Rehabilitation of the edentulous mandible with implant-supported overdenture using ball attachments and healing abutments: A case report

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Received 11 October 2008; revised 18 March 2009; accepted 23 May 2009 Available online 29 October 2009

Abstract For many years, osseointegrated implant-supported overdentures have been used in the rehabilitation of the edentulous lower jaw with excellent results. In this report, additional implants with healing abutments were applied posterior to mental foramen on each side was used to achieve additional support to the overdenture.

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given a detailed explanation concerning the present state, procedures and alternative treatment plans and then informed consent was obtained from the patient.

All the mandibular teeth were removed and the extraction sockets were thoroughly debrided and degranulated to remove all tissue. Following 2 weeks of healing, computed tomo-

**Figure 1**  (A) Clinical view at the initial visit. (B) Occlusal view before treatment. (C) The radiograph showed generalized alveolar bone loss and apically involved teeth. (D) Cross-sectional view of computed tomogram after extraction.
graphic examination was performed to assess the available bone length and width (Fig. 1D). Four implants were planned to be placed with two in the canine and the others in the first molar region.

Three implants (Implantium, Dentium, Seoul, Korea) were installed first in the lower canines and first molar region with the aid of surgical stent. The defected area next to the extraction area and the marginal voids between the implant surface and the buccal cortex were grafted with deproteinized bovine bone (Bio-Oss, Geistlich Pharm AG, Wolhusen, Switzerland) (Fig. 2A). An acellular dermal matrix graft (Sure-DermTM; Hans Biomed Corp., Seoul, Korea) was shaped to completely cover the defect and bone graft in a saddle-like manner with the basement membrane side facing the oral cavity and secured under the buccal and lingual flaps. The wound was closed by means of single sutures (Vicryl, Johnson and Johnson Medical Inc., Arlington, TX, USA). The patient was placed on amoxicillin 500 mg 3/day for 5 days, mefenamic acid 500 mg initially then mefenamic acid 250 mg 4/day for 5 days, and chlorhexidine digluconate 0.12% 3/day for 4 weeks. The ball attachments (Dentium, Seoul, Korea) were placed and torque to 15 N cm in the both canines and the healing abutment was placed in the first molar region 3 months after implant installation (Fig. 2B). Vent holes were created in the denture to accommodate the caps for ball attachments (Fig. 2C). With these caps seated on the attachment and the denture in place, self-curing acrylic resin was introduced into the denture vents and allowed to cure with the patient biting in centric relation. The additional surgery to place implant on the left mandibular molar was done. The healing abutment was connected to support the mandibular overdenture. Meanwhile, the full-mouth tooth extraction was performed on the maxilla and the upper jaw was restored with the complete denture.

The prosthesis was well in function up to 18 months. The clinical assessment showed good result without bleeding on probing and minimal plaque (Fig. 3A). The radiographic evaluation showed stable bone level around all implants (Fig. 3B).

3. Discussion

It was reported that no significant differences in the peri-implant health between two implants and four implants (Batenburg et al., 1998). But the retention and stability of the dentures may be improved with an increasing number of implants (Mericske-Stern, 1990). Continuing posterior jaw bone resorption may be seen for the resilient overdenture design (Jacobs et al., 1992). This could result in a tilting of the overdenture and unfavorable loading in the anterior region of the edentulous maxilla treated with a removable denture, which involves increased bone resorption in the anterior region (Jacobs et al., 1993). In this view, additional two implants were inserted posterior to mental foramen to distribute the load and increase stability (Mericske-Stern, 1998).

In this report, ball attachment was applied because, it is reported that ball attachment are less costly, less technique sensitive (Naert et al., 1991), and easier to clean than bars (Cune et al., 1994) and less wear or fracture of the component than that of gold alloy bars (Schmitt and Zarb, 1998). Moreover,
the potential for mucosal hyperplasia reportedly is more easily reduced with ball attachments (Krennmair and Ulm, 2001). It was also reported that the use of the ball attachment may be advantageous for implant-supported overdentures with regard to optimizing stress and minimizing denture movement (Tokuhisa et al., 2003). The approach in this report using ball attachments with healing abutments as supporting structure has an advantage of being incorporated at the chair side. Even though the patient was satisfied with chewing ability with three implants, the patient reported higher satisfaction of increased stability with the fourth implant. The healing abutments can later be changed to other attachment if needed.

Combining ball attachments with additional abutment with healing abutment may be beneficial in increasing the stability. Further follow-up is needed to evaluate long-term result.

References


