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Implant Supported Overdenture: A Satisfactory Treatment Modality

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Abstract :
Statement of Problem: *Complete denture rehabilitation restore a patient's appearance and perceived social role. Conventional complete maxillary and mandibular dentures have been used as a treatment option for edentulous patients for longer than a century. Suitable maxillary complete dentures are usually well tolerated, but many patients experience problems with their mandibular dentures, especially because continued alveolar bone loss leads to lack of retention and stability, together with a reduced chewing efficiency. Previous studies have shown that a mandibular implant supported overdenture is superior to the conventional denture in terms of retention, stability, chewing efficiency and comfort. Therefore, due consideration should be given to implant supported mandibular overdenture while treating the edentulous patients. This article presents a case report where edentulous patient was rehabilitated with 2 implant supported mandibular overdenture with ball attachments. The fixtures were incorporated using indirect technique.*
Results: *The patient was satisfied with the prosthesis in terms of retention, stability, function, comfort and esthetics.*
Conclusion: *Edentulous patient may experience a wide range of denture problems, including functional complaints related to the mandibular denture. Implant overdenture treatment (IOT) is generally considered to be an effective treatment modality in these cases.*
Keywords: *Edentulism, Implant supported overdenture, Retention, Stability, Ball attachment.*

I. Introduction

The success of conventional complete denture treatment is variable and depends on the patient showing sufficient adaptive capacity to overcome the many limitations of complete dentures by process of habituation [1–4].A number of factors contribute to wearer satisfaction with prostheses, including the ease with which they chew or speak, appearance of the prostheses, and pain or discomfort [5, 6].

Conventional dentures rely on the form of remaining bony ridge for retention and support, but even when the dentures are judged to be excellent, many edentulous patients cannot eat certain foods or speak clearly because of lack of denture retention and the practice of food avoidance, particularly those that are hard or tough is a well described impairment [7, 8].

Previous randomized clinical trials (RCT) have shown that mandibular two-implant overdentures provide significant improvement in stability, retention [9-12] and oral health–related quality of life [13].

Patient responses to mandibular implant overdentures have been reported in a randomized clinical trial comparing the efficacy of these overdentures and conventional dentures in diabetic patients. It was reported that the overdentures provided better masticatory function than conventional complete dentures, and there was improved general satisfaction [14]. Edentulous patients who received mandibular implant overdentures opposing a conventional denture rated their general satisfaction approximately 36% higher than did a comparable group provided with new conventional dentures [15].

It has been observed that patient satisfaction with the simplest form of support, a two-ball attachment system, is not significantly different from that provided by two or four implants with interconnecting bars. This suggests a less expensive, simpler treatment approach within the reach of the general population of denture wearers [10].

Individual implants with ball attachments have had the same favourable clinical results in the mandible as rigidly splinted implants [16]. In comparison to the bar/clip attachment overdenture, ball attachments may be less costly, less technique sensitive, less dependent on implant position, easier to clean and to replace, easier to adjust and to control the amount of retention, may require less inter-arch space, and are better able to distribute functional forces [17].

Ball attachments provide an adequate system with respect to reducing the stress on the implant and promoting denture stability [18].

It has been suggested that mandibular two-implant overdentures combined with maxillary conventional dentures provide better function and oral health–related quality of life than conventional dentures [19].

II. Case Report

Case 1: An 80 year old male patient reported to the Postgraduate Department of Prosthodontics, with the chief complaint of missing teeth and want replacement. He had previous denture but has complaints for loose mandibular denture and wanted a stable and well fitted lower denture. He has the history of teeth extraction 22 years back. On intraoral examination and Orthopantomogram (OPG) evaluation; smooth, rounded, well-formed maxillary ridge and resorbed mandibular ridge was observed. Patient was evaluated for implant placement on mandibular arch, 13 mm of total height and 6.5 mm of width was available which was adequate for implant placement (Fig. 1, 2).

The treatment options given to the patient were:

1. A set of new conventional complete denture prosthesis
2. Implant supported mandibular overdenture and maxillary conventional complete denture prosthesis.
3. Implant supported mandibular fixed denture and maxillary conventional complete denture prosthesis.

Looking to the age and financial constrain patient opted for Implant supported mandibular overdenture and maxillary conventional complete denture prosthesis.

A two stage surgery was planned for implant placement.

Implants of diameter 3.75 × 11.5 mm and 4.2 mm x 10 mm (Adin, Dental Implant Systems Limited, Israel) were placed at 33 and 43 positions respectively in the mandibular arch.

After a week of stage I surgery, previous mandibular denture was relined and implants were allowed to osseointegrate for three months.

After 3 months of healing, gingival formers were placed to create proper gingival collar for 15 days (Fig. 3).

Preliminary impressions of maxillary and mandibular ridge were made using impression compound (Fig. 4). For Maxillary arch border molding was done with green stick and final impression was made using zinc oxide eugenol impression paste.

Mandibular final impression was made using open tray technique (Fig. 5). Impression copings were placed and impression was made (Fig. 6, 7). Impression copings were retrieved along with the impression (Fig. 8). Implant analogue attached to the impression copings and cast was poured after placing gingival mask around the implant analogue (Fig. 9).

Indirect technique was used for placement of ball cap with O ring in the denture. For this prior to the fabrication of record base and bite rims, ball abutments were screwed to the implant analogues (Fig. 10) and ball cap with O ring were placed (Fig. 11).

Tentative jaw relations and facebow transfer was then done and teeth setting was done on the articulator. The trial dentures were then waxed up and tried in patient's mouth (Fig. 12).

On the master cast the periphery of the ball cap was sealed using silicone putty to prevent flow of acrylic between the ball abutment and ball cap at the time of processing using heat cure acrylic resin (DPI). Denture was retrieved with the housing assembly (Fig. 13).

The ball abutments were screwed on implants and the complete seating of the abutments was verified with the help of OPG (Fig. 14).

After finishing and polishing, the denture was inserted in patient's mouth (Fig.15).

The patient was satisfied with the esthetic result and was comfortable with the retention and stability of the denture.

III. Discussion

Bone loss under complete dentures continues with the mandible experiencing a fourfold greater vertical bone loss than the maxilla. Studies show implant-supported overdentures have superior retention to conventional dentures [20, 21]. Regardless of the type of attachment system used - bar, ball or magnet; patients are significantly more satisfied with implant-supported overdentures than with conventional dentures as they are more stable and rate their ability to chew a wider variety of foods as significantly easier, thus improving their nutritional state. Furthermore, they find implant-supported overdentures more comfortable and speech is easier.

The mandibular overdenture retained by implants in the inter- foraminal region appears to maintain bone in the anterior mandible. When 2 implants are used in the anterior mandible to retain an overdenture, ball attachments appear to be less costly, less technique sensitive, and more accommodating of tapered arches. Controversy persists as to whether the ball or bar design requires more maintenance [22]. The ball/O-ring attachment overdenture exhibited less stress on the implant bodies than the bar-clip attachment when the model was subjected to a posterior, vertical load [23].

There are various techniques for incorporating these attachments to the overdenture. Broadly, they can be classified as direct techniques (performed by the clinician intraorally) or indirect techniques (performed in the laboratory). The direct technique involves use of autopolymerizing resin which may result in porosity and staining of the overdenture prosthesis over time and a potential for debonding of the attachment from the denture. The residual monomer from autopolymerizing resin may irritate the surrounding tissue. The indirect technique offers the advantage of reduced chairside time and overcomes the disadvantages of autopolymerizing resin that is used in direct technique. However, disadvantage is the need for an additional laboratory step, resulting in increased treatment time [24].

There appears to be no statistical difference when long-term maintenance is compared among mandibular implant overdentures retained by 2 implants in contrast to those retained by 3 or more implants. Mandibular implant overdentures appear to show higher patient satisfaction scores than complete dentures, even with patients who have undergone pre-prosthetic surgery. Patients appear to be similarly satisfied with a fixed implant complete denture or a removable implant overdenture on the mandible. Patients who rate stability more important than hygiene tends to choose a fixed prosthesis. When the anchorage system or number of implants is varied, there may be no significant differences in satisfaction with moderately resorbed edentulous patients restored with mandibular implant overdentures [22].

IV. Figures

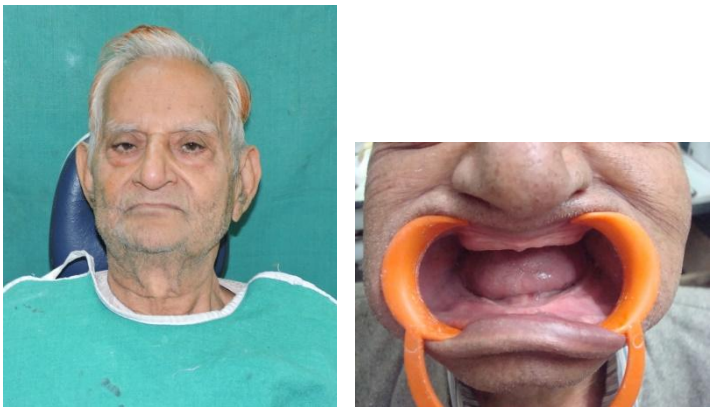

Fig. 1 Pre-op photograph

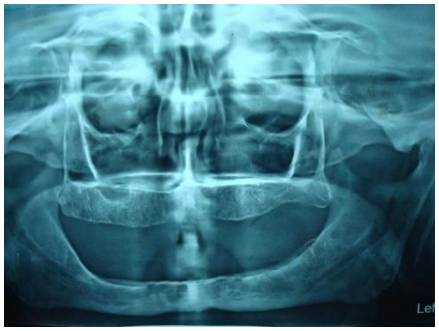

Fig. 2 Pre- op Orthopantogram showing severely resorbed mandibular alveolar ridge

Fig. 3 Well-formed gingival collar to receive ball abutments

Fig. 4 Preliminary impressions of maxillary and mandibular ridge

Fig.5 Mandibular custom tray for open tray impression technique

Fig. 6 Impression copings in situ

Fig. 7 Mandibular final impression made using open tray technique

Fig. 8 Implant level impression using open tray technique showing impression copings

Fig. 9 Implant analogue placed

Fig. 10 Ball abutments screwed to the implant analogues for indirect technique

Fig. 11 Ball cap with O ring

Fig. 12 Try in

Fig. 13 Finished mandibular denture with housing assembly

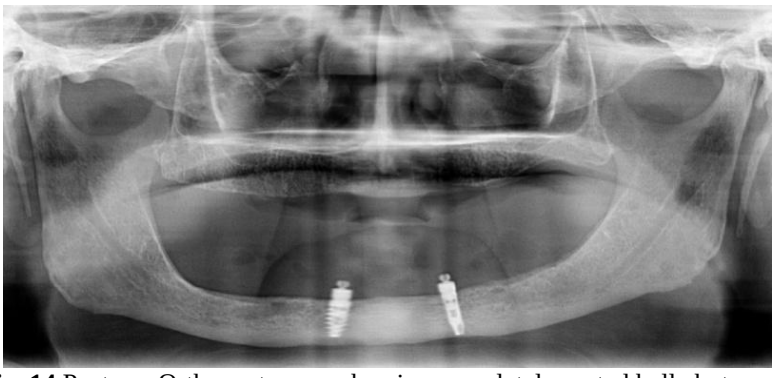

Fig. 14 Post- op Orthopantograms howing completely seated ball abutments

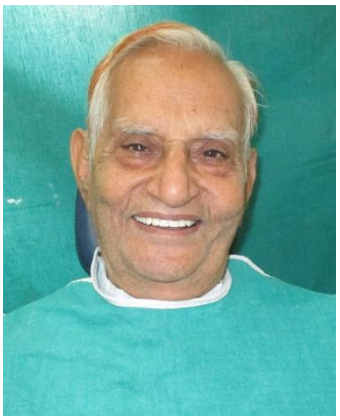

Fig. 15 Rehabilitated patient

V. Conclusion

Severe loss of alveolar bone often presents a challenge in fabrication of prosthesis. Implant supported mandibular overdentures are more retentive, stable and efficient in mastication as presented in this clinical report.The fabrication procedure is easy. Therefore, the two implant supported overdenture may be considered as the first treatment option for mandibular edentulous patients.

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