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CLINICAL REPORTS

Complex rehabilitation of atrophic mandible with implant-supported prosthesis

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ABSTRACT

In this study, we report the case of a patient presenting a severe atrophic mandible that was treated with short implants and stable internal fixation, without using bone grafts or biomaterials. The patient had a long history of failure of several previous consecutive treatments. Cone-bean tomography revealed a small amount of mandibular bone, suggesting a high risk of fracture of the mandible during drilling and installation of osseointegrated implants. We opted to place 5 implants (4.0 × 7.0 mm) between the mental foramens. Since the mandible presented a high risk of fracture, we inserted a titanium plate (2.3 mm) as bone reinforcement along the entire length of the mandible, including the bilateral mandibular angles. A Branemark type prosthesis was installed 5 days after the procedure. After 24 months, the patient continues to be satisfied and presents good masticatory functions without any complications.

KEYWORDS
Dental implantation, Mouth rehabilitation, Surgery, Oral.

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INTRODUCTION

In a normal human, the volume of cortical bone is about 3.5 times smaller than that of spongy bone, but with loss of teeth, a jaw greatly reduces this proportion as a result of vertical resorption. This cortical and spongy portion of the mandible when affected, in order to obtain greater transparency and safety[1].

Severe resorption of the mandible is a challenge to reestablish satisfactory masticatory function as well as harmonious functioning of the maxillofacial complex[2]. The maladaptation of a total prosthesis due to insufficient existing support causes difficulty in chewing, pain, and discomfort. Moreover, it can limit and impair the social relationships of the patients[3]. Here, we report a clinical case of a patient presenting severe mandibular resorption treated using dental implants, without mandibular bone grafts and with bone reinforcement provided using a plate and screws as a safe alternative to rehabilitation.

CASE REPORT

A 64-year-old woman without systemic diseases underwent to maxillofacial surgery and implantation at Face Defects Hospital from Sao Paulo, Brazil. She complained of masticatory problems, pain in the facial muscles, and social life limitation caused by reduced masticatory function and prosthesis maladaptation. Several previous attempts at creating an adaptable total prosthesis for her had been unsuccessful. A clinical examination, associated with cone-bean tomography, revealed a severe atrophic mandible (fig.1). Because of the imminent risk of fracture of the mandible, we treated the atrophic mandible by using 5 dental implants (4.0 × 7.0 mm, Osseotite®; Biomet-3i) and a bone reinforcement plate (2.3 mm, ThreadLock®; KLS Martin) (fig. 2, 3).

The plate was completely constructed before surgery by using a model prototype. Five days after surgery, a Branemark-type prosthesis was installed. Two years after the surgical procedure, the patient presents excellent masticatory function and is quite satisfied with the treatment (fig. 4). No postoperative complications were observed and marginal bone changes around implants were almost imperceptible with two years of follow-up.

DISCUSSION

Different surgical procedures have been described in the literature to rehabilitate patients with atrophic mandible, including onlay grafts and different types of osteotomies. The success rate of mandibular bone grafting is not high because of the high reabsorption rate of the grafts[4].

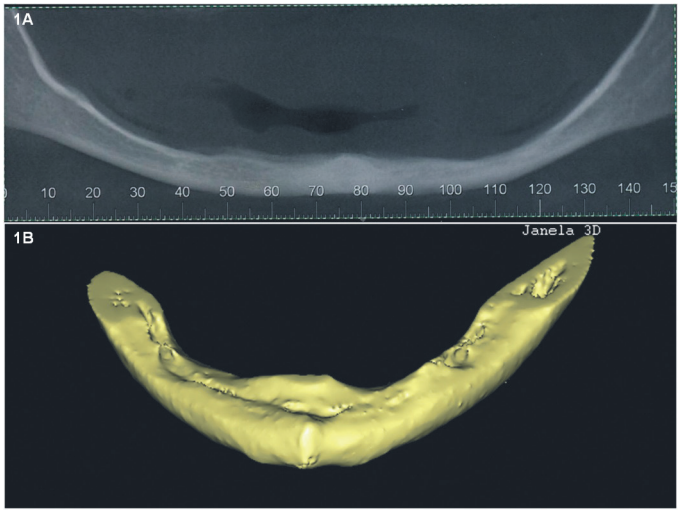

Figure 1. Severe atrophic mandible: 3-D reconstruction.

Although dental implantation has been reported in atrophic mandible[5], it results in serious complications, such as fracture of the mandibular bone [6,7].Other methods used to reconstruct the mandible are osteogenic distraction, autogenous grafts, and the use of rhBMP-2. However, the outcomes of these techniques are not highly predictable and they can be quite expensive[8].

Procedures of bone grafting to increase the mandible with subsequent installation of dental implants are currently the choice treatments of many researchers for reconstructing atrophic mandibles. These techniques result in survival rates of 88% to 100%[2]. The main complications reported after mandible grafting are suture dehiscence, sensory disorders, infection, and increased morbidity because 2 different surgical sites are involved[9].

Another technique used to reconstruct the mandible is osteogenic distraction. The main advantage of this procedure over autogenic bone grafting is that it does not need a donor site to decrease morbidity. Another significant advantage is that osteogenic distraction allows the expansion of soft tissues[2]. However, this procedure can result in serious complications, such as decrease in the size of the previously

Figure 2. Prototype model and reconstruction plate.

Figure 3. Reconstruction plate fixed and five implants placed in mandible.

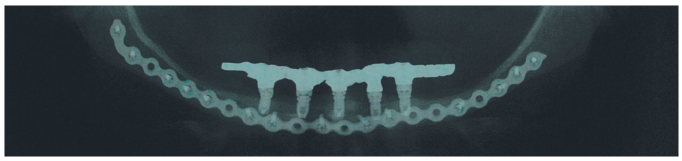

Figure 4. 24-month radiographic follow-up.

existing residual bone, infections, dehiscence of soft tissues, and loss of implants[10].

Dental implantation is a simple surgical procedure that produces excellent results, and hence, it has become an attractive treatment[11]. The main complication that could have occurred in the present case was the fracture of the atrophic mandible during implant placement. To avoid this complication, a 2.4-mm plate was installed in the mandibular bone before placing the 5 osseointegrated implants. We used a rapid prototyping model to assist in the preoperative construction of the plate as well as in surgical planning.

The virtual surgical planning of the location of the implants and their reproduction with guided surgery is an alternative during rehabilitation with dental implants[12]. However, the technique has some limitations, such as a structure of anatomical structures and alveolar bone with a greater risk of perforation or fenestration in cortical areas[13].

The plate was placed via an intraoral approach, even though the main complications have been observed when the plate is passed bilaterally under the mental nerve bundles. Taking this into account[11], the prototype was essential for inserting the plate via a transoral approach, and this helped prevent any skin incision. After 5 days, the prosthesis was installed. We conclude that this technique leads to less surgical morbidity and low risk of infection. However, future prospective studies are needed to compare this procedure with other treatment modalities.

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