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Case Report
Dental Implants

A lower border augmentation technique to allow implant placement after a bilateral mandibular fracture as a complication of vertical distraction osteogenesis: a case report

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Abstract. As with other techniques, vertical distraction osteogenesis (VDO) can also induce complications. The case of a patient with a residual alveolar ridge in the symphyseal area of 8 mm is presented. After performing VDO, the patient returned at 1-day postoperatively complaining of pain and dislocation of the distractor device, due to a fracture of the lower mandibular segment on the right side. After removal of the distractor device and application of osteosynthesis plates, the patient returned 2 weeks later due to a second fracture of the lower segment, yet on the left side. After removing the osteosynthesis material, stabilization of the mandible was achieved with an acrylic splint, which was fixated with peri-mandibular wiring. Finally, reconstruction was accomplished by lower border onlay grafting, limited to the symphyseal area, in preparation for implant insertion. Ultimately, after a healing period of 5 months, two endosseous implants were installed. The patient's function has remained satisfactory for 3 years. Reinforcement of the extreme resorbed edentulous mandible after fracture healing by lower border bone augmentation can be a reliable method to allow implant installation in a second stage.

Key words: mandibular fracture; lower border augmentation; vertical distraction osteogenesis.

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Edentulous patients with an extremely resorbed mandible (Cawood V or VI) often have reduced retention and instability of the lower dentures. Besides impaired masticatory function, the diminished vertical height of the alveolar process results in loss of vertical dimension of the face and poor facial aesthetics. Improvement of denture retention can be obtained by installation of endosseous implants. In extreme cases, jaw atrophy even impedes implant placement. To create more bone height, various augmentation techniques have been proposed using autologous bone as well as bone substitutes. Vertical distraction osteogenesis (VDO) can also be performed. However, VDO of fully or partially edentulous regions is prone to a high rate of complications,[1,2] such as mandibular fracturing.

To deal with a fracture of an extremely edentulous mandible and at the same time allow implant placement at a second stage, application of a bone graft onto the lower body of the mandible that is restricted to the interforaminal mandibular region (i.e. submentally) is advocated.

Case report

A 65-year-old male required dental implants to improve the retention and stability of his dentures. Intra-orally, a diminished alveolar ridge was visible as a heightening of both the floor of the mouth and the buccal sulcus. A panoramic, lateral cephalometric radiograph and cone beam computed tomography (CBCT) were performed to determine the available residual bone volume of the mandible. The bone height in the symphyseal area was 8 mm (Fig. 1a). It was decided to augment the mandible by VDO using an intra-osseous device (IOD) (Endo-Distraction Krenkel®, Mondeal®, Tuttlingen, Germany) prior to placement of the two endosseous implants.

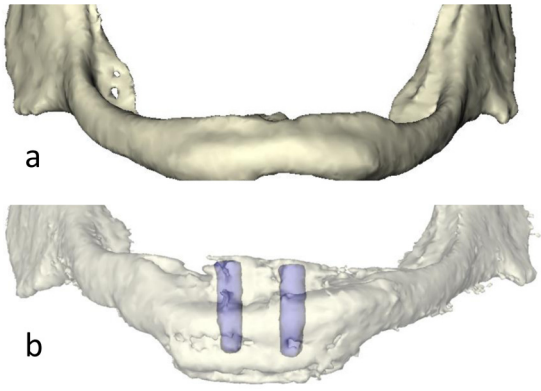

Fig. 1. (a) Before the vertical distraction osteogenesis procedure. (b) After the lower border augmentation and implant installation.

Surgical procedure

The surgical technique described by Krenkel and Grunert[3] was performed under general anaesthesia. First, a mucoperiosteal flap was reflected on only the vestibular side, leaving the periosteum in place on the alveolar crest. After identification of both mental nerves, a horizontal osteotomy was performed using a reciprocal saw. The IOD was inserted in the middle of the symphyseal area. After drilling a hole in both the cranial and basal segments, a distraction rod was guided through the basal bone segment into the soft tissues of the sub-mandibular chin area. The upper segment was fixated to the upper part of the device, thus moving upwards when activating the rod by turning it. After wound closure, only the top of the device was visible. During and after completion of surgery, the distractor device remained in the correct position and no complications occurred.

Fig. 2. Fracture and dislocated distractor device.

One day postoperatively, dislocation of the distractor device was observed. On the panoramic radiograph, a fracture on the right side of the corpus of the mandible was visible (Fig. 2). The distractor device was surgically removed and the fractured mandible fixated with a six-hole osteosynthesis plate (Mondeal 2000®; Mondeal, Tuttlingen, Germany) and two additional lag screws (Fig. 3). Over the next 2 weeks, healing was complicated by pain, swelling, and dislocation of the lag screws. Surgery was once again performed to stabilize the new fracture with an additional plate osteosynthesis, this time also on the left side of the mandibular body (Fig. 4). During the following 2 months, healing seemed to be disturbed; prolonged administration of clindamycin was necessary because of a continuous infection causing pain and discharge of pus. CT showed sequestration of bone segments indicative of osteomyelitis. Three months after the first operation, all osteosynthesis material was removed and a sequestrectomy was performed. Stabilization of the mandible was achieved with an acrylic splint fixated by peri-mandibular wiring. Antibacterial therapy was continued for several weeks. Two months later, the acrylic splint was removed, and a month after that, callus formation was already radiographically visible. Eight months after the VDO procedure, the patient underwent a lower border onlay grafting, limited to the symphyseal area, in preparation for implant