

PRECI-CLIX RADICULAR PRECISION ATTACHMENT RETAINED MAXILLARY OVERDENTURE – A CASE REPORT

POKHREL S.,¹ MADHYAN D.,² BHULLAR A.,³ MALAVIYA N.,⁴ SHAFIQ S.,⁵ AND YAZDANIE N.⁶

¹⁻⁴Department of Prosthodontics, UCMS College of Dental Surgery, Bhairahawa, Nepal

^{5,6}FMH College of Dentistry, Lahore – Pakistan

ABSTRACT

The preservation of teeth to support an attachment-retained overdenture is a clinically applicable and stable alternative to extractions and complete dentures. A key to success is the strategic selection of teeth for retention and attachment anchorage. This clinical report discusses a method for fabricating a maxillary overdenture using Preci-Clix Radicular Precision Attachment System. This technique is a simple and time-efficient alternative to traditional methods and adds to the retention, support and stability of the prosthesis, leading to enhanced patient comfort and acceptance.

Keywords: Radicular Precision Attachment, Maxillary Overdenture.

INTRODUCTION

Preservation of what remains is the basic principle of dentistry and it holds true even in the current era of implants. The percentage of older population is increasing and thus their need for dental treatment.^{1,2} Considering the number of partially dentate or edentulous patients, a variety of prosthodontic treatment options and modalities are indicated, which include conventional complete dentures and both tooth-supported and implant-supported overdentures.^{1,3}

An overdenture is defined as a denture, the base of which overlies on one or more prepared roots or implants. Overdentures have clinically proven to be a valid alternative to conventional complete dentures especially in cases where advanced resorption of residual alveolar bone is evident.⁴

Tooth-supported overdentures can be retained with attachments and provide improved retention, stability and reduce the extent of alveolar bone resorption. In addition, overdentures offer psychological benefit of natural teeth preservation and improved chewing efficiency in comparison to conventional complete dentures.² They are cost-effective and maintain dental proprioception when compared to implant-supported overdentures.⁵ However, excellent home oral health care with professional assistance is needed to prevent treatment failures.^{2,6}

Retaining teeth for an overdenture is an old authentic concept and a predictable and clinically applicable treatment modality.^{7,8} It dates back to the mid-to-late 19th century, when Ledger (1856), Atkinson WH (1861), Evans (1888) and Essig (1896) described methods for using retained roots for support and retention of the restorations. Boos (1948), Millar (1958) and Buncet

(1995) further extended the scope of Overdenture therapy in 20th century by considering worn down yet, periodontally stable teeth as overdenture abutments after elective devitalisation.⁹

Renner et al, in a 4-year longitudinal study, concluded that 50% of retained roots, used as overdenture abutments remained immobile. In addition, 25% of the retained roots that were initially mobile became stabilized. Hence, they suggested, that periodontally compromised teeth with predictable clinical prognosis could be used for overdentures after elective root canal therapy and decoronation.¹⁰

The preservation of remaining teeth for overdenture abutments provides a clinically sound prosthodontic treatment.⁴ However, tooth preservation requires accurate diagnosis and treatment planning to ensure acceptable long-term performance, maintenance of sufficient bone height and periodontal support.^{2,4,10}

Attachment systems are often used in overdenture construction by either connecting the attachments to cast abutment copings or connecting into the prepared post space of the abutment teeth.¹¹

The use of attachments can redirect occlusal forces away from clinically compromised supporting abutments and onto soft tissue, or redirect occlusal forces toward stronger abutments and away from soft tissues. They act as shock absorbers and stress redirectors as well as providing superior retention.⁸

The aim of the present article is to describe the prosthodontic rehabilitation of a patient with labially inclined pre-maxilla and an accompanying labial undercut. The suggest prosthesis design comprised of a flangeless denture for improved esthetics and prefabricated stud attachments to achieve stability, support

and retention in maxillary tooth-supported overdenture.

CASE REPORT

History Taking and Clinical Examination

A 55 year old male patient reported to the Department of Prosthodontics, Universal College of Dental Surgery, Bhairahawa, Nepal with chief complaints of inability to masticate and unaesthetic facial appearance.

A pertinent history was recorded and thorough clinical examination was executed. The clinical examination revealed the presence of 13 and 23, and high well-rounded residual alveolar ridge in mandibular edentulous arch and a prominent anterior labial undercut in the maxillary arch.

MATERIALS AND METHODS

A variety of different tentative treatment plans were formulated and discussed with the patient after a thorough diagnostic evaluation. A precision attachment-retained tooth supported flangeless maxillary complete overdenture and a tissue supported mandibular conventional complete denture was selected as the treatment of choice. The flangeless maxillary denture design was selected to counter labially inclined pre-maxilla, the accompanying labial undercut and excessive fullness of lips to improve the esthetics.

Elective endodontic therapy was done on teeth 13 and 23. The clinical crowns of the aforementioned teeth were reduced to gingival level (Fig. 1). A sequential clinical and laboratory steps of flangeless maxillary complete overdenture and lower conventional complete denture fabrication was carried out. Primary impressions were made with impression compound (Pyrex Polykem, India) in stock metal trays followed by irreversible hydrocolloid (Zelgan 2002, Dentsply, India) wash impressions. Secondary impressions were made with medium bodied polyether (3M ESPE, Imp-



Fig. 1: Clinical crowns reduced after endodontic therapy.

regum™ Soft, Deutschland, GmbH, 1453, Neuss, Germany) in customized impression trays (Fig. 2).



Fig. 2: Maxillary secondary impression.

The master casts were fabricated with Type III dental stone (Goldstone, Asian Chemicals, India) and trial denture bases were fabricated for maxilla-mandibular relation records. Facebow transfer was done and casts were mounted on a semi-adjustable articulator using the vertical and horizontal maxilla-mandibular relation records. Try-in was done following teeth arrangement, and vertical dimension of occlusion, the centric and eccentric occlusal contacts were verified. Facial and functional harmony was ensured with patients' satisfaction. The trial dentures were finished and characterized, invested using Type II dental stone and processed with the recommended curing cycle. Laboratory remounting and selective grinding was done after denture processing. Finally the dentures were finished, polished and disinfected.

After fabrication of dentures, the Preci-Clix radicular CEKA attachments were incorporated at chair side using auto-polymerizing resin (DPI self care, India). The armamentarium (Alphadent NY, Belgium) was prepared for attachment post space preparation in abutment teeth (Fig. 3). The canal was prepared with the predrilling bur. The cavity bur was used to prepare the canal for the base of the post. Finally, the precision reamer was used to calibrate the canal for the diameter of the post (Fig. 4). The burs were used in a slow-speed hand piece.

The seating tool was threaded into the Preci Clix post. The Preci Clix post was placed into the canal to assess the fit. The Preci Clix Post was sandblasted prior to cementation. The seating tool protected the threads from being contaminated with the cementing material. After setting of the composite resin, the post and root

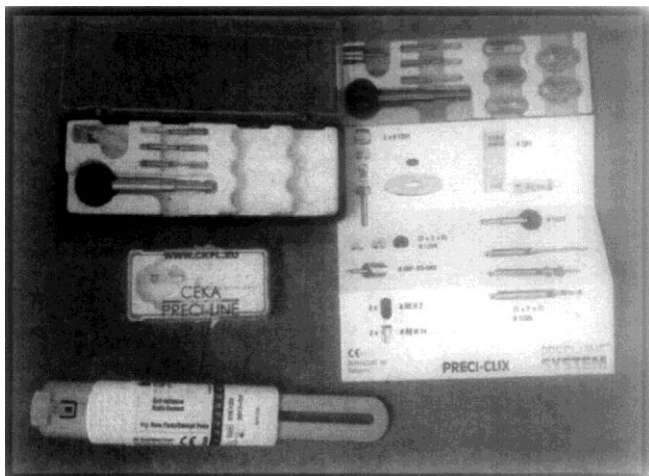


Fig. 3: Armamentarium for post space.

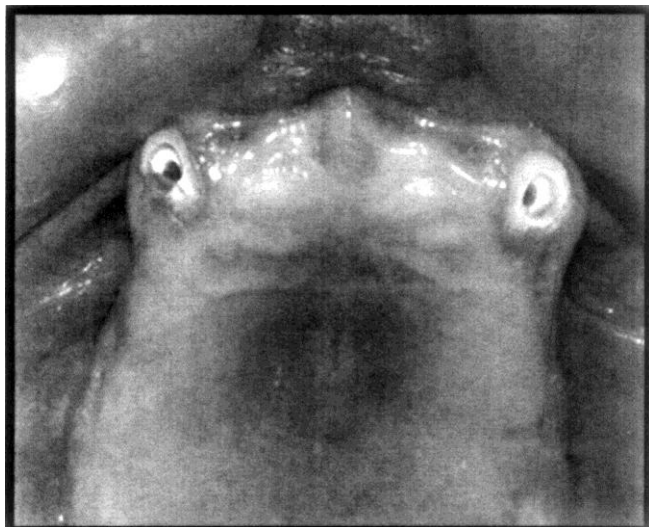


Fig. 4: Prepared post space in abutments.

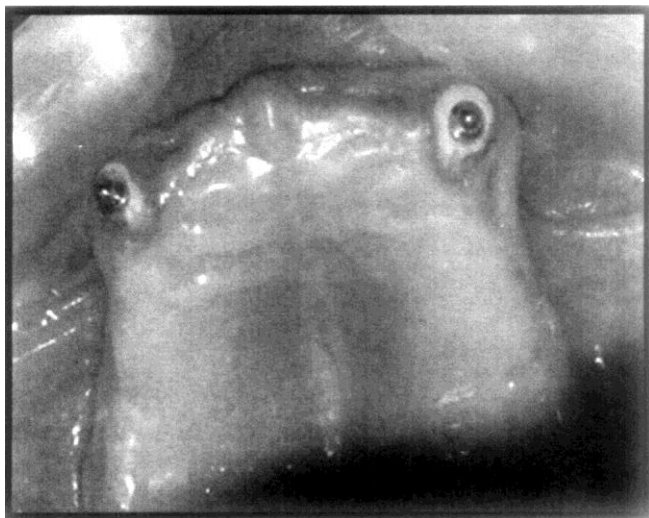


Fig. 5: Male part cemented in the abutments.

surface was coated with bonding composite resin. The post was seated carefully and accurately. The root surface was polished with a fine sandpaper disk. Topical fluoride was used to prevent decay.

For attaching the Male part to the cemented attachment post, a drop of Ceka Bond was applied on the male threads before threading it into the Clix Post. This maneuver prevented gradual unthreading of the threaded male. The ball was threaded into the post in the mouth with the help of screwdriver tool (Fig. 5). The black rubber space maintainer was placed on the ball. The Clix female was seated into the metal housing using the Preci Clix female insertion tool. The complete female component was seated over both the ball and spacer (Fig. 6). The undercuts were blocked out.



Fig. 6: Female positioned over the male.

After the male and female parts were assessed for accuracy of fit, the prosthesis was relieved, and evaluated to make sure that there was no contact with the attachment or abutment. A “vent”, or small channel was cut in the palatal side of the prosthesis to allow excess acrylic to escape. A small amount of low viscosity auto-polymerizing resin was mixed and placed in the relieved area of the prosthesis. The prosthesis was seated in the mouth for approximately 6 minutes (Fig. 7). Finger pressure was applied in the area of the attachments. After setting of the materials, the prosthesis was removed, ensuring to pick-up both the female attachment parts simultaneously.

The metal housing was fixed in the prosthesis, and excess resin was removed. The female part was clearly visible in the prosthesis after it was picked up (Fig. 8).

Final occlusal refining and adjustments were accomplished. Verbal and written post-insertion instructions were delivered to the patient. He was also educated about insertion and removal of the new dentures and maintenance of oral and denture hygiene was reinforced. Recall appointments were scheduled. Patient with the final prosthesis (Fig. 10).

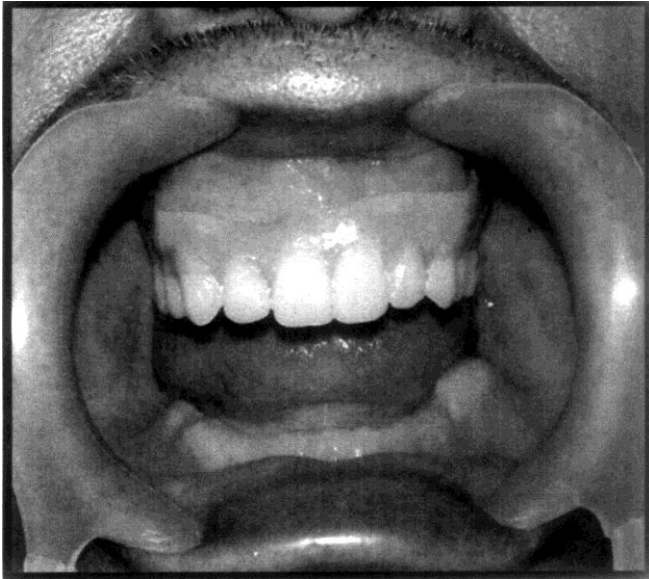


Fig. 7: Prosthesis seated for pickup.

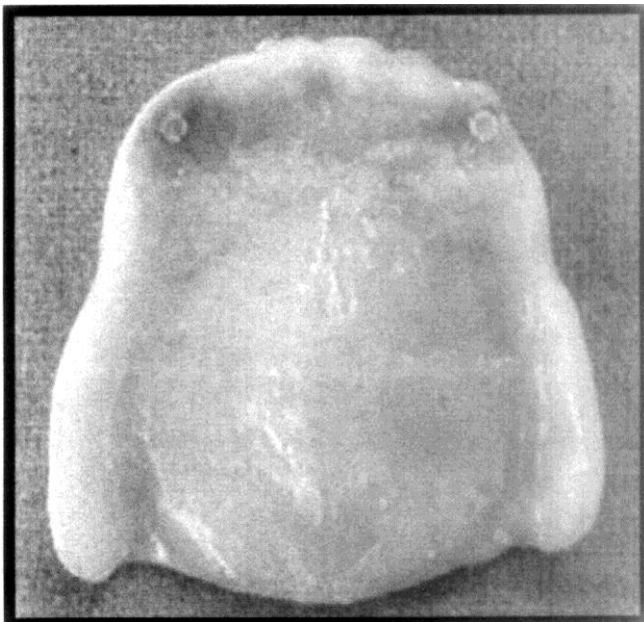


Fig. 8: Female part in the upper denture.

DISCUSSION

Old age has for long been considered inevitably accompanied by the loss of teeth. The prevalence of edentulism is also strongly associated with ageing although it is now a well establish fact that teeth can be kept throughout life in many individuals.

The rate of edentulism varies significantly among populations of different countries and it has declined dramatically during the last few decades in most countries.^{12,13} A nationwide study in Sweden over two decades showed that the prevalence of edentulism in subjects aged 55 – 84 years was 43% in 1980 – 81 and 14%

in 2002. In the youngest age group (55 – 64 years) only 4% were edentulous in 2002.¹⁴ In a more recent study the prevalence of edentulism in 2012 among 70-year-old subjects in Sweden was only 3%.¹⁵

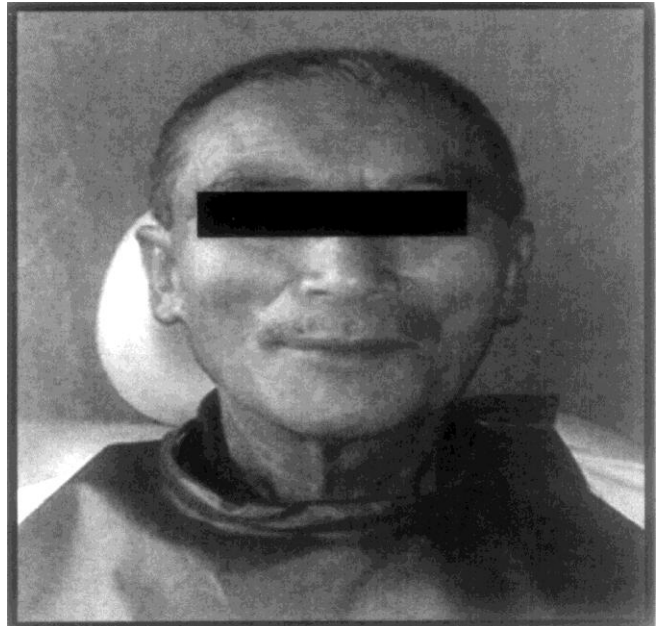


Fig. 9: Patient BEFORE prosthodontic rehabilitation.

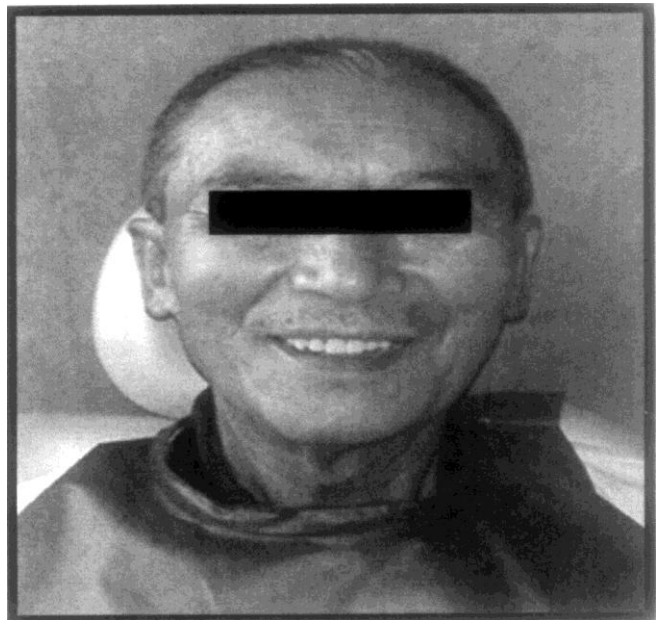


Fig. 10: Patient AFTER prosthodontic rehabilitation.

Edentulism in Pakistan occupies an estimated 4.1% of the total population aged 65 years and above, with a projected increase to 9.3% by 2030.^{16,17} It is a well-established fact that the loss of teeth is related to a number of factors, such as socio-economy, tradition, oral health resources, and not only to dental diseases.¹⁸

Despite the documented fact that the prevalence of edentulism is decreasing in most countries, there is still a great number of edentulous individuals in need of prosthodontic treatment. A majority of them represents the socioeconomically compromised fraction of the population are unaffording to implant treatment; therefore, they only have complete dentures as their treatment option.^{19,20}

New paradigms of care in dentistry are in dentistry are emerging, and there has been a trend towards 'minimally invasive dentistry'²¹ and functionally-orientated treatment planning' for the elderly patients.²² These treatment strategies are aimed at maintaining a functional, natural dentition throughout life without recourse to removable prosthodontics.¹

The prosthodontic rehabilitation with overdenture has proven to be beneficial to the patients in terms of improved retention, stability, function and maintenance. The psychological aspect of patients losing teeth cannot be underestimated and this has been well documented.⁸

Crum and Rooney compared the bone loss between conventional complete dentures and overdentures and concluded that the bone loss was reduced by 8 times in patients rehabilitated with overdentures retained by mandibular canines.⁴

The most significant and critical decisions in successful rehabilitation with overdentures are patient selection, and establishment of a logical and clinically applicable treatment plan that is satisfactory to both the patient and dentist. The key to success of an overdenture is the selection of strategically located roots or teeth for retention. Therefore, careful selection of strategic abutment(s) significant and elective endodontics and periodontal therapy make them excellent abutments for an overdenture.⁸ The decision must first be made to retain the teeth as overdenture abutments and then the attachments should be planned.

Various techniques are available for replacement and restoration of the lost dentition using overdentures namely simple tooth modification and reduction, tooth reduction and cast coping, endodontic therapy with cast coping and endodontic therapy with some form of attachment system.²³

The patient attitude, motivation and cognition to the treatment should be assessed. Only those who understand the limitations and benefits of attachments should be treated with attachment retained overdentures. Hence, patient selection is critical to the success of the treatment.⁸

The Abutment teeth are classified either as studs, which connect the prosthesis to the individual tooth, or as bars which connect the prosthesis to the splinted abutment teeth. They are further classified as rigid or resilient. However, since edentulous ridges and the remaining roots are often compromised, the prosthesis that relies on resilient attachments is better able

to divert occlusal forces away from weak abutment teeth.^{5,25}

It has been evident in literature,²⁶⁻³⁰ that tooth supported overdentures are retained by stud attachments. There is scarce data available in context of bar/clip attachment.^{31,32} The use of bar and O-ring attachment is very rare for the tooth-supported overdentures. However, they are indicated in implant-supported overdentures.⁸

In this clinical case, Stud type Preci-Clix attachment system was selected. Preci-Clix attachments consist of male stud part that usually is a post extending into the endodontically treated tooth. Fixation is achieved with the help of female component in the form of ring placed on the intaglio surface of the denture. The prime reason for selection of this type of attachment is its simplicity, ability to rotate in all directions and single visit application of the attachment.

It is **concluded** that the bone loss of the alveolar process after tooth extraction occurs with great individual variation, impossible to predict at the time of extraction. The simplest way to prevent the bone loss is to avoid extraction of all teeth. To keep a few teeth for a tooth or root-supported Overdenture has shown to substantially reduce the bone loss. Overdenture treatment has become popular mode of rehabilitation in the modern dentistry. Its usage is limitless, however, failures occurring in this therapy are only due to the poor case selection and inadequate post-insertion maintenance. As more is learned about these techniques, better prognosis and success rates are assured.

Authors' Contribution

SP: manuscript writing. DM: Execution of clinical and laboratory procedures. Nm: Assistance in laboratory procedures. AB: Assistance in literature search. SS: assistance in manuscript writing and editing. NY: proof-reading and editing of the manuscript.

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