



PROSTHODONTIC REHABILITATION OF MAXILLARY DISTAL EXTENSION ARCH WITH FIXED-REMOVABLE PROSTHESIS USING EXTRACORONAL ATTACHMENT OPPOSING MANDIBULAR COMPLETE CONVENTIONAL IMMEDIATE DENTURE –A CASE REPORT

Shruthi D¹, M.Saravanan^{2*}, B.Muthukumar³

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Abstract

Oral rehabilitation of partially edentulous arches requires careful treatment planning before any prosthodontic intervention. Kennedy's class I and II situations are very challenging to rehabilitate especially opposing a complete denture. In certain situation due to the nature of residual tissues, the retention of the prosthesis is compromised. In such conditions, ideally implant supported prosthesis are considered favourable but various factors such as systemic status, economic status of the patient makes it unsuitable. A conventional removable partial denture with clasps can be given but they are unesthetic and not accepted by the patients. As an alternative extracoronral attachment retained prosthesis are considered. Immediate dentures are relatively better treatment option to avoid the period of edentulism and social embarrassment. These treatment helps to relieve patient anxiety and bring about patient satisfaction. This present case report illustrates the rehabilitation of partially edentulous maxilla with extracoronral attachment retained prosthesis opposing immediate complete denture in mandible.

Keywords: Distal extension, attachment, immediate denture, aesthetics, rehabilitation

¹PG Student, Department of Prosthodontics, SRM Dental College, Ramapuram, Chennai 600089

^{2*}Reader, Department of Prosthodontics, SRM Dental College, Ramapuram, Chennai 600089

³Professor & HOD, Department of Prosthodontics, SRM Dental College, Ramapuram, Chennai 600089

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1. Introduction

Edentulism is an irreversible condition and described as final marker of disease. Edentulism affects the facial appearance, nutrition, eating capacity, speaking and social life of an individual.¹ Prosthetic dentistry aims in replacement of missing teeth and the contiguous tissues while maintaining proper oral function, patients comfort, health and aesthetics with artificial substitutes.² Loss of teeth is associated with decreased masticatory efficiency and replacement of missing teeth solves these difficulties.³

Prosthetic options for replacement of edentulous region include Removable partial denture (RPD), Fixed dental prosthesis (FDP), and an Implant-retained prosthesis. Metal ceramic restoration are defined as an artificial crown or fixed complete or partial denture that uses a metal substructure and porcelain veneer.⁴ Metal ceramic is a versatile material in fabrication of fixed dental prosthesis.⁵ Also the fixed dental prosthesis is the most widely used restoration for replacement of the lost teeth.⁶

But conventional fixed partial denture is not recommended in a long-edentulous span with compromised bone support from a residual ridge. The dental implant as a treatment of choice is also limited due to the need of ridge augmentation. Since the main aim of preventive prosthodontics is to delay the inevitable problems such as residual ridge resorption and to preserve the remaining structures,⁷ combining fixed prosthesis with removable denture using precision attachments remains an alternative treatment modality to conventional clasp-retained removable prosthesis.⁸ Any prosthesis designed or fabricated should be based on the prosthetic principles of support, stability, retention, and preservation of remaining structures. From patient's perspective, retention is one of the important factors for its acceptability.⁹ These attachments provide better vertical support and better retention. Rehabilitation of distal extension conditions is sometimes very difficult because these are supported by tooth and tissue and require sound abutment teeth. This becomes even more critical when a completely edentulous arch opposes it. Usually, a fixed prosthesis cannot be given for a distal extension condition due to long cantilever length, which may be deleterious.¹⁰ An immediate complete denture copies the characteristics of the existing dentition and establishes the vertical dimension of occlusion. It acts as a surgical splint to control haemorrhage and

promote healing. It also prevents trauma that arises from food, the tongue, and the opposing teeth. An immediate complete denture enables the patient to maintain function as well as aesthetics to avoid a period of complete edentulism and social embarrassment.¹¹ This case report describes the management of distal extension in maxillary arch using semi-precision attachments retained cast partial denture opposing a partially edentulous mandibular arch suggested for extraction followed by immediate complete denture delivery.

Case Report

A 69 years old male patient reported to Department of Prosthodontics, SRM Dental College, Ramapuram, Chennai with a chief complaint of inability to chew food properly and poor esthetics of the teeth. A detailed case history of the patient was carried out which revealed that patient has undergone extraction before 3 months due to compromised periodontal health and caries. The patient was presented with medical history of increased cholesterol levels and was advised to be under medication for the same for past 2 years. On general examination, the patient was moderately built. Patient reported vaccination with 2 doses for COVID-19. The vital signs were checked and noted. The patient had a mixed diet routine and had no adverse habits or any parafunctional habits. On extraoral examination, the patient had normal facial profile without any facial asymmetry. On TMJ examination, there was no tenderness or clicking sound while opening and closing of mouth. The patient had competent lips. On intraoral examination, the patient presented with a total of 10 teeth in maxillary arch and 4 teeth in mandibular arch that includes 11,12,13,14,17,21,21,23,24,25,33,36,37,47. Grade 2 mobility was observed in relation to 17, 33,36,37,47 with furcation involvement in relation to 17. Generalized attrition and erosion of teeth was observed. (Fig 1) Patient was advised for Orthopantomogram (OPG) for detailed radiographic examination. On radiographic examination, the OPG revealed generalized bone loss, apical radiolucency in relation to 33, 47. (Fig 2)

The patient was diagnosed with generalized chronic periodontitis, partially edentulous maxillary arch of Kennedy's Class 2 modification 1 and partially edentulous mandibular arch of Kennedy's Class 3 modification 1 with generalized attrition and erosion.



Fig 1: Pre-operative Frontal & Occlusal view

All modalities of treatment options were explained to the patient with regards to cost, prognosis of the treatment, complications. The patient agreed and was motivated to proceed the treatment protocol of maxillary fixed removable prosthesis opposing mandibular immediate complete denture. In case of maxillary arch, contemporary technique with fixed-removable dental prosthesis was planned. It was

decided to attach extracoronar attachment on proximal surface of the premolar(14,25) bilaterally after extraction of 17. Tooth number from 14 to 25 was considered as abutment and suggested for root canal treatment. In case of mandibular arch, the removable dental prosthesis was planned. Delivery of Complete denture immediately after extraction of 33, 36, 37,47 was planned.



Fig 2: Pre-operative Orthopantomogram

Treatment

Entire treatment procedure along with appointment schedule was elaborated to the patient and informed consent was obtained. The diagnostic impressions of both maxillary and mandibular arches were made using irreversible hydrocolloid (Tropicalgin, Zhermack, Italy). The impressions were poured with Type 3 Gypsum product (i.e) Dental stone. Denture base was fabricated with autopolymerizing resin on diagnostic casts followed by fabrication of occlusal rims using modelling wax. The patient's vertical dimension and tentative centric relation were recorded and articulated.

Tooth preparation was done with equigingival margins in relation to 11, 12,13,14,21,22,23,24 and 25. Definitive impression was made using polyvinyl siloxane elastomeric impression material (putty& light body) for maxillary arch.(Fig 3) Wax pattern fabrication for metal copings was made on the master cast obtained from the definitive impression. Distal to the abutments, prefabricated castable OT cap Rhein 83 Inc, USA attachments were added. These attachments act as a stress breaker and absorb the excess stresses and provide elastic retention. The male component is attached

to the wax pattern and the female component is attached to the cast partial denture. The casting for metal copings along with the attachment was done by lost wax technique. The copings were trimmed, finishing and sandblasting was done. The metal coping was then checked intraorally for marginal fit and accuracy. Shade matching was done and ceramic build-up over the metal coping was done. Bisque trail of the FPD(Fig 4) was done followed by pickup impression with polyvinyl siloxane elastomeric impression material . (Fig 5)

The master cast was obtained, which was used to determine the path of insertion of the cast partial denture with a dental surveyor. The undercuts were blocked and duplication of the master cast was done using reversible hydrocolloid impression material. Refractory cast was obtained on which the wax pattern for cast partial denture was made, invested and subjected to casting using lost wax technique. The cast partial denture was trimmed, finished and denture base fabrication was done. The occlusal rims were fabricated on the master cast of both maxillary and mandibular denture bases. Definitive jaw relation was recorded and articulated. The teeth arrangement was done and wax trial was done intraorally for checking the

occlusion, phonetics and esthetics. **(Fig 6)** O-rings were placed in the maxillary denture base with the help of a metal ring so that its replacement in the

future in case of wearing off is possible. The maxillary cast partial denture was processed, finished and polished.



Fig 3: Definitive impression after Tooth preparation



Fig 4: Bisque trail and Definitive Jaw Relation



Fig 5: Pickup impression after bisque trail



Fig 6: Teeth arrangement done in Maxilla & Mandible



Fig 7: Post-Extraction occlusal view of Mandible

Before processing of mandibular denture, the existing tooth in the master cast was removed and surrounding area was trimmed. The artificial teeth replacing the teeth to be extracted were set, and labial flange was added. The denture was then processed. The trimming of the denture base is done in such a way that it accommodates the modification and allows good approximation of fitting surface to the shape of the ridge immediately after extraction. During cementation of the FPD, the cast partial denture was attached extra-orally after applying petroleum jelly to the attachments and cementation of the fixed partial denture was done using glass ionomer cement. This was done to ensure the correct insertion path of both the fixed and removable prostheses. After which, the maxillary prosthesis was inserted.

For mandibular arch, local anaesthesia was administered to the remaining mandibular teeth via inferior alveolar nerve block. The teeth were then extracted. Finger pressure was applied to the extracted site for haemostasis. **(Fig 7)** After proper haemostasis achieved, the denture was fitted. Pressure-indicating paste was then applied to the fitting surface and border to check for excessive pressure and the denture adjusted accordingly. The extension of the denture border was also checked.

Following the delivery of the immediate complete denture, detailed post-operative instructions were given to the patient. In addition to receiving instructions regarding post-extraction management, the patient was asked to return for a review appointment the following day. Prior to that, the denture should not be removed. At

the 24-hour appointment, the patient was asked whether he had any complaint regarding the extraction sites and the denture. Sign of soft tissue trauma stemming from the denture was checked. Special attention was paid to the region corresponding to the trimmed area of the working model because remodelling of the alveolar ridge was unpredictable after teeth extractions. The region would be under excessive pressure if it had been over-trimmed. The denture had to be adjusted

accordingly. Instructions regarding the insertion and removal of the denture, as well as instructions regarding denture hygiene were given. Thereafter, the patient was reviewed weekly for a few more times until no new problem was detected. The patient was reminded to visit the dentist promptly if any problem arose. The following pictures depict the Occlusal and Frontal view of the completed prosthesis.(Fig 8,9)



Fig 8: Post-operative Occlusal view of Maxilla and Mandible



Fig 9: Post-operative Frontal view

2. Discussion

In distal extension cases, rehabilitation is quite challenging due to the nature of the supporting tissue. Implants are considered the best treatment option in such cases but may not be feasible due to the underlying systemic conditions.¹² Conventional cast partial dentures may be given, but the metallic clasps are highly unesthetic.¹³ Therefore, the use of semi-precision attachments will improve the aesthetics and it also acts as stress breakers. The type of attachments may be used based on the amount of interocclusal space present in patients. This type of treatment protocol will improve the aesthetics, retention, stability and support of the prosthesis and hence the acceptance of the patient is much higher.¹⁴ These are completely non-surgical approaches.¹⁵

The immediate complete denture treatment modality avoids the period of edentulism until healing is complete. Although it prevents and promotes proper healing of the socket area, enables function and esthetic maintenance for the patient, it has certain disadvantages. The patients should report for frequent follow-up and modification of the denture might be required on healing process. Immediate denture treatment is contraindicated in situations like patients with bleeding disorder, existing infection. As rapid resorption occurs in first few months after extraction, there might be loss of retention, stability, of the denture and thus frequent relining is required for these dentures.¹⁶ A study conducted to investigate time of resorption of residual ridge to stabilize after extraction in immediate dentures revealed that it takes almost 6

months for residual ridge to stabilize and they also reported that when extraction is done along with alveoplasty, residual ridge stability took more than 6 months.¹⁷ A clinical study compared the effects of bone resorption after simple extraction and extraction along with alveoplasty. The study reported that the resorption was less comparatively when extraction was done along with alveoplasty.¹⁸

3. Conclusion

A comprehensive evaluation, multi-disciplinary approach and a sequential treatment plan, working out in harmony with the patient's aesthetic demand and perceptions are important for a long-term successful outcome. When rehabilitated using cast partial denture using precision or semi-precision attachments in distal extension cases provide both fixed and removable prosthesis advantages in terms of retention, aesthetics, function and thus patient acceptance is better. However, it can be challenging because this type of denture treatment is time consuming. Dentists should understand well the details of the clinical procedures used for denture construction. These treatment options do not limit the patient's choice to have an implant-supported prosthesis, whenever they are psychologically and financially prepared.

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