Case Report

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Enhancement of Retention in Complete Dentures by Mini Implants: Case Report

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Abstract

Dental implants of smaller diameter have been used for almost 20 years, but recently, dental manufacturers have presented mini dental implants (MDIs) with diameter of only 1.8-2.4 mm. These implants allow very suitable prosthetic solutions within the range of their indication, due to good osseointegration success rates, simple surgical technique and immediate loading possibility. The case presents implantation of four mini implants Sendax type (IMTEC) in mental region, in order to obtain better retention and stability of the complete denture, and to improve function and phonation. The use of those implants, among afore mentioned preferences, is also very cost effective, so this implantological possibility should be taken into consideration during prosthetic treatment planning of the edentulous mandible.

Key words: Prosthetics; Implantology, Mini Dental Implants; Overdentures.

Introduction

The use of dental implants of smaller diameters in various forms has been present for almost 20 years. Those are generally 2.75 mm to 3.3 mm in diameter, and they are frequently used in cases of limited bone volume. Mini dental implants (MDIs) are even smaller, with diameters ranging from 1.8 mm to 2.4 mm.[1,2]

In the beginning, the main usage of MDIs was to serve as the remedy and provisional instrument for insertion of provisional restorations during the osseointegration phase of conventional larger-diameter endosseus implants.[3,4,5]

The assumption was that MDIs are unable to provide functional load of implant-supported prostheses.[4,6] In the course of time, it was observed that those implants integrated very well clinically[3], and were difficult to remove.[4] It became clear that, with minimally invasive implant insertion protocol with MDIs, they could provide satisfactory prosthodontic rehabilitation effect.[2,3]

The advantage in use of MDIs is the minimally invasive, single stage placement procedure.[4,6] Compared to MDIs, the insertion procedure for conventional implants (diameter 3.5 and wider) is an aggressive surgical procedure which requires a flap operation and full-depth bone preparation (osteotomy).

Therefore, there is a need of recovery time during tissue regeneration, vascular function restoration and osseointegration. This minimally invasive technique of MDIs insertion consists of turning the implant into the bone through a starting opening, but not a prepared bone site.[4,6] Therefore, there is no bone damage or bone wound during implantation.

Bleeding and postoperative discomfort are reduced[3], and most importantly, healing time is shortened. So, such implants can be practically loaded immediately, with no need for waiting for osseointegration.[4]

Case report

A 48 year old patient came for examination

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Figure 1: Individual acrylic baseplate with lead markers

in the department of prosthodontics in Inderprastha Dental College & Hospital, Sahibabad. He was not satisfied with the existing removable dentures, especially the lower one. He had been informed about the possibilities of implant therapy and fixed prosthodontic construction, but he could not afford it.

The possibility of increasing the retention of existing lower denture with MDI was explained to him. Since it was much cheaper than previously suggested implant supported by fixed prosthetic appliance, the patient decided to make lower removable denture (overdenture) supported with four MDIs Sendax type (IMTEC) with ball attachments.

Figure 2: Orthopantomograph with visible lead markers

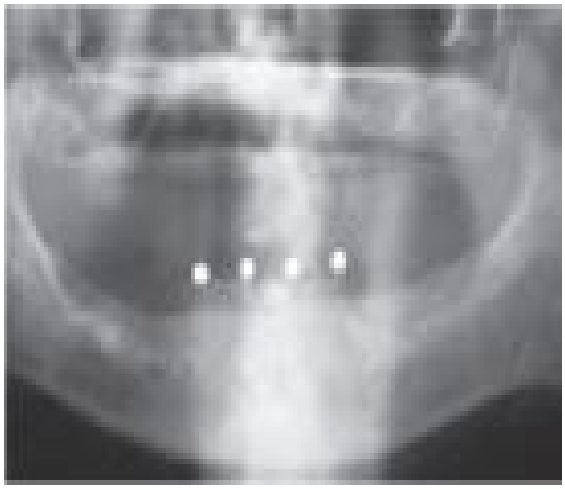
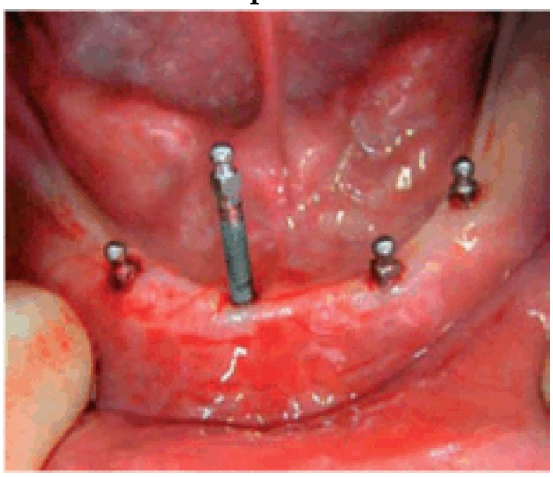


Figure 3: Implantation of mini dental implants



Anatomic impression with irreversible hydrocolloid (Jeltrate, Densply, India) was taken, and transparent acrylic individual acrylic baseplate with lead markers was produced (Figure1). The orthopantomograph (with the tray) was taken in order to evaluate the possibility of mini-implant insertion, and to determine their position and size (Figure 2).

Lead marks were removed from the individual acrylic baseplate and, according to the orthopantomograph findings; correction of future implant sites was performed. The tray was punctured on selected spots by grinding bur and placed into the patient's

Figure 4: Positioning of transfer (impression) copings onto implants

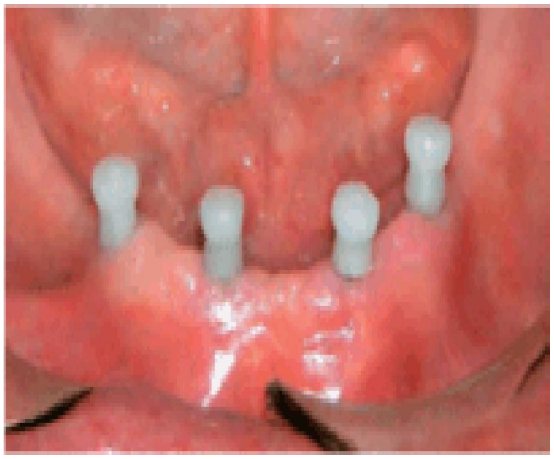
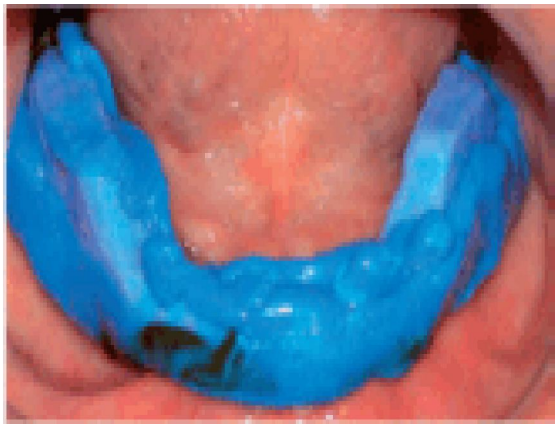


Figure 5: Functional impression taken over transfer copings



mouth. The implant sites were marked through the holes in acrylic baseplate with surgical marker and transgingival implantation was performed (Figure 3). The gingiva was punctured on the marked spots, and the bone was initially drilled with the locator drill (IMTEC) according to the marks made with surgical marker. The bone drilling was performed by using disposable surgical drill (IMTEC) of 1.1 mm diameter to the depth of length of implant as recommended by the manufacturer. Parallelization of the implants was achieved with the insertion of sterile, previously used, surgical drills into each drilled implant site. After drilling, the MDIs Sendax Classic Standard, O-Ball (IMTEC) dimensions 1.8 mm (diameter) x 15 mm

Figure 6: Functional impression with placed laboratory implants into transfer copings

Figure 7: Pored working model with built in laboratory implants and placed metal housings

(length) were screwed firstly by using manual screwing instrument (IMTEC), and afterwards with ratchet (torque 35 N/cm2). Since it was not possible to screw MDI to the end of the length, it was unscrewed and displaced. For that reason, the primarily drilled holes were deepened to the depth of 2/3 of the implants length, and in repeated screwing; it was possible to screw MDI to the end. After screwing of all the MDIs, the impressions with irreversible hydrocolloid (Jeltrate, Densply, India) were taken, poured in stone, and the acrylic individual impression trays were made on the models. Individual impression tray for mandible had the perforations on the implant sites, which were broad enough for the

Figure 8: Metal housings built in metal base lower denture

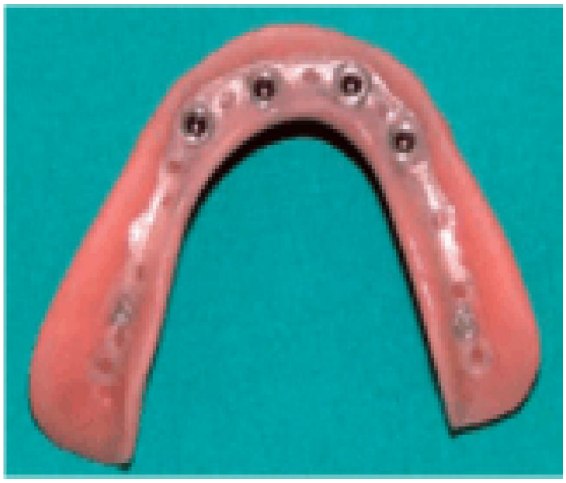


Figure 9: Dentures in patient's mouth

impression copings (IMTEC), placed on the implants, to pass through (Figure 4).

Afterwards, functional impressions were taken, by using condensation silicone Aquasil Ultra (Densply, India). Functional impression of the mandible contained impression copings (Figure 5) which were taken in the identical position as they were placed on the implants. The laboratory implants (O-Ball Prosthetic Head Analog, IMTEC) were inserted into the impression copings (Figure 6), and the models were poured in hard stone. Micro metal housings were placed onto the laboratory implants (Figure 7), and the metal base of the lower overdenture was produced (Figure 8). Further clinical and laboratory procedures were performed according to the routine procedure (7) for lower denture production.

Usual and adequate retention and stability of upper denture was obtained, but with the use of MDIs they were obtained for the lower denture, too. That resulted with the satisfactory function and phonation, and with unavoidable esthetics (Figure 9).

Discussion and Conclusions

Essential condition for all implants use, therefore also MDIs, is successful osseointegration that can be confirmed only with the long-term studies of success and survival of MDIs under load in masticatory function. Shatkin et al,[2] in their retrospective analysis over five years of 2514 MDIs, which equally supported fixed and removable prostheses, found the overall implant survival rate of 94.2%. Initial stability is important for the successful osseointegration and high implant success rate. It is stipulated with bone quality, implant design, and surgical technique that is used.[8] Some authors[9,10] recommend bone drilling to the depth of only 1/3 of MDI's length. But in our case drilling to the depth of 2/3 of the MDI's length had to be performed in order to completely screw the implant. Obvious reason was the dense bone structure of mandible of the treated patient, but such dense bone structure contributed to the good initial stability of the implanted MDIs.

Study of Balkin et al.,[4] in which they used histological analysis, revealed that the quality of MDIs osseointegration could be compared with the quality of larger diameter implants osseointegration. Ertugrul et al.[8], in their in vitro study, revealed that implants of larger diameter are more stable under lateral forces than MDIs. But it is logical, because of their almost doubly bigger surface area. In clinical practice, this disadvantage of MDIs can be solved with successful planning and using more implants.[1,4]

The MDIs do not pretend to be substitute for conventional implants. They can be used in situations with lack of adequate bone tissue for conventional implant placement, or single tooth replacement with restricted space (lower incisors)[6,9], but the most effective use of MDIs is for the retention and stabilization of complete dentures, especially lower dentures. In this way the problems such as lack of retention and stability, decrease in function, difficulties in speech and soft tissue sensitivity, are solved.[2,3] Griffitts et al.[3] were evaluating the patients' satisfaction with overdentures supported with MDI (comfort, retention, chewing ability and speaking ability), and they found that patients' satisfaction was excellent. Taking into consideration all advantages of MDI (success rates, surgical technique, financial advantages, possibilities of immediate loading), it can be concluded that MDI are highly successful

implant option for edentulous mandible. This fact should be taken into consideration during prosthetic treatment planning, especially at younger patients, narrow alveolar ridges, and patients who are not able to withstand the costs of more expensive conventional implants of larger diameter.

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