Case Report

Full Mouth Rehabilitation with Fixed and Removal Prosthesis using Extracoronal Attachments: A Clinical Report

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Abstract:

Full mouth rehabilitation always claims careful attention and meticulous treatment planning. It becomes more challenging with the partial edentulism where bilateral segment is found missing. Successful restoration can be done with plenty of contemporary and conventional treatment planning. Attachment retained partial dentures are one such kind of treatment modality in prosthodontics. Studies have also demonstrated that precision-attachment partials last longer, wear less, need less adjustments, look better, work better, less destructive, protect abutment teeth, and are easier to clean. In this case report patient's functional and aesthetic expectations were met by doing full mouth rehabilitation using combination of Porcelain fused to metal (PFM) restorations and semiprecision attachments.

Key Words: Full mouth Rehabilitation, Implant Retained Denture, Semi-Precision Attachments, Cast Partial Denture (CPD), Vertical Dimensions (VD).

Introduction:

The demand for treatment with different partial denture prostheses is increasing (Douglass & Watson, 2002). Various treatment-planning modalities can be made for restorations in patients who have lost either upper or lower posterior teeth, unilaterally or bilaterally, and have no distal abutments.In such partial edentulism, implant-assisted prosthodontics has become contemporary choice of the replacement of the natural teeth. Although, conventional methods of fabrication of the removable partial denture continues to be an essential prosthetic consideration in many oral reconstructions, especially when implant therapy may not be used to replace missing natural teeth for some patients.

In modern dental practice many published paper suggested the application of implants in partially edentulous patients, serving as abutments for single crowns or fixed prostheses (Ericsson et al, 1986; van Steenberghe, 1989). Moreover, there is a paucity of studies concerning the combination of implants and removable partial dentures. However, in many partially edentulous situations the combination of implants and fixed restorations is difficult to implement (Battistuzzi et al, 1992). Contraindications can be based on medical, anatomical factors, such as the mandibular nerve or extension of the maxillary sinus, or costs involved with implant treatment.

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These limitations are mostly encountered in maxillary or mandibular posterior distal extension cases. The other problem occurs when the distal extension removable partial denture (RPD) is subjected to vertical, horizontal and torsional forces and that may become adverse during functional and parafunctional activities. These forces, which can affect denture retention, stability and support, are often compensated for to some extent by framework and denture base design variations. Removable partial dentures can be made with or without a cast framework. The partial cast has historically been the option of choice for the same. However, both the methods initiate new complaint regarding the appearance of the dentition as element of the denture framework or acrylic resin becomes visible.

Many patients are disappointed after placement of cast removable partial dentures (RPDs) because the patient refuses or is unable to wear the denture and the treatment is, therefore, deemed unsuccessful. Rates of unsuccessful treatment for clasp retained cast RPDs range from 3% to 40% with mean being 26% (Frank et al, 1998). Patients seek treatment with cast RPDs for the purpose of improving appearance and masticatory function. It has been suggested that compliance improves when the prosthesis meets the aesthetic requirements of the patient (Mazurat & Mazurat, 2003).

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 RPDs. Towards the end of the 19th century Parr, Peeso, Chayes, designed gadgets subsequently

called precision attachments. These attachments allowed prostheses to combine the advantages of fixed and of removable restorations (Preiskel, 1974). An attachment is a precision connector made up of two parts one part is connected to a root, a tooth or an implant. The other part to an artificial prosthesis, and is used to provide mechanical connection between the two. For the most part attachments take the place of damaging clasp arm but can also be used to retain full or partial dentures on root anchors carrying studs and bars (Sherring & Martin, 1994). Precision/Semi-precision RPD is the treatment modality that can facilitate both an aesthetic and a functional replacement of missing teeth and oral structures.

Indication of the attachment according to Sherring & Martin (1994) are:

1. Fixed bridgework- Intracoronal attachment on non parallel abutments
2. Partial Denture
3. overdentures
4. Unilateral or bilateral free end denture.

Classification of Precision Attachments:

Attachments have been designed since the past century and more than 100 types are available. There are many different types of prefabricated attachments available and they are usually classified on:

(1.) Basis of location or shape and form:

1. Extracoronal, 2. Intracoronal,
3. Radicular stud and 4. Bar.

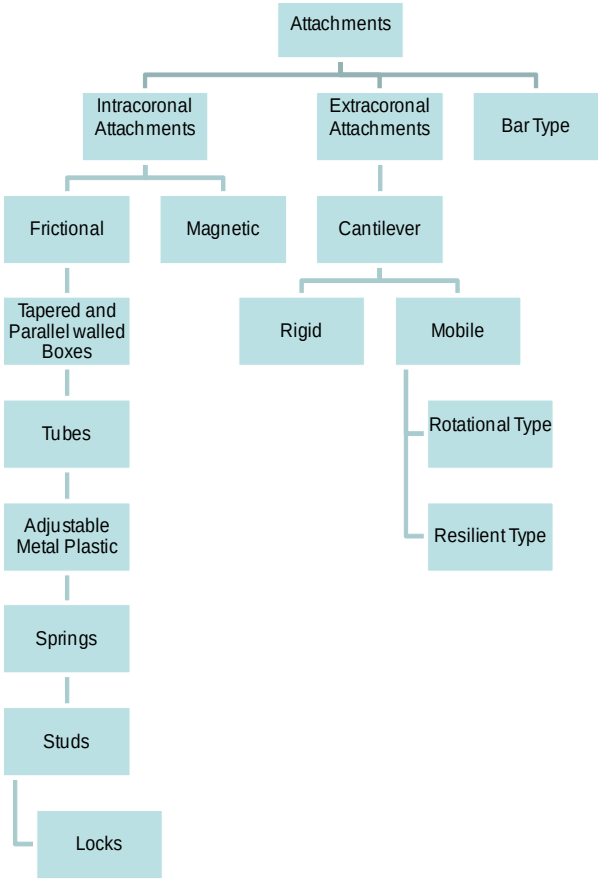
(2.) Based primarily on the function of the attachments (Feinberg & Feinberg, 2002):

1. Rigid: Any attachment employing a mechanical locking action with the use of clasps, lingual arms, springs, ball and sockets etc. The removable partial denture is held firmly in place and the abutment teeth are subjected to all of the forces in the mouth at all times.

2. Passive: An attachment that provides a free movement of the male when the abutment teeth are exposed to excessive forces. Such a passive retention mechanism has the effect of an automatic stress-breaker.

Becerra & MacEntee (1987) has described the other system of classifying the attachment to provide an overview of the designs available and to identify the common feature of each class.

While the fixed bridge or clasp-retained denture is usually the restorations of choice, attachments have to be employed where neither of these two would be



satisfactory. There is no universal or ideal design is available, so if attachments are used, they should be selected from the group with the most suitable characteristics for the task required. However, the principle concern is always the distribution of forces to maintain remaining alveolar ridges and teeth in an optimal state of health and to provide the patient with improved comfort and function.

Case Report:

The patient was 63 year old male complaining of inability to masticate and unesthetic facial appearance. He was referred by his dentist to the department of prosthodontics, People's Dental Academy, Bhopal for better prosthodontic consultation to address regular complaints by him regarding the inability to chew and speak properly. Patient was wearing mandibular temporary partial denture unsatisfactorily and having complaints of poor appearance, pain, and looseness in maxillary artificial teeth.

On clinical diagnosis, mobility and tenderness was found in PFM maxillary anterior bridge in relation to 12, 11, 21 ,22 and splinted metal crowns with #

acrylic facing in relation to 13,14,15, abfraction in teeth 23, 24 25. Grade II mobility in 42 and hypermobility in teeth 41and 32, clinically missing 31, root canal treated 46 with furcation involved, in addition he had other severe problems i.e. supraeruption in mandibular anterior teeth, mesially tilted molar tooth number 36, loss of incisal guidance and unsatisfactory occlusion. Anatomic landmarks, facial measurements and the resting positions of mandibular jaw were used to determine appropriate vertical dimension for the patient. As a result, it was found that previous restorations were given in the increased vertical dimension. Although, he had no specific medical history and dysfunction habit.

As his gingival status found compromised, after the initial clinical examination patient was referred for periodontal therapy followed by removal of the faulty bridges under local anaesthesia. Full mouth series of IOPA (Fig.I) and OPG were taken and examined. Teeth 12, 32, 41 and 46 had poor prognoses and hence they were extracted. After surgical intervention intraoral & extraoral condition was analysed (Fig. II and III), then different treatment plans ranging from conventional RPD to implants were made and discussed with the patient to restore the function and aesthetics of the dentition.

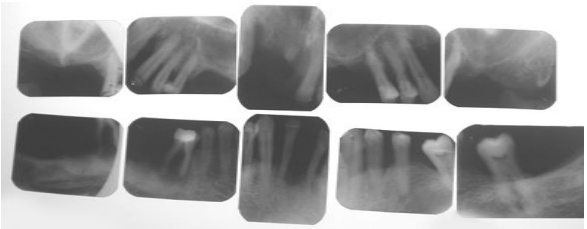


Fig. I: Showing the full mouth series of IOPA X-ray

Fig.II: Showing Pre treatment intra-oral view of patient's teeth in occlusion after removal of previous restorations.

Examination of radiograph and anatomical factors like maxillary sinus floor position and residual ridge resorption, patient was made aware of the steps involved before and during the surgery. He showed

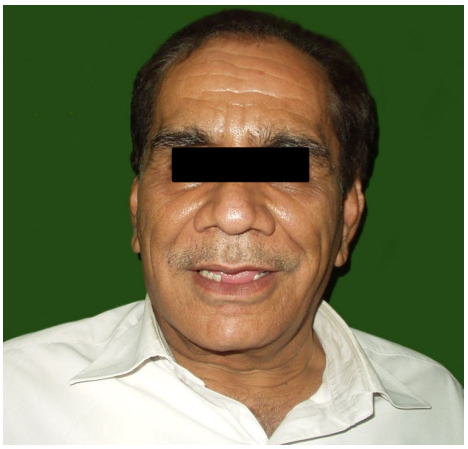


Fig. III: Showing Pre treatment extra-oral view of the patient's smile.

fear of surgery, financial limitations and dissatisfaction from the previous clasps retain RPD. For these reasons, instead of implant prosthesis, combination of fixed and fixed removal prosthesis in a form of extracoronal attachment was suggested to the patient and its advantages and disadvantages were also discussed. After taking patient's approval clinical procedures were initiated.

Impressions were made with alginate and casts were poured. Occlusal wax rims were fabricated on the diagnostic casts and later they were mounted in centric relation for prosthodontic evaluation. As teeth were found supraerrupted, tilted, and with unfavourable crown root ratio (Fig. IV), mock crown preparation was done on the diagnostic casts to analyse the required removal of tooth structure to reduce the vertical dimension crown root ratio. Radiographs were used as reference. New reduced VD is planned for aesthetic and functional restoration and established in the articulator. Teeth arrangement was done using occlusal wax rims for the purpose of try-in. Putty indexes were made ready to transfer the mock preparation records intraorally for required preparation of the teeth. Diagnostic wax-up on the teeth was done on the cast. Another set of putty index was made to fabricate the temporary restorations.

All the teeth were prepared and old crown preparation were modified with the help of putty index. Temporary restoration was fabricated with Protemp (3M ESPE Dental Products, St. Paul, USA), finished and cemented with temporary cement. Try-in of temporary partial denture was also done. Clinical diagnostic tests were repeated to check the patient's comfort at new vertical dimension. While patient was wearing provisional restoration for 3 months occlusal stability and TMJ were periodically checked.

The patient was satisfied with the provisional restoration. Thus, it was decided to reproduce the temporary VD and centric relation (CR) state on the final restoration.

Gingival displacement was done using double cord technique with (Ultradent Products Inc., Salt Lake city, Utah) Definitive impressions were made with polyvinyl siloxane impression material using putty wash technique. Working cast was generated from die stone type IV (Kalrock, Kalabhai Karson Pvt. Ltd.,Mumbai), surveyed and mounted with help of temporary record base and interocclusal records.

The wax patterns were prepared for PFM crowns and semi-precision attachments were attached distal to the distal abutment using surveyor. Casting, finishing, metal coping try-in and shade selection were done. Temporary denture base were adjusted to accommodate the semi-precision on attachment. Posterior teeth arrangement and PFM crowns were prepared and try-in was carried out. Clinical adjustments were done. The glazing of PFM crowns and acrylization of attachment retained partial dentures were completed. Pink colour rubber rings were placed (as manufacture's instruction) in the female counter part slots present in the CPD using inserting tool (Fig. V). These rubbers make the CPD retentive and stable and at the same time act as stress breakers.

Fig. IV: Showing Intraoral view of left mandibular teeth showing supraerruption in premolars and mesial tilt of first molar.

Crown and bridges were cemented with the CPD attached (Fig. VI). Extra care was taken during cementation by applying petroleum jelly to the attachments and all parts of CPD to make removal of access cement easy (Fig. VII & VIII). After the final set-up, routine check-ups were performed in every 3 months for one year. The final result satisfied the patient's chief complaints with the combination fixed partial dentures and semi precision retained CPD which produced stable occlusion obvious, improvement in the mastication and better aesthetics (Fig. IX and X).

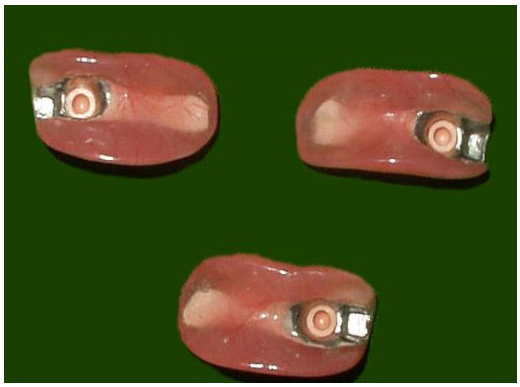


Fig. V: Showing placement of pink colour rubber rings in the female counter part slots present in the CPD.

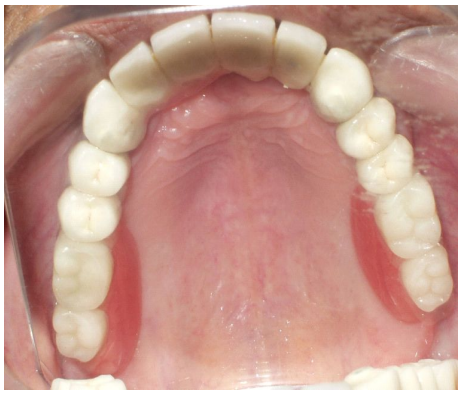


Fig. VI: Showing intra-oral view after the cementation of crown and bridges with the CPD attached.

Fig. VII: Showing intra-oral view of semiprecision attachment in right mandibular arch.

Discussion:

Removable partial dentures (RPD) have provided a viable treatment for partially edentulous patients. There are several treatment options for rehabilitation of partial edentulism including the use of conventional or implant-retained fixed prostheses.

Fig. VIII: Showing intra-oral view of semiprecision attachment in maxillary arch bilaterally.

Fig.IX: Showing Post treatment intra-oral view of restoration in occlusion

Depending on several given diagnostic factors and patient's perspective best treatment plan should be selected for the patient.

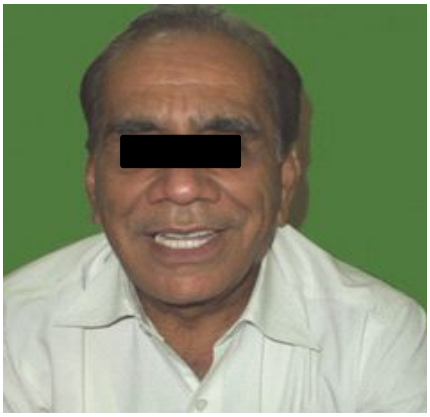


Fig. X: Showing post treatment extra-oral view of the patient's smile.

New technologies have been dramatically improving the quality of removable partial denture and the lives of patients, who use them. In recent year, dentistry has witnessed use of Computer added design Computer added milling (CAD-CAM) (William et al, 2006; Eggbeer et al, 2005), precision milled and semiprecision attachments, improved impression materials, improved techniques and designs.

Precision attachments have been used in removable and fixed prosthetics for years and have contributed to the success of RPDs, overdentures, segmented fixed prosthetics, and implants. Removable partial dentures fabricated with precision/Semi precision attachments for retention and support are the best prosthesis available to dentistry where fixed restorations are contraindicated (Feinberg & Feinberg, 1984).

There are number of attachments available now. At the same time, attachments are being used in all manner of restorative procedures, from partial dentures to implant-based prostheses. No single attachment is perfect for every application, it is critical that the appropriate attachment be utilized for each individual case situation. By analysing study models and x-rays, the clinician can make several important determinations, each of which will influence final attachment selection.

There is significant number of patients who could benefit from this treatment option, both long and short term. The survival rate of semiprecision attachment is quite satisfactory. Few retrospective studies available show a survival rate of 83.3% for 5 years, of 67.3% up to 15 years and of 50% when extrapolated to 20 years (Owal, 1991, 1995).

Other studies have also demonstrated that precision-attachment partials last longer, wear less, need less adjustments, look better, work better, are less destructive, protect abutment teeth, are easier to clean, and are worn most of the time by patients who have them (Feinberg, 1982).

Hedzelek et al (2011) conducted a Study to evaluate the repeatability of producing the semi-precision attachment; to establish their estimated longevity by a simulated, repeated denture placement/ removal procedure of denture; and to investigate the wear of their components. Results suggest that the inaccuracies of casting and laboratory procedure have only limited influence on the fit of the semi-precision attachments. The attachment with metal-to-metal type of friction exhibits the highest wear resistance (simulated up to 8 years of usage) as compared to attachments with polymeric matrix (up to 3 years) (Hedzelek, 2011).

Kapur et al (1994) has suggested in his clinical study that splinting of first and second premolars by full coverage crown, has provided good support and improved prognosis of CPD. With the having same reference it was planned in this case and premolars were splinted together to support the CPDs.

The attachments have additional benefits like enhanced retention, stability and aesthetics. This is a viable alternative for the patients who are not prepared to undergo surgical procedure involved in implant supported prosthesis.

Conclusion:

The primary objective of prosthodontics must be the preservation and health of the remaining existing tissues and structures: teeth, periodontal tissues, temporomandibular joint and oral facial muscles. In the present case patient was previously treated with the poorly planned restorations which were not fabricated by considering prosthodontic principles. As a result old restorations could not satisfy patient's realistic expectation and along they were causing more destruction to oral structures.

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