HAREKETLİ KISMİ PROTEZLER İÇİN ALTERNATİF ESTETİK KROŞE TASARIMI: 5 YILLIK OLGU SERİSİ

AN ALTERNATIVE AESTHETIC CLASP DESIGN FOR REMOVABLE PARTIAL DENTURES: A CASE SERIES AT 5 YEARS OF FUNCTION

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Özet

Hareketli bölümlü protezler, kısmi dişsiz hastalar için etkili ve ucuz bir tedavi seçeneğidir. Ancak, estetiğin önemli olduğu bölgelerde, proteze ait tutucu kısımlar, kroşeler gibi, kişinin görünümünü ve özgüvenini etkileyebilir. Bu çalışmada amaçlanan, posterior kısmi dişsiz olgularda, anterior bölgeye yerleştirilmek zorunda olan hareketli bölümlü protezlere ait tutucu parçalar yani kroşeler için alternatif bir tedavi yöntemi sunmaktır. Bu olgu sunumunda 6 hastaya alternatif kroşe tasarımı yöntemi ile hareketli bölümlü protezler yapıldı. Hastalar, posterior bölgede dişsiz ve mevcut protezlerinin estetik olmayan görüntülerinden yakınmaktaydılar. Bu hastalarda, kroşeler ön dişlerin labial yüzeylerine yerleştirilmişti. Tüm hastalara alternatif kroşe tararımı ile hareketli bölümlü protezler yapıldı. Bu amaçla, mevcut ön dişelere sabit restorasyonlar uygulandı ve laboratuar aşamasında bu restorasyonların lingual bölgelerine yuvalar oluşturuldu. Alternatif kroşe tasarımını ile hareketli kısmi protezler hazırlandı. Hastalar bu yöntem ile yapılan protezlerini 5 yıllık bir süre boyunca kullandılar. Bu süreçte tüm hastalar yıllık takiplerle kontol edildi. Tüm hastalar, alternatif kroşe yöntemi ile yapılan protezlerinin, eski protezlerine göre daha estetik ve rahat olduğunu belirttiler.

Anahtar Kelimeler: Hareketli kısmi protez, kroşe, estetik, retansiyon, protez.

Abstract

Removable partial dentures (RPD) are an effective and affordable treatment option for partially edentulous patients. However, the retentive parts of the denture such as claps in the esthetic zone may influence the appearance and confidence of an individual. This study aimed to describe an alternative clap design to solve the restorative problems in the aesthetic zone without displaying metal components of the dentures for posterior partially edentulous patients. 6 patients with partial posterior edentulism were presented in this study. The patients were complaining about their unesthetic maxillary RPDs because of the clasps on the labial area. The patients had worn anterior bridges and crowns and abraded anterior teeth. Both anterior fixed prostheses and RPDs with alternative aesthetic clasp were planned to all patients. The patients were then followed up for five years for their satisfaction of function and aesthetics. All the patients who underwent this study described experienced significant functional and aesthetic improvement with their dentures at the period of insertion. None of the patients complained of retention or esthetics even after the 5-year recall examination. The proper use of this alternative clasp design can be a strong foundation upon which to enhance estheticity of these low cost RPDs combined with fixed prostheses in the esthetic zone.

Key words: Removable partial denture, clasp, esthetic, retention, prosthesis.

Background

Loss of teeth can affect a person's appearance and functions such as eating and speaking. There is thus a need for prosthetic rehabilitation to improve quality of life (1). For many patients, a fixed dental restoration supported by natural teeth or dental implants is preferred to restore the edentulous arches. However, because of financial, anatomic, psychological, or medical considerations, removable dentures may instead be the option of choice (2). Removable partial dentures (RPD) are an effective and affordable treatment modality for partial edentulism (3-6). The patients demand removable prostheses that not only are comfortable and affordable, but also are less noticeable or more natural in appearance. As aesthetics influence the appearance, dignity and self-esteem of an individual, it is the clinician responsibility to design the RPD to achieve the best aesthetic outcome for such particular patients (3,5,7-10). However, it is a great challenge to achieve an

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aesthetic outcome with circular or T bar claps when anterior teeth must be used as retainers for a RPD (11,12). Extracoronal and intracoronal precision attachments can be aesthetic, but are of greater expense and are more difficult to fabricate and maintain (13,14) Other options including a mesial rest, proximal plate, and I bar (RPI) clasp, and mesial rest, proximal plate and Akers (RPA) clasp can be used for maxillary anterior teeth; however, this may result with unacceptable aesthetics for patients with high lip lines and high smile lines (13,15-17).

Paths of insertion, e.g. rotational, dual or curved, have been advocated which address aesthetic concerns (3,4). Although rotational path design may be an aesthetic modality for anterior teeth abutments, this type of RPDs has rigid anterior retentive part of the framework that can not be adjusted; therefore, they are seldom used for distal extension RPDs (6,7,13). The twin flex clasp (wrought wire 19 gauge) positioned in 0,01 inch proximal undercut of the abutment teeth is another alternative for aesthetic treatment. Disadvantages of this technique are complex laboratory steps, difficulty once fractured and extra thickness of the major connector (13,18). Plunger attachments engaging a distal depression have been used; however, there may not be enough space to place the denture teeth (3,19).

Tooth coloured technopolymer clasps manufactured from thermoplastic acetal resin (polyoxytmethalene) material with high crystalline structure were developed for achieving aesthetic outcome, but bulkiness, lack of adjustibility, need for special equipment, and increased cost adversely affect their performance (3,18). Also clinical studies have shown that deformation of acetyl resin direct retainers are significanyly higher than metal alloy (3).

A round-rest, distal depression clasp (RRDP) has been introduced specifically for maxillary incisors or canine retainers for RPDs when aesthetic is of high importance. It is an alternative to the rotational path design as RRDP has the advantage of adjustable retantion if needed. However, this type of clasp is not recommended for abutment teeth with excessive mobility, or in situations which cingulum of the abutment tooth has significant centric or eccentric occlusal contact.

In addition, RRDP can not be used as the terminal abutment for distal extension RPD as the clasp doesnot achive 180-degree encirclement of the abutment (13).

Lingual retention and the elimination of the visible facial clasp arm have been demonstrated for premolars (13,18,20). Also a maxillary canine retainer with mesial groove reciprocation, mesiolingual rest, distofacial depression retantion have been described, but may not be applicable to maxillary incisors (21,22).

This article presents an alternative design for RPDs responding both aesthetic and function by eliminating the metal clasp on the labial surface of maxillar anterior teeth used as retainers for Kennedy Class I RPDs.

Case Presentation

This study was concerned with 6 maxillary partial edentulous patients (4 women and 2 men) with an age range of 58 to 71 treated at the University of Hacettepe, Department of Prosthodontics (Ankara, Turkey) between January 1 and end of December, 2009. The including patient criteria for this study was maxillary Kennedy Class I cases with at least two collateral remaining teeth in the need of a crown rehabilitation. All six patients followed the same diagnostic protocol which confirmed the necessity of anterior fixed and posterior removable partial prostheses. The patients' chief complaint was dissatisfaction with their existing maxillary RPDs because of unaesthetic appearance of the buccal metallic clasps. Three of the patients had worn anterior crowns and bridges, the rest had abraded anterior teeth. Because of financial reasons, the patients were seeking rehabilitation other than implants. In addition, there were lack of space for denture teeth so precision attachments could not be preferred. Both anterior fixed prostheses and RPDs were planned to all patients. After a complete diagnostic work-up, the decision was made to fabricate the prostheses with an alternative clasp design in which both retentive and reciprocal features of the RPDs would take place on the lingual side; because the patients did not want to display any metallic clasp on the anterior teeth.

Procedure

The preexisting crowns and bridges were removed for the necessary patients. Teeth preparations were made for fixed prostheses. Impressions were made using vinyl polysiloxane material (Elite H-D; Zhermack SpA, Italy), cast models were prepared with type IV dental stone (GC Fujirock EP; GC Europe, Belgium) and removable dies with pin system were fabricated. For defining path of insertion of the RPDs, the models for FPDs were surveyed. After full contour waxing was completed, the abutment teeth were cut back on the facial and lingual surfaces. Proximal guide planes and lingual undercuts were established. A hole was made between the two collateral teeth on the palatal site over the gingival embrasure of the wax model. A paralleling mandrel in the surveyor and anolog similar to bur has been used for positioning and making the hole. This is the female part of the system where the male part of the RPD should be placed. The hole with a length of at least 2,5 - 3 mm was made cylindrically so that the male part of the RPD could place easily (Fig. 1).

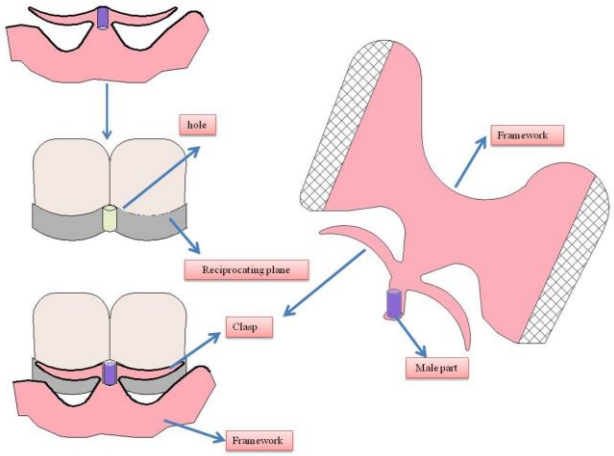

Figure 1. Shematic illustration of the alternative clasp system. Both retentive and reciprocal features of the RPDs took place on the lingual side.

The spoon form base could also allow the distal movement of the RPD for Kennedy Class I cases; otherwise, the system could be very rigid. Some patients had three or more remaining teeth; for these patients two holes were made between the end terminal teeth. The hole(s) had two major functions: They act as a reciprocal arm (like a guiding plane) so that the retentive tip of the lingual clasp of the RPD could move with the guidance of this hole until it seats to the undercut. Secondly and importantly, they act as a rest; therefore, the preparation of the hole was made like a spoon form allowing adequate flexibility for the rotational movements of the RPDs.

The patterns were invested (Bego, Breden, Germany) and veneering ceramic (Vita Zahnfabrik, Bad Säckingen, Germany) was added. Guide planes were finished using 0-degree milling bur. Final polishing and finishing of the FPDs were completed using rubber polishing wheels. Once the fit of the FPDs were confirmed intraorally, pick-up impressions (Pentamix, 3M ESPE, Germany) were made with custom trays. The impressions were poured in a dental stone (Moldano; Bayer Dental, Leverkusen, Germany). Definitive casts were indexed with tripod marking and surveyed, undercuts were blocked out with wax on the definitive casts, and the refractory casts were created. Connectors and the lingual clasps of the RPDs were waxed on the refractory casts. Duraley was used to prepare the male part of the RPD for the burn-out procedure. The male parts of the RPDs were prepared similar to telescopic crown preparation technique. Duraley was placed into the female part of the restoration and then attached the RPD. The length of the male part varied depending on the interocclusal dimension, crown length and gum level for each patient. However, the recommended dimension should be at least 2,5 – 3 mm.

Cast chrome (Bego, Bremen, Germany) RPD frameworks were fabricated. The frameworks were evaluated clinically and adjusted. After the maxillofacial jaw relation records were obtained, denture teeth (Ivoclar, Vivadent; Schaan, Liechtenstein) were arranged over the residual ridges and evaluated intraorally. The denture base (Lucitone 199 Denture Base Resin, Dentsply, Germany) was processed and finished. A round bur, sandpaper and/ or emery-coated discs were used to remove the excess acrylic resin. The fixed prostheses were cemented and the dentures were inserted (Figs. 2 to 8).

Figure 2. Case 1. Fixed restorations were inserted.

Figure 3. Case 1. Removable partial denture was fabricated.

Figure 4. Case 1. RPD was placed intra-orally.

Figure 5. Case 2. The two holes were made between the end terminal teeth for patients who had more than two remaining teeth.

Figure 6. Case 2. RPD was inserted.

Figure 7. Case 3. Patient's intraoral view before the treatment.

Figure 8. Case 3. Fixed restoration and RPD with alternative clasp design were inserted.

The patients were then recalled twice each year for 5 years. All the patients who underwent this study described experienced significant functional and aesthetic improvement with their dentures at the period of insertion. The patients were then followed up for 5 years for their satisfaction of function and aesthetics. The only complication during the

follow up period was fracture of one of lingual clasps in two cases; however, the clasps were easily restored with conventional clasp repairing methods. A pick up alginate impression was made, poured with type III dental stone and surveyed; and a wrought wire clasp was fabricated at the local laboratory. This was easy and cost effective. The patients were then continued their function. None of the patients complained of retantion or aesthetics even after the 5 year recall examination. Complete patient satisfaction was achieved.

Clasps are often used as direct retainers for the RPDs. The flexible clasp tip engages the undercut of the abutment to provide retention (3,8-10). The components of any clasp assembly must satisfy biomechanical requirements of retention, stability, support, reciprocation, encirclement and passivity (3,4,8). Additionally and importantly, the clasp assembly must ideally not affect the aesthetics adversely (3,10). In the design of a Kennedy Class I removable denture, retaining elements are usually placed on the abutments. When maxillary incisors and /or canines are the abutments, aesthetic considerations are pivotal in the selection of the retainer, particularly if the patient has a high lip line (13). Retentive parts of the RPDs placed buccally will not satisfy the patient from the aesthetical point of view. Ideally, precision attachments are used. However, when they are not an option, for example, because of reduced periodontal support of the abutments or financial considerations, alternative methods should be considered. The described technique in the present study is applicable to these situations as it is cost effective and a very good option for patients with reduced interocclusal space where distal attachments could not be placed and/ or where distal attachments leave minimal space for denture teeth. The retentive parts of the denture are placed lingually which fulfills the aesthetical criteria and demands of the patients, hence it is highly aesthetic. The system does not include any extracoronal attachments; therefore, any lateral forces are not transmitted to the periodontal tissues. Even after the 5 year recall examination, no periodontal tissue/ bone destructions were seen with the abutment teeth in all subjects in the present study. Other advantage of the technique is that the RPDs fabricated with the described protocol can easily be repaired in case of a clasp fracture because the system doesnot include any precision attachment-like connections as there is only the lingual clasp within the framework.

Ease of application to the patient is the other advantage of the system. The RPDs with this technique do not include any features such as clips to be renewed and/ or changed by time or they do not require any special aftercare. As the denture wearers were elderly in our study, these patients could easily wear and remove their dentures during the 5 year follow up. Furthermore, in case, if the denture is needed to be renewed, because the fixed parts of the system is independent from the RPDs (contrary to precision attachment system), the fixed parts will not be effected through this procedure.

Conclusion

As the choice of the best RPD design has been questioned for Kennedy Class 1 patients for years, the proper use of this alternative clasp design can be a strong foundation upon which to enhance aestheticity of these low cost RPDs combined with fixed protheses in the aestetic zone. This alternative clasp design fulfils the criteria for aesthetics, retention, support and stability for a maxillary RPD because 100% patient satisfaction was achieved in the present study.

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