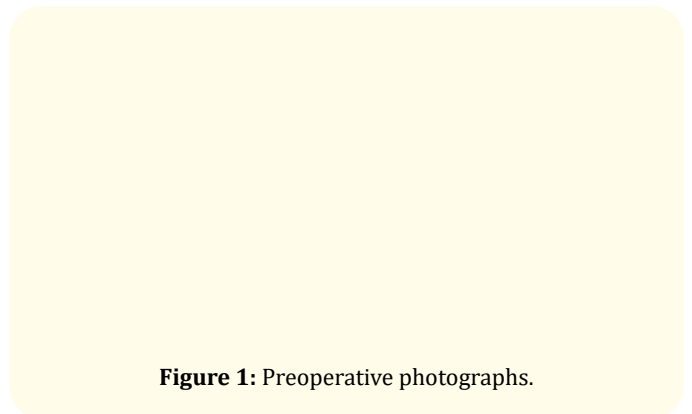


Figure 1: Preoperative photographs.

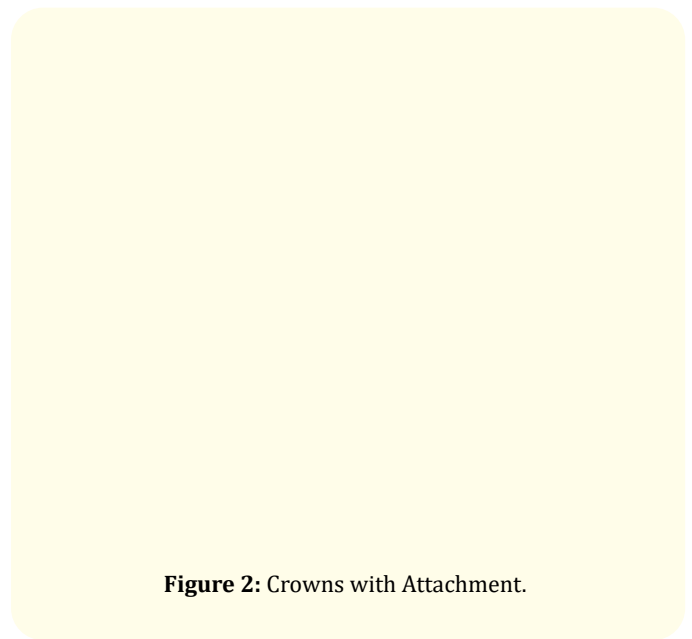


Figure 2: Crowns with Attachment.

Figure 3: Bite Registration.

Figure 4: Prosthesis.

Figure 5: Final prosthesis in place.

Discussion

The distal extension removable partial denture derive their support from both teeth as well as tissue. The differences in the sup-

port given by these two variables can lead to non-axial loading. In this case of distal extension cases, the abutment tooth becomes the load bearer. There are 3 ways in which abutment tooth suffers from detrimental forces, if regular distal clasping system is used. First, since the distal end of the abutment tooth acts as the fulcrum point, the resultant forces cause tipping of the abutment teeth. Secondly the distogingival tipping of the prosthesis will cause the crown to move distally and roots mesially. Lastly, this tipped denture will act as an inclined plane and drive the denture itself distally. Though this may be resisted by the mesial clasping system but it will exert distal torqueing force on the adjacent tooth. Ultimately this whole process will lead to sacrifice of the abutment tooth. To counteract this stress 3 methods have been proposed: reducing the load, increasing the load distribution, and finally equalizing the load between the tooth and the mucosa^{iv}. Generally a combination of these methods is used. Attachments like the RPI-RPA, combination clasp system helps not only in better retention but also acts as a stress breaker. If proper selection protocol and treatment planning is followed, they will lead to ultimate success of the prosthesis.

However no treatment plan comes with only benefits. Attachments defy the principle of minimally invasive dentistry as they require complicated laboratory and clinical procedure. The other disadvantages are they eventually wear thereby losing its action, very difficult to repair and replace, meticulous oral hygiene and maintenance requirement, costly and if not taken care, they can be unesthetic. Despite being a complicated procedure on following sound principles of treatment planning, clinical therapy, and laboratory construction, attachment based prosthesis can be an insightful and a reliable choice.

Conclusion

Attachment based prosthesis not only reduces the stresses that the abutment teeth is subjected to but it also causes improved retention and stability of the prosthesis. If treatment execution is done after proper understanding of the oral functioning, and biomechanics of the attachment and the cast partial denture, it will lead to ultimate success of the prosthesis.

Conflict of Interest

None.

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