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REVIEW ARTICLE

SHORT IMPLANTS FOR THE MANAGEMENT OF STRONGLY RESORBED TOTAL EDENTULOUS: A CASE REPORT

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ABSTRACT

In implantology, the resorption of bone ridges, especially at the posterior region, is a constraint for standard dimensions implant placement, unless reconstructive surgery is envisaged, such as elevation of the sinus floor or augmentation of ridges, although widely used, these techniques, sometimes uncertain, require an additional surgical procedure, and an expensive cost. Hence the interest of short implants, which can offer us an alternative solution. The purpose of this article is to shed light on this implant concept, which we propose to illustrate through a clinical case of a strongly resorbed edentulous mandibular crest, where bone augmentation surgery is not possible.

INTRODUCTION

Implantology is part of our daily therapy. The implant concept has undergone many changes. The short implants occupy a prominent place, responding to clinical situations of high bone resorption, especially at the posterior area. or in the presence of anatomical obstacles such as the maxillary sinus and the alveolar mandibular nerve, which makes it possible to simplify the treatment plan by avoiding reconstructive surgery and its possible complications (Pruvost, 2011; Nedelec, 2011 and Li, 2008). Indeed, short implants offer an alternative to bone grafts, which considerably reduces the duration and cost of treatment, as well as the risk of postoperative morbidity. it also solves difficult clinical situations, such as reduced visibility, limited oral opening, and difficult surgical access, as well as poor bone quality (Calvo-Guirado, 2016; Grant, 2009; Misch, 2006). The definition of short implants varies according to the authors, there is no consensus on this terminology. For some authors an implant is considered short when its length is equal to or less than 10 mm (Bidalt, 2013; Bortolini, 2015 and Monje, 2014), while for others, a short implant has a length of 6 mm (Nedelec, 2011) or even less. This evolution requires the optimization of other geometric parameters. In addition, the reduction in length facilitates the parallelism of implants in the case of multiple restorations, and avoids interference from the roots of adjacent teeth in the case of root proximity (Grant, 2009).

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However, short implants have an unbalanced crown/root ratio, the coronal height is increased, which accentuates occlusal loads. In addition, oblique occlusal forces cause greater stress on the bone, prosthetic components and implant neck (Pruvost, 2011 and Ramos Verria, 2015).

Clinical case report: We report case of patient KH. F, 75 years old, she was consulted for prosthetic rehabilitation of her total edentulous, looking for a solution to her mandible prosthetic stabilization problem that has never been solved, despite two dentures previously worn. Our reflection was focused on the implant solution. Clinical examination reveals a highly resorbed, or even negative, edentulous mandibular crest (Fig. 1: A, B), confirmed by panoramic radiographs, which also showed the proximity of the lower alveolar nerve. (Fig. 2).

The cone beam showed:

- An anterior bone height of 9 mm
- The proximity of the lower nerve is 2 mm (Fig. 3).

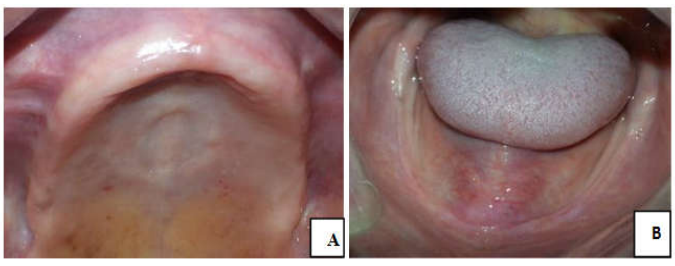

Figure 1. Intraoral view of the two maxillary and mandibular arches

Figure 2. Panoramic radiography

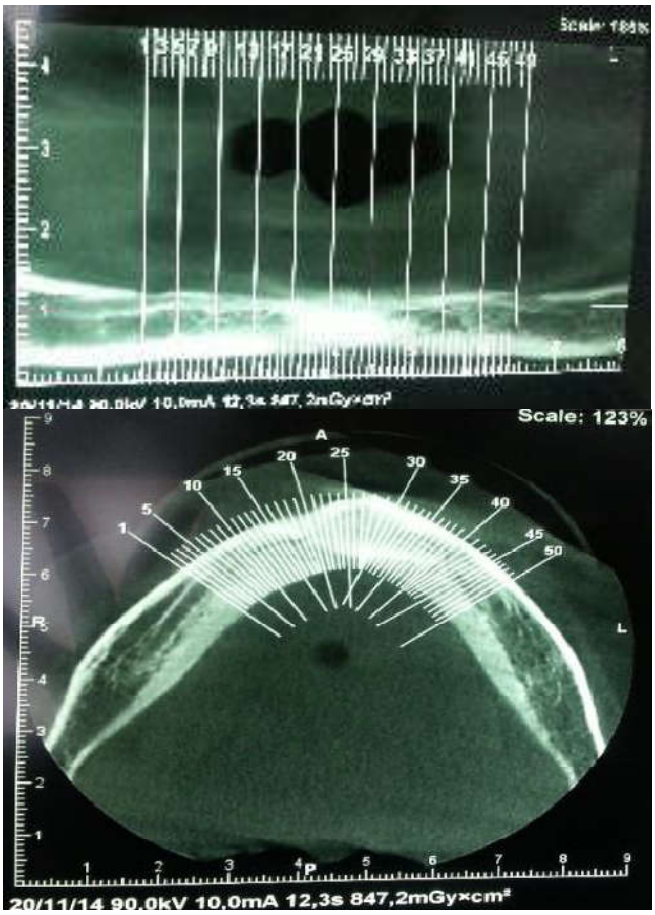

Figure 3. Cone beam

Therapeutic Decision: The cone beam showed that the available bone height is approximately 9 mm. this situation does not allow two standard implants to be placed, so we have opted for 2 short implants of 6 mm length and 4.2 mm diameter (Fig.4, 5), and the placement of a total denture with two ball attachments.

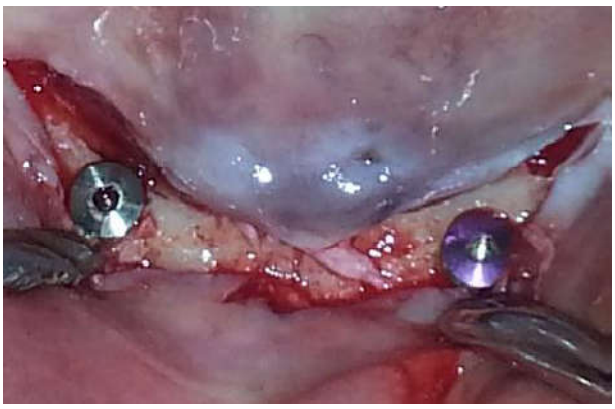

Figure 4. Placement of two short implants in the mandible

Figure 5. Control radio

The conventional complete removable prosthesis has been rigorously realized by scrupulously respecting the requirements for occluso-prosthetic balance (Fig.6, 7, 8).

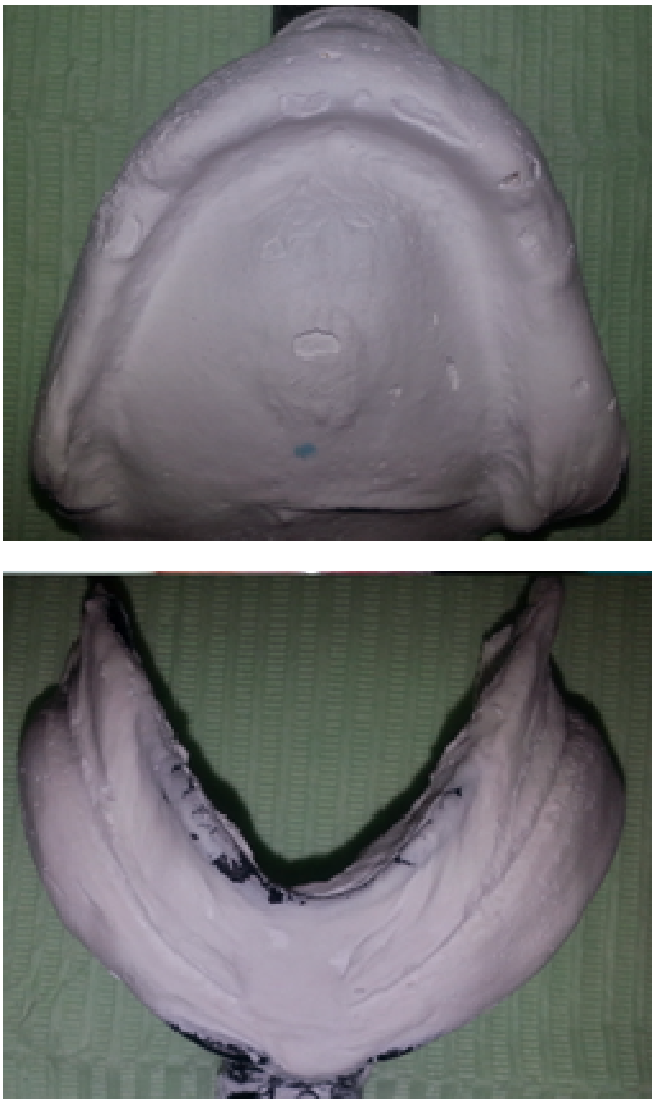

Figure 6. Primary impressions with plaster

The prosthesis was unloaded sufficiently with respect to the implants, and readjusted after surgery to avoid compressing the soft tissues, and to compromise the biological integration of the implants. (Fig.9)

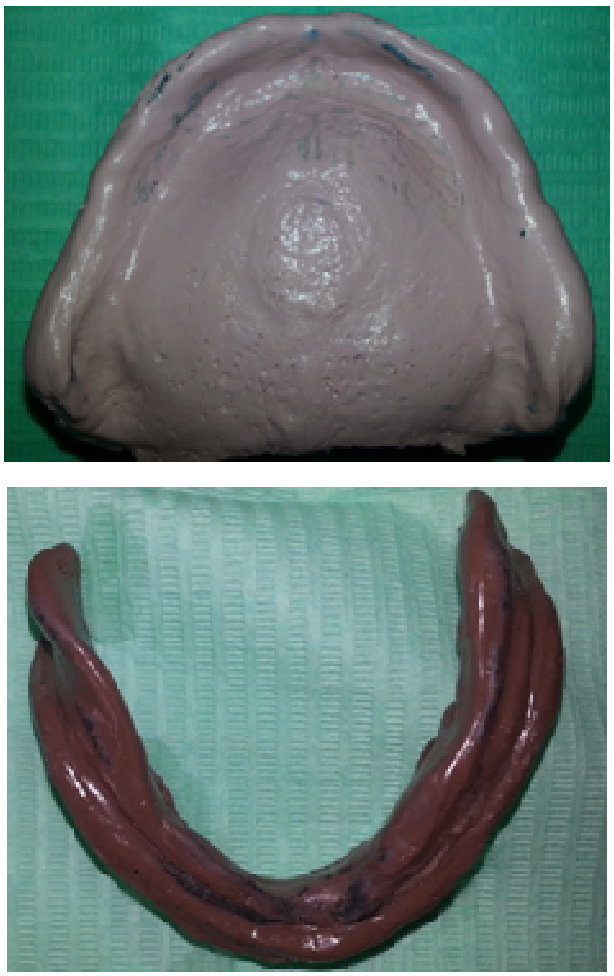

Figure 7. Anatomical-functional impressions

Figure 8. Insertion of prostheses

Figure 9. Prosthetic intrados hollowed out in front of the implants

Once the osseointegration period has elapsed, the intrados of the denture is lined with autopolymerizable resin opposite the implants, and a small amount is applied directly to the attachments to improve their incorporation into the intrados of the mandibular denture (Fig.10 : A, B). The resin is set under occlusal pressure. The prosthesis is then removed and repolished, and the occlusion is checked. The significantly improved retention facilitated the psychological integration of the prosthesis, the patient reported increased comfort during the control visits.

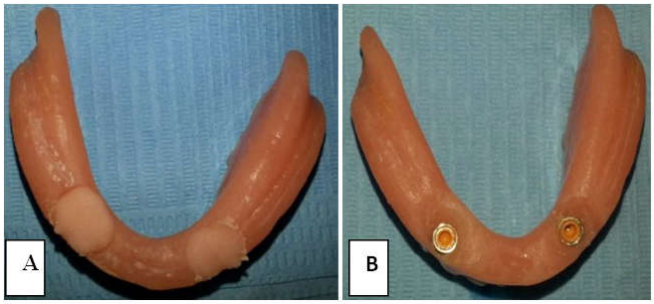

Figure 10. Filling of the prosthesis intrados with self-polymerizing resin, resin overflows are eliminated and thedenture is repolished

DISCUSSION

Short implants have been designed to overcome certain clinical difficulties. This concept is a topical issue, many publications have reported varying results depending on the length of the implants used. Clinical studies now show that the success rate of short implants is increasingly high, approaching that of standard implants. Indeed, Atieh (Atieh, 2012), Das Neves (Das Neves, 2006), Monje (Monje, 2014 and Monje 2013), confirm that the short implants have a success rate similar to that of implants. this proves that that implant length is not the only parameter influencing the success rate of implants (Bortolini, 2015), several factors such as diameter, shape (cylindrical, cylindrical-conical, conical), type of bone integration (screwed, impacted), connection, surface condition and prosthetic concepts, are to be taken into consideration when making an implant surgical decision (Nedelec, 2011). To overcome the disadvantages of the reduced length of the implant, the osseointegration surface must be increased as much as possible, which makes it possible to dissipate masticatory forces and reduce biomechanical stress around the implant. This is possible either by increasing the diameter, improving the surface condition, physically and chemically treating the implant surface and choosing the right spiral geometry and screw pitch width. Diameter is an important parameter in terms of short implants, many studies (Bortolini, 2015; Annibali, 2012; Mezzomo, 2014), have focused on the role of implant diameter, the larger it is, the larger the contact surface between the implant and the surrounding bone is, which gives better osseointegration, adequate stress distribution, and certain mechanical stability. Xi Ding *et al* (Monje, 2013), showed a decrease in biomechanical stress around the implant neck, particularly in the diameter range of 3.3 to 4.1 mm. This decrease appears to be more pronounced for lateral forces that generate comparatively higher forces.

The rough surface predominates in studies (Das Neves, 2006; MISCH, 2005; Monje, 2013), which show that the geometry, and topography of the surface are crucial for the success of short and long-term implants, a rough surface can overcome the difficulties caused by vertical bone resorption.

There are several ways to obtain a presumed favourable surface condition. By subtraction such as sandblasting, etching,

electrochemistry, etc. Or by addition such as electrochemistry, plasma jet. These processes are used alone or in combination. For Goené (Goené, 2005), the introduction of acid etching treated surfaces would have allowed short implants to achieve success rates similar to implantology standards. Another way to achieve a larger contact surface is the design of the implant itself, in particularly the spirals, their design and screw, which significantly increases the bone-to-implant contact surface. According to Steigenga *et al*. (2004), square section spirals would provide more bone-implant contact surface than triangular section spirals. In addition to the diameter of the implant, the design, and the surface condition, the prosthetic concepts will have to be adapted, by respecting some biomechanicalrules:

- A good choice of occlusal scheme.
- The fixation of short implants to each other, or to conventional length implants, which makes it possible to obtain results comparable to those of standard implants (Misch, 2006; Monje, 2014 and Monje, 2013).
- Coronary morphology: the prosthesis must be constructed in such a way that the resultant static and dynamic occlusal forces are transmitted along the axis closest to the major axis of the implant. And it is by reducing the inclination of the cuspidian slopes that the bending moment (or torque) will also be reduced (Pruvost, 2011; Rangert, 1997 and Weinberg, 2001) For this reason, the placement of implants must be based on a prosthetic wax-up simulation before the surgical procedure.
- Adopt the concept of Platform-Switching: it is now demonstrated by several clinical studies, in the international literature, the effectiveness of this concept in terms of bone stability, peri-implant stability, tissue maintenance and decreased gingival inflammation (1, 23, 24).

Conclusion

In cases of increased bone resorption, short implants are considered to be a less invasive, faster and less painful alternative for the patient, while ensuring quality prosthetic restorations in the long term, compared to heavier surgical techniques required for standard implant placement. Moreover, implant diameter, surface condition, implant morphology, biomechanical and prosthetic considerations have a major impact on the clinical success of these implants.

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