

# The use of short implant as a treatment option in a region of the maxilla with reduced bone height

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## Abstract

Dental implants have been a safe option in oral rehabilitation. The short ones, under 10 mm, are used in clinical situations with great bone resorption after dental loss, instead of a bone grafting process. The present study consists in the case report of #15 tooth loss 17 years ago, and the subsequent deficit in residual bone volume. Among the possible treatment options with dental implants, it were presented to the patient: bone grafts and installation of conventional size implants; and the short implants. For being a more conservative option, with lower morbidity, lower cost and reduction of treatment period, the short implants became the patient's choice. Many papers have reported high index of success with short implants, considering the importance of bone quality, implant diameter, geometry, design, and surface treatment. This technique might be a good treatment alternative for areas where the volume bone is reduced. However the success of this type of treatment is related to the performing a judicious planning.

**Keywords:** Short implant. Bone graft. Osseointegration.

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## Introduction

The use of dental implants has been considered as a safe and effective method for oral rehabilitation. This technique is currently responsible for improving the life quality of totally or partially toothless patients.

Implantology success is not related only to the maintenance of implants in the dental arch, but also to the concern about esthetics and a harmonic function, which is obtained by means of case planning, performance of surgical technique and installation of prosthesis.<sup>1,2</sup>

It is known that, from the osseointegration point of view, dental implants have high index of success,<sup>3</sup> however the use of this technique can be limited according to the presence of situations inherent to each patient, as for instance: the reduction of bone height or the presence of anatomical accidents.<sup>4</sup> The pattern of bone resorption in the posterior region of mandible and maxilla is asymmetric,<sup>5</sup> starting immediately after extraction of dental element, due to destruction of the canaliculi system — responsible for the innervation and blood nutrition — present between the alveolar bone and the preexisting periodontal ligament.<sup>6</sup> Besides, the absence of occlusal forces exerted on the alveolar ridge might lead to bone resorption.<sup>7</sup> The dental absence on the maxilla leads to horizontal bone loss in the buccal-palatal direction. And the deficit of vertical bone appears through natural remodeling in height caused by the pneumatization of the maxillary sinuses. In the mandible, this resorption occurs vertically resulting in little bone height and proximity to the mandibular canal, but with reasonable quantity on the horizontal plane. Therefore it becomes more complex the planning for rehabilitations on the posterior region of upper and lower atrophic dental arches.<sup>8</sup>

To overcome these physiologic and anatomic limitations, literature reports several techniques of bone grafting such as: *inlay/onlay* block grafts, osteogenic distraction, guided bone regeneration, maxillary sinus grafts and repositioning of the

lower alveolar nerve.<sup>9</sup> However these procedures have little acceptance by the patients due to aspects related to necessity of multiple surgical procedures, greater post-surgical sensitivity, high costs and longer period of treatment.<sup>4</sup>

Short implants, i.e., under 10 mm of length,<sup>10,11</sup> made the rehabilitation on areas of ridges with great resorption, less complex, costly and traumatic to the patients.<sup>12</sup>

The present study aims to present a clinical case report in which a short implant was used in a maxilla with absence of bone height, as a way to avoid bone grafting complementary procedures.

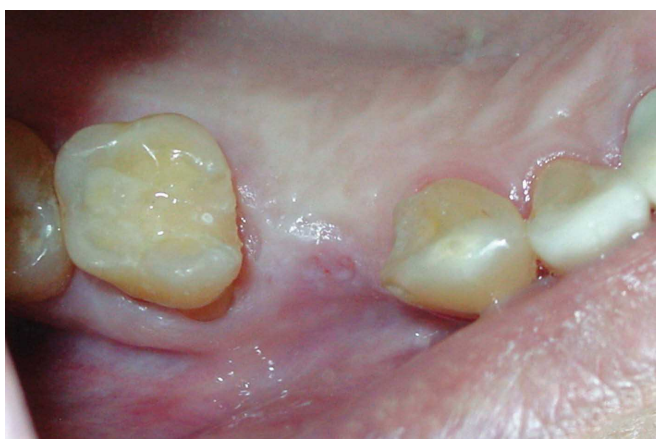
## Case report

Female patient, 57 years old, attended the dental clinic of UNIPAR, presenting an adhesive fixed partial prosthesis rehabilitating the absence of the tooth #15. During the anamnesis the patient reported that the tooth had been extracted 17 years ago and that the current prosthesis loosened often. In the clinical exam it was observed good presence of prosthetic space for rehabilitation (Fig 1). It was performed periapical (Fig 2) and panoramic radiographs, which indicated little residual bone height (5 mm of bone ridge), making it more complex the rehabilitation through osseointegrated implants with conventional size (over 10 mm). In this situation it were presented the following treatment options to the patient:

- » Option 1 - Bone grafting and immediate installation of dental implant.
- » Option 2 - Bone grafting and installation of dental implant posteriorly to period of bone repair.
- » Option 3 - Installation of short implants.

After presented these treatment options, the patient chose the utilization of short implants, considering the lower cost, lower morbidity, reduction of a surgical step and reduction in treatment period.

The surgical step was initiated after the intra and extraoral antiseptics techniques and subperiosteal infiltration anesthesia in the buccal aspect of premolars region and with infiltrative complementation in the palatine. Posteriorly supracristal linear incision was performed using a 15c blade, in the region of the element #15,

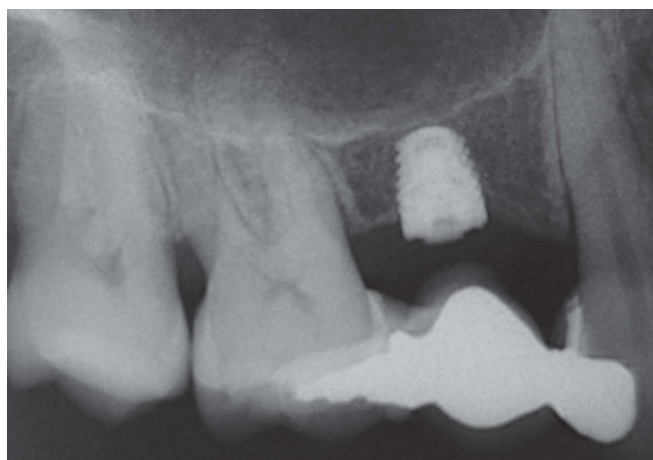


**Figure 1** - Initial photograph of the receiving area.

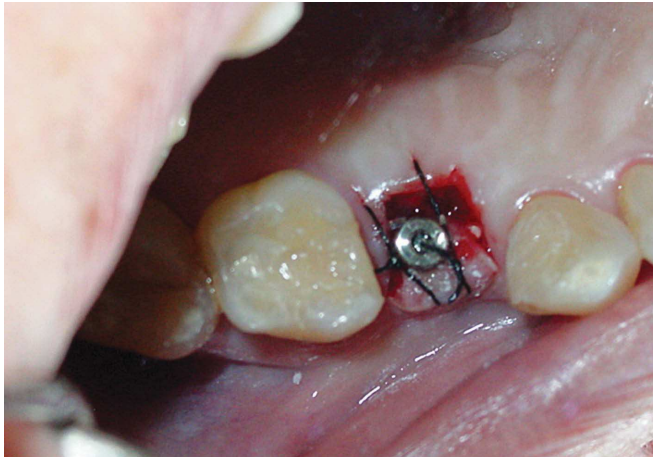
which was extended intrasulcularly towards the adjacent teeth — favoring the folding of a mucoperiosteal flap, with the aid of a Molt elevator. Then an osteotomy was performed respecting the sequence of drills for the previously selected implant. The installed implant was a cone morse Titamax WS with 4 mm of width and 5 mm of height with 45 N.cm fro locking. After positioning the cover screw it was sutured with nylon 5.0 and the adhesive fixed prosthesis was temporarily repositioned during the entire healing period. Orientations on post-surgical care were given to the patient, and medication to control the pain was prescribed (acetaminophen 750 mg every 8 hours for 3 days). The removal of the suture was performed 10 days after. After implant healing period, 5 months, it was performed a control periapical radiograph (Fig 3), reopening and installation of healer (Fig 4). After 20 days the unitary implant-supported prosthesis was installed, allowing the restoration of the patient's esthetics and masticatory function (Fig 5). After 18 months the patient returned for clinical and radiographic control exam (Fig 6).



**Figure 2** - Initial radiograph of the receiving area.



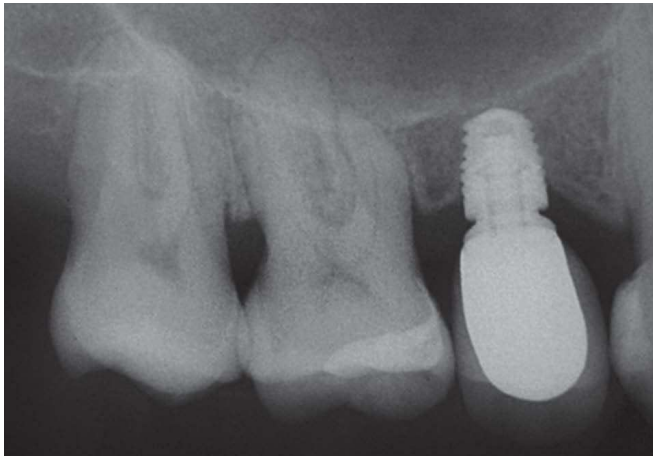
**Figure 3** - Periapical radiograph 5 months after implant installation surgery.



**Figure 4** - Reopening and installation of the healer.



**Figure 5** - Final photograph.



**Figure 6** - Control periapical radiograph after 18 months.

## Discussion

Today in Brazil there is a significative number of partial and total toothless individuals. With the increase in the life expectancy of the world population, it is common the presence of elderly with dental absences and necessity of prosthetic rehabilitation.<sup>13,14</sup>

With the extended use of conventional removable prosthesis, there is continuous resorption of bone tissue,

providing greater discomfort and dissatisfaction to the patient.<sup>15</sup> Besides, it is known that bone tissue loss in areas limited by important anatomic structures — such as the mandibular canal and the maxillary sinus — might preclude the rehabilitation treatment with conventional osseointegrated implants.<sup>4</sup> With the advent of short implants a new possibility was developed for treating areas adjacent to these anatomic structures, avoiding grafting procedures and/or more complex surgical procedures.<sup>16</sup>

Nowadays it is difficult to find a consensus in literature, related to the term short implant, as regards to its length. Most authors consider short implants as the ones under 10 mm.<sup>11,17,18</sup> There are researchers who advocate as “short implant” the ones with 10 mm or less.<sup>19,20</sup> And there are those who believe that short implants must have length under 8 mm.<sup>21</sup>

Papers can be found reporting high index of success with short implants, however some aspects must be considered in order to improve this success: bone quality, implant diameter, geometry, design, surface treatment, number, position, crown-implant proportion, type of occlusion and forces magnitude.<sup>10,22-26</sup>

Bruggenkate et al<sup>20</sup> followed 253 treated surface implants, over a period of 1 to 7 years. Out of these, 45 located in the maxilla and 208 in the mandible, with 6.0 mm in length and 3.5 or 4.1 mm in diameter. Seven implants were lost: 5 in the maxilla because of inflammation in the healing phase and 2 (maxilla and mandible) due to bone loss without inflammation and with unitary crowns in molars. The remaining implants were followed over 6 years and resulted in a success rate of 94%.<sup>20</sup>

Another study reported the monitoring of 269 implants: 139 in the mandible and 130 in the maxilla in the sizes 6, 7, 8, 8.5 and 10 mm, in 111 patients, for 92 months. It was possible to observe that it were lost 12 implants: five of 7.0 mm, one of 8.0 mm, two of 8.5 mm, four of 10 mm. The success rate of 10-mm implants when compared to that of short implants did not present statistical significance.<sup>27</sup> According to the authors, the bone quality seemed to be a decisive and determinant factor for the success of short implants. The technological progress lead to an improvement on the surface of short implants, the success rate increased to values over 93%, very similar to conventional sizes implants.<sup>22</sup> Alterations on the shape and rugosity of the surface were developed to increase the mechanical imbrication between bone and implant improving the initial stability, resistance and dissipation of forces. Surface treatment accelerates the osseointegration process, allowing the premature installation of the prosthesis.<sup>10</sup>

In short implants the smaller length is compensated by the annexations of threads, substantially increasing the contact area between bone and implant. The region with greatest forces transmitted to the implant is near the bone crest, while the apical region receives less tension, therefore the length of the implant might not be the most important factor in the distribution of loading on the interface bone-implant.<sup>10</sup>

Although literature show some risk factors for short implants — such as high crown-implant proportion, greater occlusal loadings on the posterior region and little bone density in the premolars and molars regions<sup>10,28,29</sup> — it is important for the professional to develop a careful protocol that must be followed to control risk factors and optimize the results in order to compensate the smaller length of short implants. Implant design, surface treatment, splinting, absence of cantilever and canine guided occlusion are resources that improve results when using short implants.<sup>10</sup>

### Conclusion

Short implants can be a good treatment alternative for specific cases in which there is absence of enough residual bone for installation of conventional implants. This type of implant can make the rehabilitation treatment less costly to the patients and less traumatic, for it can avoid complementary surgeries of bone grafting. However it is necessary that the professional specialist in Implantology perform a careful planning to minimize future problems.

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