

Implant Supported & Tooth Supported Overdenture - An Approach Towards Preventive Prosthodontics

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Abstract : Preventive Prosthodontics emphasizes the importance of any procedure that can delay or eliminate the future Prosthodontic problems. The overdenture is a logical method for the Dentist to use in preventive Prosthodontics. This article presents a case report of fabrication of overdenture using access post system and implant. The advantage of the overdenture post system lies in its patented, thick walled hollow tube design, stabilizing flanges, and undercuts of the shank which offers strength, retention due to nylon caps, and stability for the prosthesis. The mandible is well suitable for implants particularly in the inter canine region because of the superior bone quality. It gives better retention and stability to mandibular denture

Keywords: Access post, Implant, Nylon cap, Overdenture, Stability

I. Introduction

Nearly one-third of people who are older than 65 years of age are fully edentulous, and they require replacement of missing teeth. Even though, the conventional denture may meet the needs of many patients, some require more retention, stability, function and esthetics. The overdenture is a complete or partial denture prosthesis which is constructed over an existing teeth or a root structure or over an implant. Today, with the stress on preventive measures in prosthodontics, the use of overdentures have increased. Bone volume and vertical height is maintained by an overdenture which produces increased retention and stability of the prosthesis. It also gives patient better function and control because of presence of nerve receptors in the root¹. The access post restoration provides a substructure on which a final restoration can be attached. The prefabricated post has an ability to resist masticatory forces and achieve maximum amount of retention by distributing functional stresses evenly². Access post kit³ consists of primary reamer, a countersink drill, access posts and nylon caps. Features of access post are ball and socket type of attachment which allows rotation of the denture attachment. It is thick-walled, and has a hollow tube design which provides strength of solid shank post^{4,7}, it vents hydrostatic pressure of cementation, and offers ability to remove post without surgically widening the canal³, it also guides retreatment drills for safe post removal and access to the apex.

Various attachment systems are used with implant like "O" Ring or Ball attachment, Magnetic attachments, Bar attachments, Locator attachments etc.¹² Of these ball attachments are found to be reliable.^{13,14} The ball attachment consists of a spherical matrix that is screwed into the implant assembly. The matrix fits over the matrix and provides retention by means of an interchangeable elastic ring.

II. Case Report

A 55-year-old male patient reported to the Dental College, with the chief complaint of inability to chew and impaired speech due to missing teeth in upper & lower arch. Clinical examination showed partially edentulous maxillary arch (Figure 1) and completely edentulous mandibular arch (Figure 2). The periodontal findings were moderate amount of deposits and stains with gingival inflammation. The teeth present in the upper arch were 13 and 23 (Figure 1). The patient had a history of tooth loss as a result of decay and mobility. It was concluded that both 13 and 23 had adequate periodontal support and can serve as abutments for an accesspost overdenture. A treatment protocol was planned which involved oral prophylaxis followed by endodontic treatment of both 13 and 23 and final prosthetic phase included access post retained overdenture in upper arch and implant supported overdenture in mandibular arch. Radiographic examination of the patient indicated dense compact bone in the mandibular anterior region without any pathology. The blood reports of the patient were checked to rule out any pathology. The treatment plan was explained to the patient and an informed consent was obtained from the patient.

2.1 Treatment procedure

2.1.1 Denture fabrication

Initially the tooth was reduced to about 1mm above gingival margin (Figure 3). Primary impression was made with alginate and a custom tray was fabricated. Border molding was done with greenstick compound (DPI PINNACLE). Secondary impressions were made with zinc oxide eugenol impression paste. Jaw relations were recorded and teeth arrangement was done. The trial denture was then tried in the mouth,(Figure 4) vertical dimensions verified, centric contacts were evaluated. The facial and functional harmony were studied and patient's approval obtained. The dentures were then waxed and flaked for processing. After acrylization & deflasking , selective grinding was done. Finally, the dentures were finished and polished.

2.1.2 Post space preparation

Post length was measured against undistorted intra oral peri-apical radiograph, leaving around 3-5mm of gutta percha. Gutta percha was then removed with Peeso reamer. Primary reamer was then used to prepare a full length of post. Countersink drill was used to create flange & second tier preparations. The access post seats directly on the tooth surface based on the tiers prepared. Trial insertion of access posts were done to determine their fit. To adjust post length, apical end was cut to ensure full seating of flange and second tier.

2.1.3 Post cementation

Post was coated with resin cement (Rely X U200) and placed in canal till the flange & secondary tiers were fully seated(Figure 5). Excess cement was removed.

2.1.4 Incorporation of Nylon caps in denture

Rubber bands were placed to cover the height of contour of the ball of post (Figure 6). Female caps (nylon housings) were placed on the post over the rubber band(Figure 7). Denture was seated and marking of housings were transferred onto the denture tissue surface. Now the denture was reduced in order to provide space for housing. It was ensured that the patient had the same vertical dimension of occlusion as earlier. Self cure was applied on to the denture(Figure 8) and denture was inserted back and the nylon cap was picked up in the denture(Figure 9). Now the rubber bands were removed and flash was trimmed off. The denture was adjusted and equilibrated and the patient was instructed to wear the denture(Figure 10). Post insertion instructions were given along with a recall appointment. The following day, the mouth was observed for any sore areas and final occlusal adjustments were made. The designed prosthesis served as an esthetic and functional solution in the management of this patient.

2.1.5 Implant Surgery

Mandibular complete denture was duplicated with clear acrylic to form the radiographic stent. Gutta-percha markers were placed in stent at proposed implantation site. With the help of surgical stent the implant sites were marked in patient mouth. Two implants of size 3.75 × 13 mm (ADIN implant system) were placed in mandible (Figure 11) between mental foramen, sequential drilling to prepare implant site and maintaining sterile surgical protocol. The mandibular denture was relieved from the area where the implants were placed so that it could be seated passively. After 3 months of implant placement, the ball attachment (Figure 12) was placed on the implant. After which, nylon caps were incorporated to the denture (Figure 13,14) in the same way as that of the access post. After finishing and polishing of denture containing the nylon caps, occlusal equilibration was done intraorally(Figure 15, 16)

III. Discussion

Preventive prosthodontics emphasizes the importance of any procedure that can delay or eliminate future problems. Crum⁸ stated that retaining tooth preserves the edentulous ridge and stated that only a 0.6 mm of ridge reduction is found in the patients with overdentures compared to 5mm loss in complete dentures patients. Van Waas⁹ compared complete denture with overdenture and stated that there was a reduction of bone in canine area by 0.9mm in overdenture and 1.8mm in complete denture and in the molar area 0.7mm in overdenture group and 1.9mm in complete denture group. Rissin¹⁰ had done a clinical comparison of masticatory performance and electromyographic activity of patients with complete dentures, overdentures and natural teeth and concluded that overdenture patients had a chewing efficiency one-third higher than that of complete denture wearers.

Access posts are stud attachments that work well with overdentures, as they are the simplest of all. They occupy a small vertical space and the male units on the different roots do not require parallelism. The ball and socket attachment of accesspost allows rotation of the denture attachment. Small head of the attachment limits the amount of material that has to be removed from the denture. The nylon cap provides 3–5 pounds of retention. The technical work required is minimal and can be carried out at chairside making it cost effective¹¹.

Van Steenberghe, proposed placement of only two implants in the edentulous mandible.¹⁵ In a study done by Li Chen, the patients with implant-supported overdentures and toothsupported overdentures showed higher comparative masticatory efficiency than those restored with conventional complete dentures. A photoelastic analysis done by Kenney and Richards indicated that the ball/O-ring attachment transferred less stress to the implants. It appears that the O-ring provide retention against dislodging forces toward occlusal surface, allowing the overdenture to rotate around the ball connected to the implant body. As rotation occurred, stress was transferred to the posterior edentulous area providing optimal broad stress distribution to the ridge and minimal stress to the implants. Thus, the mandibular overdenture retained by implants in the interforaminal region appears to maintain bone in anterior mandible and appeared to improve retention, stability and chewing ability

Figures



Figure 1. Maxillary arch with 13 & 23



Figure 2. Mandibular Edentulous arch



Figure 3. Tooth reduced to 1mm above gingival level



Figure 4. Try -In of Complete Denture



Figure 5. Post luted with Resin cement



Figure 6. Rubber bands placed over Height of contour



Figure 7. Nylon housing over the rubber band



Figure 8. Self cure added to denture



Figure 9 . Nylon housing picked up in denture



Figure 10. Denture adjusted and equilibrated



Figure 11. Implants drilled into position



Figure 12. Ball attachments placed on the implants



Figure 13. Nylon caps placed over ball attachment



Figure 14. Nylon caps incorporated into denture



Figure 15. Maxillary and mandibular overdenture in occlusion



Figure 16. Post operative picture

IV. Conclusion

The overdentures delay the process of resorption of denture foundation and thereby contributes towards the concept of Preventive Prosthodontics. The access post retained dentures helps to achieve the primary goals of an overdenture by providing necessary strength, retention and stability a restoration requires. The mandibular overdenture retained by implants maintain bone and improves retention, stability and chewing ability, it also improves the oral health related quality of the edentulous subject. Careful case selection and abutment preparation as well as periodic recall are the key to successful overdenture rehabilitation.

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