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Clinical Insights Into Restoring Function And Aesthetics With Implant- Supported Mandibular Overdentures

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Abstract

Conventional complete dentures are the treatment of choice for completely edentulous patients catering to functional and aesthetic needs of patients. Though cost- effectiveness and patient's acceptability of the dentures are very high, but most of the patients report problems pertaining to their lower denture due to lack of comfort, retention, stability and inability to masticate. Implant-supported prosthesis have been a common treatment for edentulous patients for the past 20 years and predictably achieve good clinical results.

Implant supported prosthetic options include fixed as well as removable options, commonly known as overdentures. In spite of several advantages of a fixed full arch prosthesis, a stable implant-supported overdenture has more acceptance due to reduced clinical time and financial expense.

This case report portrays a conventional complete denture in the upper arch and an overdenture supported by two implants in the lower arch with mini-ball attachments.

Keywords: Implant supported overdenture, cost-effectiveness, ball abutments, attachments

Introduction

The goal of modern dentistry is to restore the patient to normal contour, function, comfort, esthetics, speech, and health. The increased need and use of implant supported prosthesis in the future result from the combined effect of several factors, including aging population living longer, tooth loss related to age, consequences of fixed prosthesis failure, anatomical consequences of edentulism, poor performance of conventional removable prostheses, consequences of removable partial dentures, predictable longterm results of implant-supported prostheses, increased public awareness and advantages of implant-supported restorations like decreased bone resorption, reduced prosthesis movement, better esthetics, improved tooth position, better occlusion, increased occlusal function and maintenance of the occlusal vertical dimension.[1]

A mandibular denture often moves when the mylohyoid and buccinator muscles contract during speech or mastication. Additionally, occlusion is difficult to establish and stabilize with a completely soft tissue–supported prosthesis because the mandibular prosthesis may move as much as 10 mm or more during function. But with implant supported prosthesis, the patient can more consistently return to

centric relation occlusion rather than adopt variable positions dictated by the prosthesis' instability. [2]

The number of implants needed for a mandibular overdenture (usually two to four implants) is lesser than that required for a fixed implant prosthesis. This is an advantage because the volume of bone is reduced. Numerous long-term studies have confirmed that implant-supported overdentures provide satisfactory results with only two mandibular implants.[3] Implants supporting the overdenture can be splinted with a bar or an implant connection can be attained with individual connectors: ball or stud attachments and magnets. Freestanding implants have distinct advantages over the splinted implants such as a reduced number of fabrication steps and lower treatment cost.

Another dilemma associated with overdenture treatment is the technique of incorporating the attachment matrices into the overdenture. Several possible approaches have been described in the dental literature. One approach includes incorporation of the matrices into the overdenture in the dental laboratory. The other approach is their pick-up intraorally in the clinic. This is an extremely important step and, if not performed correctly, can negatively influence overdenture fit or contribute to the dislodgement of the matrix from the overdenture. [4]

This case report describes a case of rehabilitation of a completely edentulous patient with a conventional upper denture and an implant supported overdenture in the mandible supported by 2 implants with mini-ball attachments.

Case Report

A 65year old female patient reported to the dental clinic with partially edentulous upper and lower jaw with the chief complaint of dissatisfaction of previously fabricated removable dentures with respect to its esthetics and functionality specially with the lower denture. Clinical evaluation showed multiple carious teeth and root stumps present in both the arches with well- rounded edentulous areas in the upper arch. Orthopantomogram showed poor alveolar support of the remaining teeth and pneumatization of maxillary sinus resulting in reduced amount of bone in the upper arch and a considerable amount of bone in the lower arch [Figure 1,2,3]. The final treatment plan that was suggested taking into consideration her chief complaints, her financial restraints and her unwillingness of additional augmentation surgeries was to extract all the remaining teeth and place 2 intraosseous implants in the anterior mandible followed by fabrication of an implant supported overdenture supported by mini-ball abutments and a conventional complete denture for the upper arch.

Surgical PHASE

Extraction of all the teeth were done and after a waiting period of 3weeks, implant placement surgery was scheduled. The surgery was performed under local anesthesia with lignocaine and 1:100,000 adrenaline. A clear acrylic stent was fabricated beforehand over the diagnostic cast. The first premolar regions (B and D regions in the inter-foraminal area) were decided pre- operatively for implant placement which were prepared in the stent and the pilot drill was drilled through the stent marking the exact position in the mouth. A full thickness flap was reflected in the desired areas and alveoloplasty was done. The pilot drills were then drilled upto the desired lengths and guide pins were placed and the parallelism of the osteotomies were checked [Figure 4]. Subsequent drills were then used to enlarge the sites upto 4.3mm and then two implants (4.3x7mm size, Dentium NR Line series) were placed. The left 1st premolar region had also been grafted with sterile Bioresorbable Demineralized Bone Matrix (XENOGRAFT, Advanced Biotech Osseograft DMBM) buccally to compensate for a buccal defect present [Figure 5].

Cover screws were placed and the flap was sutured with continuous locking suture. All the implants' positions were then confirmed with the help of an orthopantomogram. Two months later, 2nd stage surgery was performed and the healing abutments were placed.

Prosthetic PHASE

3 weeks after the 2nd stage surgery, primary impression was made of the upper and lower arch. Border moulding and final impression was done on a custom tray with green stick and medium body addition silicone impression material respectively [Figure 6]. Jaw relation was done where the patient presented with a Class I inter arch relationship with a 10mm inter ridge distance in the premolar region. Teeth selection was done followed by teeth setting. A

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trial was done after which the dentures were fabricated with heat cured-acrylic in the laboratory.

The dentures were adjusted in the mouth. 2 mini-ball abutments of 3.5x1mm size (Dentium) were selected for the implants considering the gingival collar height. The healing abutments were removed and the ball abutments were placed. The corresponding areas of the ball abutments were trimmed in the intaglio surface of the lower denture for the clinical pick up of the female sockets. The female sockets with O-rings were placed on the abutments and were then picked up in the denture with cold-cure pink acrylic resin. The dentures were finished and polished and delivered to the patient. [Figure 7,8,9,10] A follow up was done after 48hours, 1month and 3months.

Discussion

The widespread occurrence of edentulism creates both physiologic and psychologic problems because the alveolar ridge of denture wearers is very susceptible to resorption. Consequently, reduced stability and retention of dentures lead to a compromised functional capacity, especially in the lower jaw. [5]

According to Johar AO, many difficulties are encountered when treating an edentulous arch with a fixed prosthesis. Factors including lack of lip support, problems with speech, patient's oral hygiene and excessive facial cantilevering should be considered as it may complicate the treatment with a fixed prosthesis. Another main element that must be identified during treatment planning is the space from crestal bone to the occlusal plane, as a minimum of 13 to

14 mm is needed when planning for an implant supported fixed prosthesis and bar overdentures. On the other hand, locator or ball attached overdentures necessitate at least 8.5 mm. Comparing ISOD with fixed detachable prosthesis in terms of esthetics, ease of cleaning, speech, and patient satisfaction, and all were in favour of ISOD. Additionally, decrease the number of implants, less complicated surgical and laboratory procedures were also advantages of ISOD. [6]

In this case report, 2 intraosseous implants were placed in the B and D regions of the lower arch after extraction of grossly carious teeth and root stumps. After a healing period of 2months, 2nd stage surgery was done and subsequently mini ball abutments were used for attachment which were picked up in the lower denture in a chairside procedure intraorally.

Johar AO also found out that the satisfaction level of the conventional complete denture in the treatment of an edentulous arch can be dramatically improved by adding dental implants and changing the design to an overdenture. He also concluded that two implants with overdenture to treat edentulous jaw is as effective as five implant fixed prosthesis but at a lower cost and reduced clinical time. [6]

Borges GA et al., in their systematic review and meta-analysis compared the patient-reported outcome measures (PROMs) and clinical outcomes associated with implant-supported overdentures and fixed prostheses in edentulous mandibles and concluded that fixed rehabilitations for mandibular edentulous patients seemed to be a well-accepted treatment from the patients' oral health perspective. However, mandibular overdentures are no less efficient than fixed prostheses in terms of clinical outcomes like comfort, ease of mastication, retention and stability.

Prosthetic maintenance and complications associated with different overdenture attachment systems are various such as matrix loosening, detachment of matrix, fracture of a denture, need for relining and rebasing, fracture of components such as bar fracture, crown fracture, etc. Furthermore, the retention provided by various overdenture attachment systems is varied. Sometimes prosthesis retention is too high may cause problems in insertion and removal of the prosthesis. Effect on peri-implant tissue conditions such as plaque and calculus deposition, gingivitis, probing depth, marginal bone loss are also noteworthy complications associated with different attachment systems. Patient satisfaction is an important consideration, which can be affected by prosthesis maintenance, stability and retention of the prosthesis, and the prosthesis's ability to function properly. These factors collectively decide the success of prostheses. [7]

Sutariya PV et al., in a systematic review aimed to compare different attachment systems used in mandibular implant supported overdentures by assessing outcomes such as prosthodontic maintenance and complication, peri implant tissue changes, retention, and patient satisfaction for optimum selection of attachment system. They found out that the ball attachment system is a favourable

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choice for limited inter arch space and parallel implant placement. [8]

Conclusion

In the case of the implant-retained overdenture, retention to the dental prosthesis is provided by the dental implants, and most of the support is gained from the coverage of the alveolar ridge. In contrast to the implant-supported alternatives, this treatment can be carried out with a minimal number of implants, and its fabrication is a relatively straightforward practice. Consequently, these characteristics explain the lower treatment cost associated with this design and its widespread acceptance. Also, the efficacy of this treatment has been validated by numerous clinical trials.

Figure Legends:

Figure 1: Pre-operative orthopantomogram

Figure 2: Pre-operative frontal view

Figure 3: Pre-operative extraoral frontal view

Figure 4: Guide pin placement verifying parallelism of the osteotomies

Figure 5: Grafting of the buccal defect

Figure 6: Border moulding and final impression of the upper and lower arches

Figure 7: Post-operative extraoral frontal view

Figure 8: Occlusal view of the lower arch with the mini ball abutments placed over the implants

Figure 9: Post-operative intraoral frontal view

Figure 10: Post-operative intraoral right and left lateral view

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Figures

Figure 1: Pre-operative orthopantomogram

Figure 2: Pre-operative frontal view

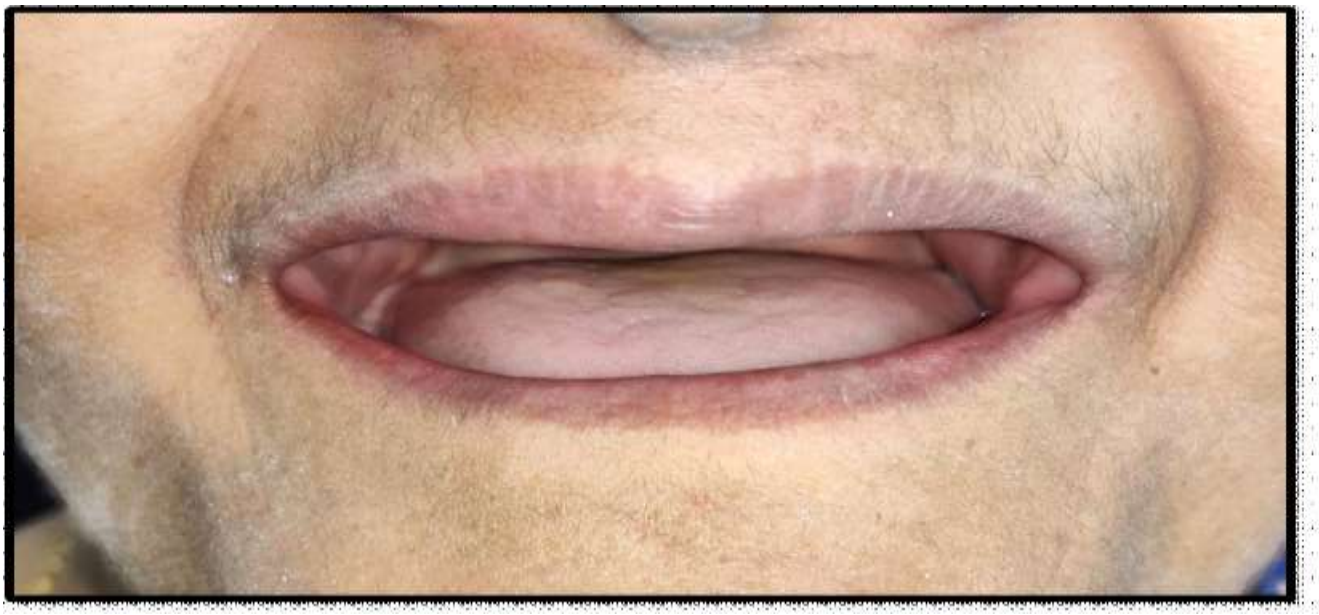

Figure 3: Pre-operative extraoral frontal view

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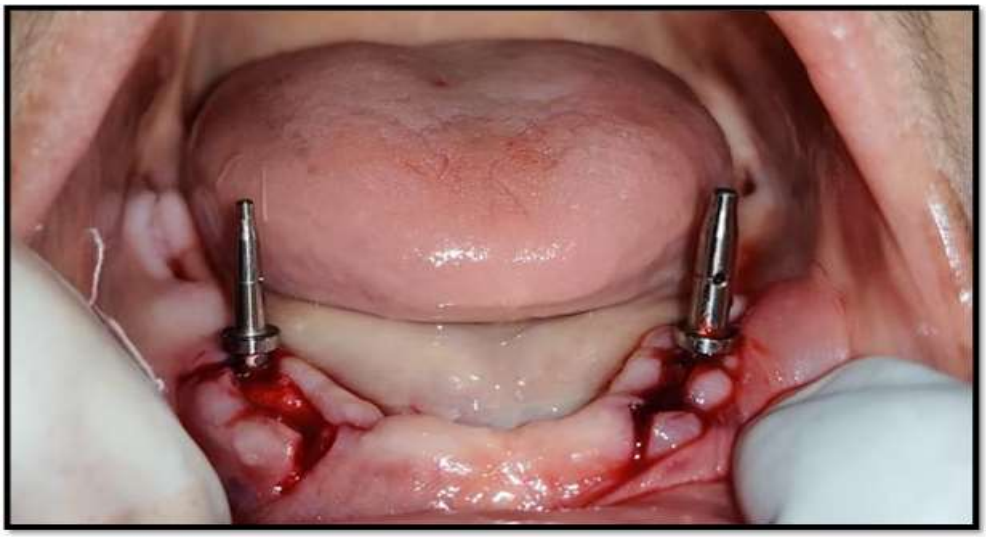

Figure 4: Guide pin placement verifying parallelism of the osteotomies

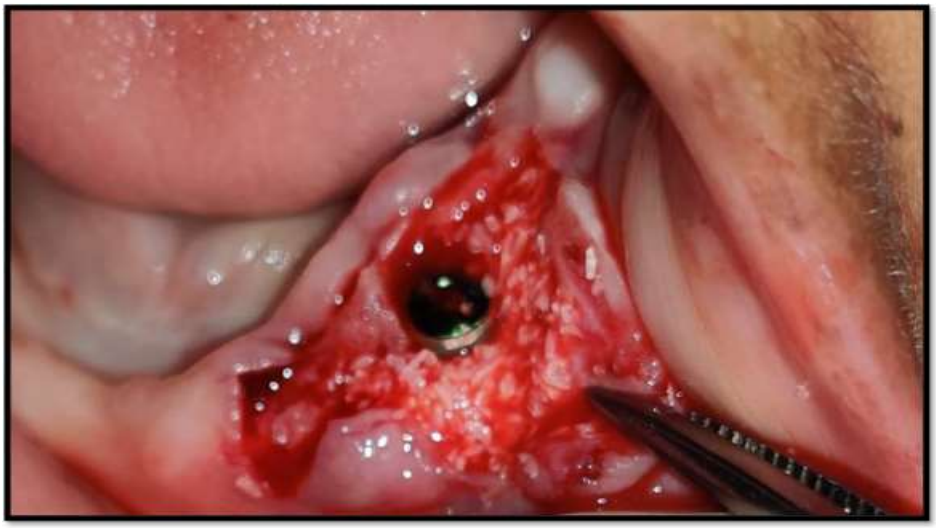

Figure 5: Grafting of the buccal defect

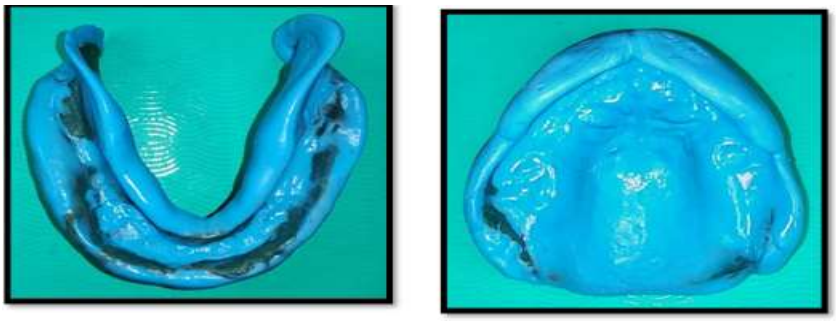

Figure 6: Border moulding and final impression of the upper and lower arches

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