Case Report

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FUNCTIONAL REHABILITATION OF A PATIENT USING O-RING ATTACHMENT AND MANDIBULAR OVERDENTURE: A CASE REPORT

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ABSTRACT:

The standard protocol of treatment for the edentulous patient is fabrication of conventional maxillary and mandibular complete dentures. However, retention of the mandibular denture, especially in cases of resorbed ridges is a cause of major concern in this form of treatment. Use of implant supported overdentures in completely edentulous patients helps to improve the retention of the denture and as well as patient satisfaction. This article presents a clinical report of a completely edentulous patient treated using implant retained overdentures and O-ring attachments.

Key words: implants, o-rings, overdenture, rehabilitation.

INTRODUCTION:

Treatment of edentulous patients using conventional removable complete denture is a common procedure. Yet at times it can be a difficult and challenging intervention due to its inherent disadvantages like denture retention, stability and early bone loss. This is especially true in cases of mandibular dentures. This in turn can lead to ill-fitting dentures, pain on mastication and constant patient anxiety about esthetics and denture dislodgement. In severe cases, the patient may avoid social gatherings completely in fear of embarrassment of denture loosening or dislodgement. [1-4]

Implant-supported overdentures (ISOD) offer better stability, retention and chewing efficiency in denture wearers. Patients also report greater satisfaction with regard to aesthetics because the dentures are not visibly moving in function. Implants also reduce further bone resorption and the long-term success rate of implants in the lower mandible is found to be at least 95% with fewer complications. [2, 4-5]

In the year 2002, the The McGill consensus statement on overdentures was published following a symposium

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held at McGill University in Montreal, Canada. It stated that: 'The evidence currently available suggests that the restoration of the edentulous mandible with a conventional denture is no longer the most appropriate first choice prosthodontic treatment. There is now overwhelming evidence that a two-implant overdenture should become the first choice of treatment for the edentulous mandible' The York statement concluded that 'a substantial body of evidence is now available demonstrating that patients' satisfaction and quality of life with ISOD mandibular overdentures is significantly greater than for conventional dentures. Much of this data comes from randomised controlled trials'. [2,4-7]

Although a two-implant retained overdenture is not the gold standard for ISOD fabrication, it is the minimum number that will be sufficient for optimum patient satisfaction keeping in mind prosthesis performance, cost and time. [5]

Attachments used in implant overdenture therapy function in a manner similar to attachments on natural tooth retained overdentures. They help redirect the occlusal forces and evenly distribute the stresses. They also help to provide additional retention. [6, 7]

Overdenture attachments for implant retained prosthesis may be classified as stud/ball – type or bar – type attachments. [8]

The current article describes the use of a ball type attachment with O-ring to retain an implant supported mandibular denture.

CASE DETAIL:

A 60 year old male patient reported to the Department of Prosthodontics with the chief complaint of loss of upper and lower teeth because of which he had difficulty in speech and eating. A thorough history revealed that the patient had gotten his teeth extracted two months ago due to caries and periodontal disease. As his work was such that he need to constantly interact with clients, his only expectation with the new prosthesis was that 'the new denture should fit well' such that he could speak comfortably and have no difficulty while eating.

Intra-oral examination revealed that the ridges were well rounded, with no retained root pieces or bony spicules (Figure 1). Both ridges appeared favorable for complete denture construction.

The patient was explained the various treatment options like conventional complete denture for both upper and lower arches; complete dentures retained on 2/4 implants with attachments or implant retained fixed prosthesis using 6/8 implants for both arches.

The patient opted for the implant retained complete denture option. It was decided that maxillary and mandibular complete dentures will be fabricated with only the mandibular ridge initially being restored with implants and the maxillary ridge restored with implants at a later date. The above decision was solely based on the patient's inability to pay the entire bulk

amount for implant treatment in the maxillary and mandibular arches.

Maxillary and mandibular diagnostic casts were made. These were then articulated to check for interarch space which appeared to be adequate. A panoramic radiograph was taken and bone mapping was done to check for the bone quality and quantity. The blood reports of the patient were checked to rule out any pathology.

Clinical procedure:

Before the treatment was started, the procedure was explained to the patient and a written consent was obtained.

It was decided that first conventional complete dentures for both arches will be fabricated following which implant placement will be done.

Primary impressions were made, cast was poured and custom tray was fabricated. Border molding and secondary impressions were made and the master cast was obtained.

Following jaw relations, teeth arrangement and try-in was done. After the patient approved of the try-in denture, the denture was processed (Figure 2).

At the time of insertion, the denture was checked for function, occlusion and esthetics. Following this, the mandibular denture was duplicated in clear acrylic and a template was fabricated (Figure 3).

Two lead balls of diameter 3mm were embedded into the template in the regions of implant placement and the patient was asked to get a CT scan done with this radiographic template in place (Figure 4).

The scan revealed a bone width of 6.92 mm on the right side and 6.70 mm on the left side. The available length of bone was 25.27mm on the right side and 25.13 mm on the left side. Hence, it was decided to use a tapered self threaded implant of size 3.75mm x 10mm for the surgery. A two stage surgery was planned.

Surgical procedure:

Five days prior to the surgery, the patient was put on antibiotics coverage. He was asked to continue the antibiotic until three days post surgery.

The lead balls were removed from the radiographic stent and it was used as a surgical stent (Figure 5).

Mental nerve block was given and a mid-crestal incision was made. The stent was placed in the mouth. Two implants were placed in the predetermined regions following surgical bed preparation and sequential drillings while constantly maintaining a sterile surgical protocol. Continuous matrix sutures were placed and the surgical site was closed. The patient was asked to get a panoramic radiograph following surgery to check the position of the implants (Figure 6).

The mandibular denture was relieved and relined with a soft liner in the area of implant placement and the patient was instructed not to use the denture during the initial two week healing period.

The second stage surgery was done four months following the placement of implants. Local anesthetic was injected and a punch incision was made in the region of implant placement. The overdenture stud attachments were fixed into place and torqued to 25 Newtons.

Prosthetic Phase:

Brass O-rings/ keeper elements were placed over the ball attachments (Figure 7). The mandibular denture was prepared and checked in the patient's mouth and relieved in the canine regions on both sides to accommodate for the O-ring attachments. The prosthesis was checked for passive fit. The neck of the O-ring attachment / undercut area was blocked out. The retentive elements for the implant abutment were housed directly into the fitting surface of the denture using autopolymerizing acrylic resin (DPI cold cure acrylic resin).

Once the denture was relieved, petroleum jelly was applied onto the patient's mucosa, autopolymerizing resin mix was applied on the intaglio surface of the mandibular denture and both the maxillary and mandibular dentures were seated in the patient's mouth. The patient was asked to close in function with the resilient bands and O-rings placed over the stud attachments. The denture was removed from the patient's mouth just before the final set of the material and the excess was trimmed out after which the denture was replaced back in the mouth and the material was allowed to set completely. Finishing and polishing of the mandibular denture was done and it was checked for a passive fit with no rocking movement in the patient's mouth (Figure 8). The denture was re-seated and occlusal equilibration was done (Figure 9).

Homecare instructions were given to the patient regarding denture care. The patient was asked to remove and re-insert the denture a few times in the clinic itself before he was sent home.

The new prosthesis appeared to have better retention and chewing efficiency in comparison to the older denture. The patient was satisfied with his new prosthesis.

DISCUSSION:

The mandibular implant supported overdenture has gained considerable acceptance in the past few years. It has effectively replaced the tooth borne overdenture prosthesis mainly because of its superior clinical outcomes. Its relative simplicity, minimal invasiveness, predictability, efficacy and affordability (in comparison with other more complex implant Prosthodontic treatment options) make it an especially attractive treatment option. [3]

However, despite its broad acceptance, the mandibular implant-retained overdenture has been investigated only with longitudinal studies since 1987. Van Steenberghe et al were among the first authors to propose placement of only 2 implants in the edentulous mandible. Naert I et al in 1998 compared the clinical outcomes of different overdenture anchorage systems and found a 100%

implant success after 5 yrs for all groups. [5-7]

In this article a conventional complete mandibular denture was converted into an implant supported overdenture. The advantage and functioning of overdentures retained by implants is almost similar to that of tooth retained overdentures: improved patient self – esteem, better masticatory efficiency, better speech control and soft and hard tissue preservation.[8]

Although dental caries, periodontal disease and tooth related restorative issues are not of concern when implants are used, thorough treatment plan is a very important step in implant treatment. A patient planned for implant procedure needs to be examined clinically and radiographically and needs to be in good overall health. The quality of bone should be favorable and there should be sufficient bone volume and height to accommodate the implants. Also, adequate interarch space should be present as nearly all implant overdentures use an attachment mechanism between the implant and denture base. Generally a vertical height of 5-6mm is necessary to accommodate the implant attachment mechanism. [1,8-9]

The number of implants necessary for an overdenture treatment remains controversial. Two dental implants are usually considered the minimal number required for mandibular implant overdenture treatment. A main disadvantage of placing only two implants anteriorly is that the prosthesis may function more akin to a bilateral distal extension removable partial denture rather than a complete denture, i.e the anteriorly located implants provide prosthesis support, retention and stability in a fashion similar to that occurring with anterior natural teeth and RPD treatment. This may create a situation similar to combination syndrome. This concept remains controversial, however, it is speculated that with posterior alveolar ridge resorption, the implants function similar to anterior teeth transferring inappropriately high occlusal forces into the anterior maxilla thus leading to tissue inflammation and anterior maxillary bone resorption. However, some studies have described that when the posterior prosthesis support is adequately maintained, the implants may provide a stabilizing influence on the mandibular prosthesis, providing a more stable occlusion and promoting improved tissue health. [10-11]

In overdenture prosthesis, both mucosa and implants play a role in support, retention and stability of the prosthesis. As the number of implants increase, the responsibility of these functions shifts from mucosa to implants. [11-12]

Different types of attachments are used in implant retained overdentures like ball/stud attachments, bar attachments and magnetic attachments. David R Burns in 1995 compared the retention, stability and tissue response between conventional complete dentures and implant retained dentures with O-ring and magnetic attachment. It was concluded

that implant overdentures were significantly superior in function when compared to conventional dentures. It was also found that the retention and stability of the denture retained with O-ring attachment was significantly better than magnetic attachment. In the present case the stud attachment was used solely based on the lower cost factor. [2,9,12]

The connection between the retentive element and the denture can be achieved by either direct or indirect technique. In the indirect technique, the soft tissue support as well as the position of the implants has to be transferred to the cast so that the pick-up of the attachments can be done in the laboratory. Although this technique has the advantage of reduced chair side time, there is always the possibility of error while recording and transferring the implants with the analogs. On the other hand, using the direct technique to transfer the attachments to the denture base, as in this case is simpler, quick and allows the patient to retain their prosthesis. The direct technique described in this article is less technique sensitive and less time consuming. [9, 13]

Usually, the time needed for implant integration varies depending on the surgical protocol followed. In this report a time span of four months was given for the implant to integrate before the prosthetic intervention was carried out. This is in accordance to the guidelines proposed for a conventional surgical protocol. An implant supported overdenture treatment may have a few complications although initial clinical success is observed. These may include breakage of retentive clips associated with the bar attachment, peri-implant mucosal problems, and implant screw and acrylic resin component fractures. [11-13]

CONCLUSION:

Treatment of the edentulous patient using overdentures is not a new concept and mandibular complete overdenture treatment has been available for decades. However, recently it has been gaining widespread popularity. This form of treatment helps improve the quality of life in the edentulous patient and aids in greater patient satisfaction.

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FIGURES:

FIGURE 1 - Intra oral view of patient pre – treatment

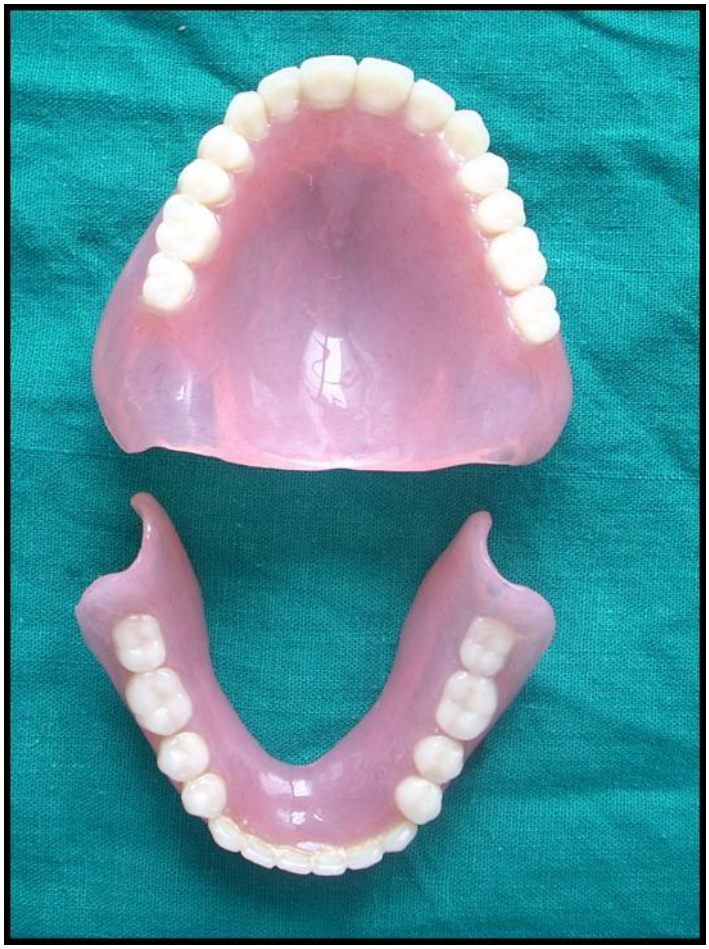

FIGURE 2 - Conventional maxillary and mandibular complete dentures

FIGURE 3 - Radiographic stent

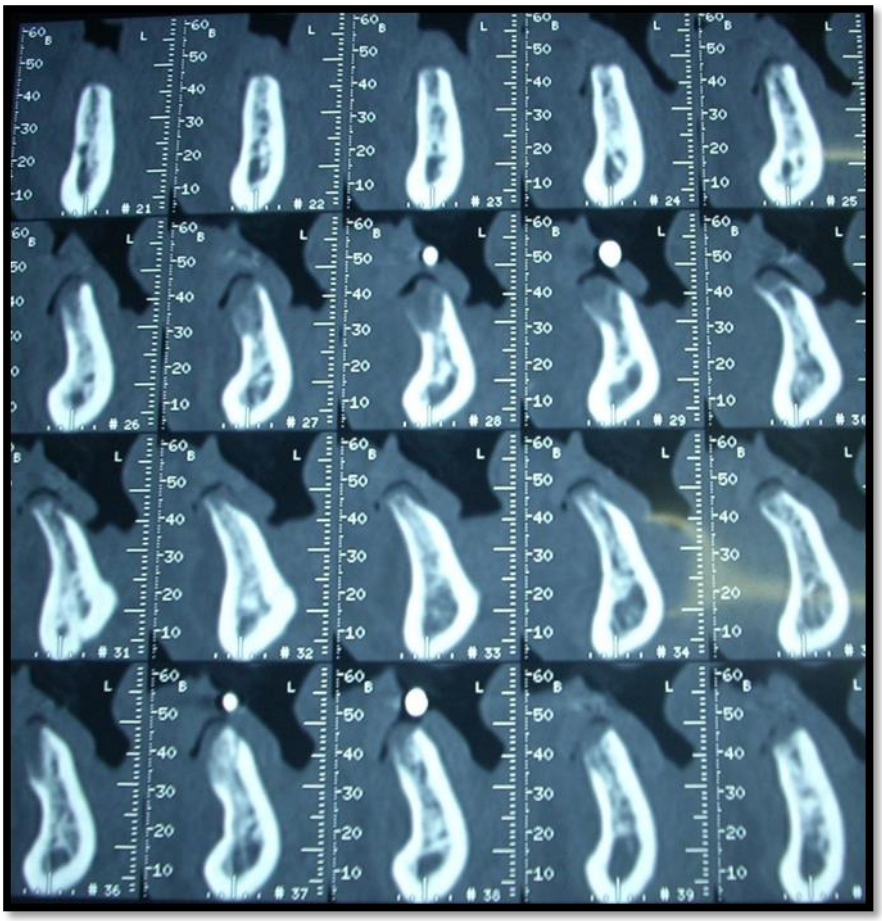

FIGURE 4 - CT scan with radiographic stent in place

FIGURE 5 - Surgical stent in place

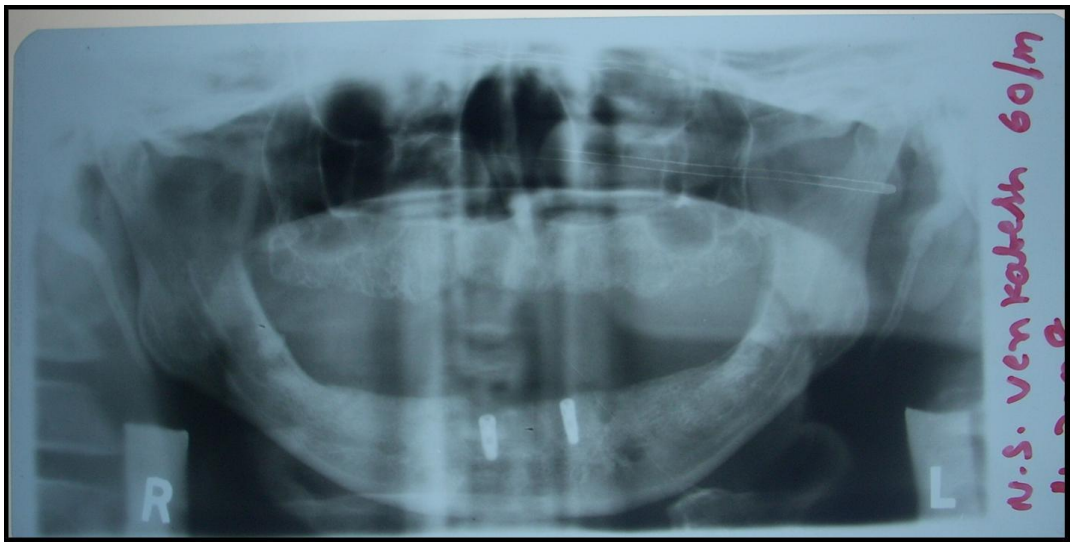

FIGURE 6 - Post operative OPG

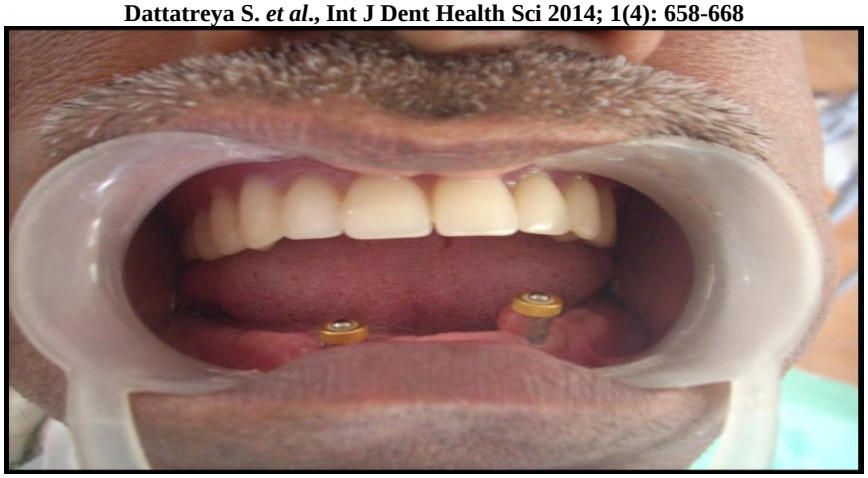

FIGURE 7 - Brass O-rings placed over the stud attachments

FIGURE 8 - Mandibular denture with O – rings in place

FIGURE 9 - Intra oral Post – operative view