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Case Report

Rehabilitation of completely edentulous mandibular arch using immediately loaded transmucosal single-piece implants and overdenture

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Introduction

Restoration of completely lost dentition using dentures is a well-known treatment entity since many centuries. With the increased life expectancy, this rehabilitation should have long-lasting treatment predictability. Conventional tissue-supported prosthesis requires frequent recall visits due to continued residual ridge resorption.¹ The use of natural tooth- or root-supported overdentures has promised better prognosis due to enhanced stability and retention, and reduced ridge resorption. However, availability of periodontally sound abutment in strategic positions for successful rehabilitation is always a challenge. However, implant-retained or -supported

overdentures have provided better opportunity in rehabilitative procedure with predictable success.

Conventionally, implants used as abutments were submerged below overlying mucosa for 3–6 months for effective osseointegration.² During the healing period, the patient stays without any prosthesis, leading to difficulty in mastication and speech, and having unpleasant appearance. In addition, increased appointments involved in delayed loading protocols increase the chair side time and discomfort to the patient. All this may demoralize the patient's motivation for implant-supported prosthesis. Studies conducted by various researchers are of the opinion that immediate loading of single-stage implants is as effective as two-stage protocol. They have also reported that root form implants may successfully osseointegrate if kept above the bone during early bone remodeling.³ This surgical approach has been called as one-stage or nonsubmerged implant procedure as it eliminates the second-stage implant surgery and aids in immediate prosthetic rehabilitation of the patient. This case report presents the rehabilitation of a completely edentulous patient with maxillary tissue-supported complete denture and two, implant-retained mandibular overdentures using nonsubmerged transmucosal single-piece implant with immediate loading.

Case report

A 65-year-old male patient reported with the chief complaint of difficulty in chewing food and loosely fitting lower complete

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Fig. 1 – (a) Pre-operative picture of residual ridges. (b) Pre-operative orthopantomogram.

denture since one month. History revealed that the teeth were lost due to caries and periodontal disease about four months ago. Conventional complete dentures were fabricated about a month ago, but the patient reported looseness of the mandibular denture. Clinical examination revealed a maxillary arch that was U-shaped and medium in size, with well-rounded contour. Mucosa was firm in consistency. The mandibular ridge was U-shaped and smooth, with no irregularities. Maxillary and mandibular diagnostic casts were prepared; orthopantomogram (OPG) was taken to assess available bone height for implant placement in the mandibular anterior region (Fig. 1). On OPG examination, there were no abnormalities detected, and sufficient height of bone was available in interforaminal region for implant placement in the mandible. Necessary blood and urine examinations were also carried out, and they were within normal limits.

Upon evaluation of the mandibular complete denture, it was found that the prosthesis was well made and did not require any modification or remaking. Hence, it was decided to convert the same prosthesis into a two implant-retained overdenture after obtaining the patient's consent. The lower complete denture was duplicated using silicone putty and a surgical stent was fabricated. The procedure was carried under local anesthesia. Crestal incision with vertical releasing incision was given and the flap was raised. Pilot drill was used to mark two initial osteotomy sites in the B and D locations. Relative parallelism was evaluated using paralleling pins. Sequential drilling was further performed to prepare implant site under the strict sterile surgical protocol with abundant irrigation. Two one-piece transmucosal implants of size 3.8 mm × 13 mm with ball attachments (Equinox snap)

Fig. 2 – Two transmucosal single-piece implants placed in B and D locations.

Fig. 3 – Post-operative orthopantomogram. Showing relative parallelism between the implants.

were placed (Fig. 2). The post-operative OPG showed two well-aligned implants in the B and D locations of the mandible (Fig. 3). During the implant placement, the primary implant stability was evaluated using the insertion torque value. The final torque values for both the implants were ≥ 40 N cm. Mucosa was approximated with sutures. Two openings were made in the mandibular denture corresponding to the implant location using the acrylic burs. O-ring housings were placed over the implants and the complete seating of the denture was evaluated. Light body elastomeric impression material was injected around and over the housing and the same was picked up. The implant analogues were attached to the O-ring housings in the impression and the cast was poured in type IV dental stone. Impression material was removed from the denture and the passive fit of the denture was again evaluated. Now the O rings along with metal housings were placed over the implant analogue. Using autopolymerizing acrylic resin, O-ring housing was picked up in the denture. Excess acrylic resin was trimmed off. The denture was polished and finished (Fig. 4a). The denture was inserted in the patient's mouth. Retention and stability of the denture were verified. Pressure points over the mucosa were checked using pressure-indicating paste and necessary corrections were done. Occlusion of the dentures was checked (Fig. 4b). After explaining post-insertion care, dentures were delivered. The patient was called after 72 h. The implants and dentures were evaluated. The patient was recalled after 7 days, and 01, 03, 06, and 09 months. The implants were stable with the ISQ values of 73 and 75 after 06 and 09 months of implant placement. The patient was completely satisfied.

Fig. 4 – (a) Finished mandibular denture with incorporation of 'O' rings. (b) Maxillary mandibular dentures in occlusion.

Discussion

Extensive work of Branemark and his team lead to the development of the concept of osseointegration and dental implants.⁴ Implant-supported overdenture is a prosthesis that covers and rests on one or more dental implants and is partially or completely retained and/or supported by them. Implant-retained prostheses have improved stability, support, retention, and associated functions, such as mastication, speech, and swallowing.

As per recent ITI (International Team of Implantology) consensus, three protocols have been described for prosthetic loading of dental implants, which include immediate, early, and conventional loading protocols. In immediate loading, prosthesis is connected to the dental implants within 1 week following implant placement. With early loading protocol, prosthesis is connected to the dental implants between 1 week and 2 months following implant placement. In conventional loading protocol, dental implants are allowed to heal for a period greater than 2 months after implant placement without connection of a prosthesis.⁵⁻⁷

The choice of attachments usually depends on the clinical situation at hand.⁸ For instance, splinted bars cannot be used in cases where the interarch space is limited. On the other hand, nonsplinted solitary attachments require less interarch space, need minimal to no laboratory support, are less technique sensitive, and can be fabricated at a lower cost. In this case, a ball-and-socket type of attachment ('O' ring) was used. The O-ring attachments can be incorporated in the denture using indirect or direct method. The direct method requires the use of acrylic resin in the mouth, which may induce hypersensitivity reaction in the susceptible individuals because of the free monomer. The cytotoxic effect of monomer has a detrimental effect on osseointegration of implants. Advantages of indirect technique include reduced chair side time, no monomer contact with tissue, and no interference of tongue and cheeks. In indirect technique, the recording and transferring of the implants position with analogues may induce some error if correct impression procedure is not followed. In this case report, indirect technique was used to incorporate the O-ring attachment into the denture base.

Conclusion

Implant-supported overdenture is definitely a viable option to improve retention and stability of mandibular conventional denture. Immediate loading protocol is a simple and time-saving option for rehabilitation and can provide a long-term success comparable to the gold standard conventional loading protocol.

Conflicts of interest

The authors have none to declare.

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