Rehabilitation of a Severely Resorbed Posterior Mandible with 4-mm Extra-Short Implants and Guided Bone Regeneration: Case Report with 3-year Follow-up

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Alveolar bone resorption has been a major challenge for implant placement in regions limited by anatomical structures. New alternatives have been introduced with the inclusion of extra-short implants in dentistry. The association of guided bone regeneration (GBR) with the use of extra-short implants might be a viable alternative for regions with limited bone height. This case report aimed to present the rehabilitation of a patient with severe mandibular bone resorption in the posterior region. The association of GBR with the use of extra-short implants was a viable alternative after a 3-year follow-up. INT J ORAL MAXILLOFAC IMPLANTS 2018;33:e147–e150. doi: 10.11607/jomi.6548

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The use of implants to rehabilitate mandibles with severe bone resorption has been a major challenge in dentistry. Alterations in the bone dimension occur after the tooth loss.1 The bone resorption pattern is in general continuous and irreversible, with a multifactorial etiology involving local and systemic factors such as the use of prostheses, diet, facial morphology, hormonal disorders, and osteoporosis.2 The alveolar bone reabsorption might impair or limit implant placement.3 The treatment complexity increases in cases of atrophic mandible in the posterior region because of the presence of the mandibular canal and the inferior alveolar nerve.3 Therefore, there is the concern of nerve injury when performing the implant placement in this region. Alternative techniques have been developed such as lateralization of the inferior alveolar nerve, osteogenic distractions, interposition grafts, guided bone regeneration (GBR),4 and the use of short (> 6 mm and < 10 mm)5 or extra-short (≤ 6 mm)5 implants. The use of extra-short implants associated with GBR might provide advantages in comparison to the use of traditional bone grafts or lateralization of the inferior alveolar nerve. The major advantages could be the lower number of surgical interventions and reduction of the treatment time and cost.3 Previous studies suggest that the lateralization of the inferior alveolar nerve might lead to postoperative morbidity.6 Moreover, the association of extra-short implants with GBR might result in a lower risk of damage to the mandibular alveolar nerve.7 The use of extra-short implants and GBR might reduce the complexity of the surgical procedure, minimize the risk of bone overheating, make the procedures of preparation of the surgical site and implant placement easier, and provide a lower risk of root trepanation of the neighboring teeth.7

Short dental implants present adequate scientific evidence from clinical studies that allow their reliable use.8 Improved surface treatments and geometry are characteristics that have provided short implants with similar success to regular implants, with predictability of success, mainly when splinted.8,9 However, in the case of extra-short implants, the literature is still scarce. A clinical study conducted by Slotte et al10 showed that 4-mm implants had 92% survival in severely

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resorbed posterior mandibles after a 2-year follow-up. The authors credited the adequate survival rate to the high initial stability and high primary bone-to-implant contact in dense bone. However, the authors also attempted to have careful bone preparation to avoid overdrilling and careful prosthetic planning to prevent unfavorable occlusion and to avoid harmful shear forces. It might be possible that extra-short implants become a viable alternative in terms of cost, morbidity, and technical simplification when compared with the other more time-consuming and invasive procedures. Moreover, GBR has been successfully introduced to implant dentistry, providing adequate local bone and tissue conditions, becoming an attractive alternative for association with extra-short implants in the rehabilitation of severely reabsorbed mandibles.

The present case report aimed to present the rehabilitation of a patient with severe mandibular bone resorption in the posterior region. Extra-short implants were associated with GBR providing survival after a 3-year follow-up.

**Case Report**

A female patient 48 years of age sought treatment with dental implants because of the absence of the bilateral mandibular molars. The patient complained about poor stability of the removable partial denture. Bone height limitation was observed for the placement of short or standard-length implants. Figures 1 and 2 show the initial clinical and radiographic conditions at the free-ends of the mandible in the regions of the mandibular left first and second molars and mandibular right first and second molars.
In the evaluation of the cone beam computed tomography, the distance from the bone crest to the mandibular canal at the implant sites was less than 4.8 mm (Fig 3), reaching 3 mm in the region of the mandibular right second molar, as shown in Fig 3. The treatment options were explained to the patient, involving: osteogenic distraction, interposition graft, bone graft, lateralization of the mandibular alveolar nerve, or placement of extra-short implants with GBR. All possibilities were explained in a simple and easy way to understand. After hearing about the risk of complications, cost, and treatment time of each procedure, the patient could choose one treatment option.

The patient chose extra-short implants with simultaneous GBR for vertical bone increase. She reported that the option was based on the lower morbidity associated with shorter treatment time. After the treatment plan was defined, diagnostic wax-up and surgical guide were confectioned. Laboratory examination of the patient’s systemic condition was requested.

Four implants of 4 mm in length and 4.1 mm in width (Standard Plus RN, Straumann) were selected. The deproteinized bovine bone mineral (Bio-Oss, Geistlich Pharma) and resorbable collagen membrane (Bio-Gide, Geistlich Pharma) were used for GBR. The patient received Cephalexin (500 mg) and Dexamethasone (4 mg) as preoperative medication 1 hour before the procedure.

The surgical procedure was initiated by intraoral antisepsis with 0.1% chlorhexidine gluconate and extraoral antisepsis with 2% chlorhexidine. The anesthesia was performed by regional block of the mandibular alveolar nerve and buccal and lingual subperiosteal infiltration. A supracrestal vertical incision was performed over the alveolar ridge with a relaxing incision in the second premolar, followed by detachment of the periosteum.

The location of the intended insertion point of the implants was defined with the aid of the surgical guide. Bone drilling and implant placement were performed according to the manufacturer's instructions (Fig 4). After placement of the implant cover screw, bone perforations were performed for graft irrigation. Deproteinized bovine bone mineral was deposited on the exposed part of implants (Fig 5a). The resorbable collagen membrane was inserted over the region that received the bone graft (Fig 5b). Finally, flap replacement and suture were performed.

A panoramic radiograph was requested 90 days after the surgical procedure to verify the general implant and bone condition. Radiographic and clinical examinations indicated no signs of complication. The implant exposition was scheduled for 180 days after the surgical procedure. The patient did not use the removable partial prosthesis during the postoperative period.

The implants were exposed after the 180-day period of osseointegration. The prosthetic rehabilitation was initiated 1 month after implant exposition. Abutments (RN SynOcta 1.5 screw-retained, Straumann) were inserted over the implants, and an open-tray impression was performed. At the next appointment, the fit of the metallic framework was checked, and the color was registered for porcelain application. The metal-ceramic crowns were placed in the third appointment of the prosthetic phase (Fig 6). The patient has been followed for 3 years without any biologic or prosthetic complication (Fig 7).
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REFERENCES


