

# Use of bone exostosis associated with biomaterial in maxillary sinus floor elevation

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**Objective:** *Bone exostosis refers to benign bone growths in the craniofacial skeleton. They occur along the labial, lingual (mandibular torus) or palatal (palatal torus) regions of the jaws. The presence of these structures can affect phonation, chewing and adaptation to partial or completely removable dental prostheses. The removal of these structures should always be considered. In addition, the removal and use of these structures should also be considered in cases of atrophy of the alveolar ridge, when seeking to promote rehabilitation through the use of dental implants. Therefore, the aim of the present study was to report a clinical case in which a patient exhibited a palatal torus and required surgery to raise the floor of the maxillary sinus in order to then install an implant. The palatal torus was removed and utilized in association with heterogeneous biomaterial. **Keywords:** Exostoses. Alveolar bone loss. Bone resorption.*

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## INTRODUCTION

Bone exostosis refers to benign bone growths in the craniofacial skeleton. They occur along the labial or lingual/palatal regions of the jaws. They are more commonly located in the vicinity of mandibular pre-molars (mandibular torus) or the midline of the palate (palatal torus).<sup>1-4</sup>

The etiology of these structures has not been completely clarified in the literature, although it is known that they involve well-circumscribed bony protrusions that originate in the cortical bone and can be unilateral or bilateral.<sup>3-6</sup>

Tori are generally asymptomatic, although since they have an extremely thin epithelial covering, they can be irritated easily by slight movements, such as opening and closing the mouth during chewing.<sup>4-8</sup> Significantly, this structure hinders the correct adaptation of a complete or removable prosthesis, thereby hindering the performance of certain rehabilitation procedures with these patients. Furthermore, the presence of these structures can hinder the patients phonation, and in some cases, affect their psychological state.<sup>8-9</sup> Thus, when a torus is diagnosed, surgical removal should always be considered.

Cases of bone exostosis also lead to indications for removal in special circumstances, such as during implant rehabilitation, in which the area where the implant will be inserted has suffered from a gradual process of alveolar bone

reabsorption. This prevents the use of an implant without previously performing a bone graft. In these cases, the surgical removal of the torus provides a donor site that is ideal for the bone graft, since it is the patient's own tissue and exhibits the ideal properties for the formation of a new bone (osteogenesis, osteoinduction and osteoconduction).<sup>10-11</sup>

Therefore, the aim of the present study was to report a clinical case in which a patient required surgery to raise the floor of the maxillary sinus and exhibited bone exostosis on the midline of the palate. The torus was later removed and used in association with biomaterial.

## CASE REPORT

A female patient, aged 41 years of age, sought oral maxillofacial surgery to install dental implants. During the anamnesis, she reported tooth loss in the right upper section (15 years previously) and the use of a removable prosthesis in the area. The clinical and radiographic examination confirmed the absence of elements #15, #16 and #17 in this area, as well as a bone height of approximately 4mm to the floor of the maxillary sinus in the area of elements #16 and #17. In addition, the patient also exhibited bone exostosis on the midline of the palate, which was compatible with palatal torus (Figs 1 and 2).

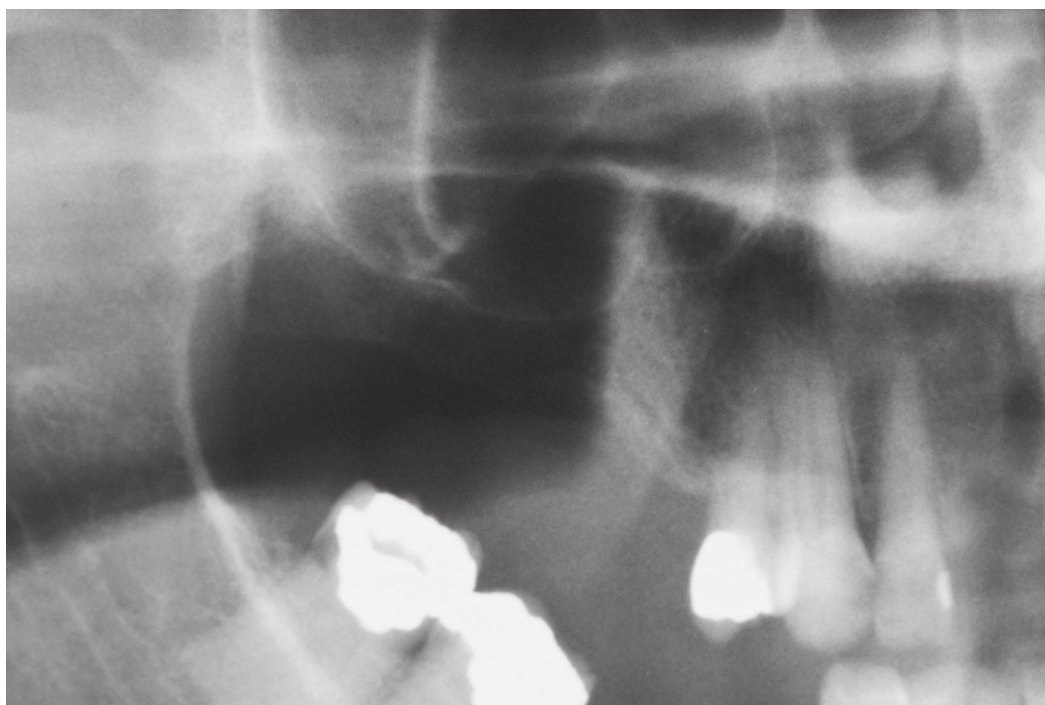
The proposed treatment involved raising the floor of the maxillary sinus and using particles of the palatal torus in association with heterogeneous

biomaterial, under local anesthesia. The association of the materials was necessary due to the fact that the torus was not large enough to perform the bone graft in isolation.

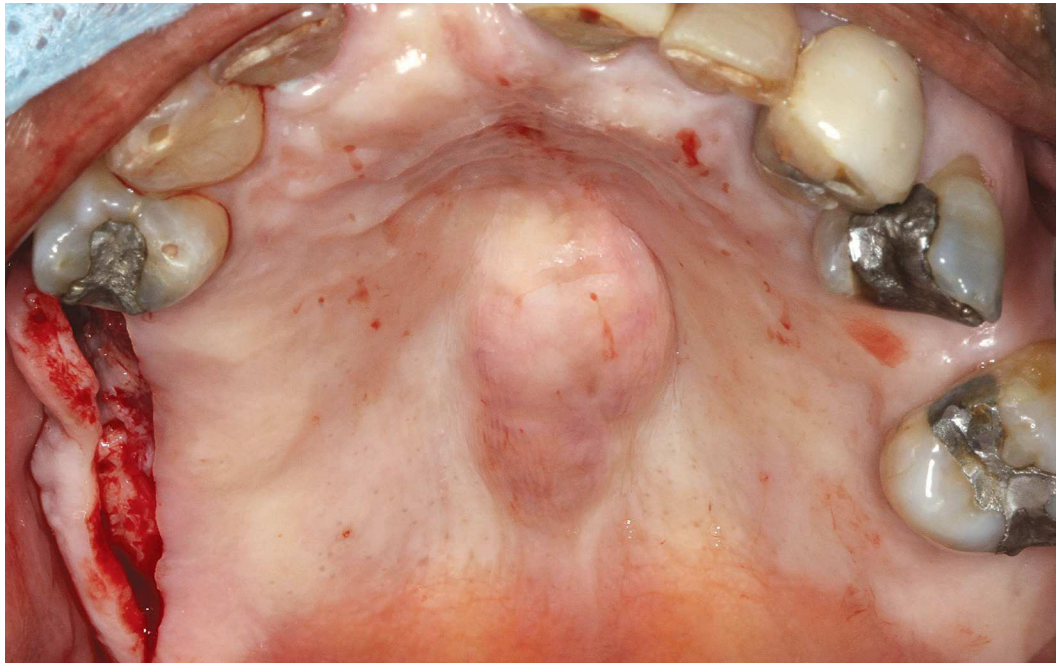
The surgery began by accessing the receptor area by means of a Neumann

incision and mucoperiosteal displacement of the anterior wall of the maxillary sinus, thereby exposing the bone tissue in the area (Fig 3). Subsequently, osteotomy was performed with a spherical diamond drill in order to reach the sinus membrane, which was displaced using specific curettes (Fig 4).

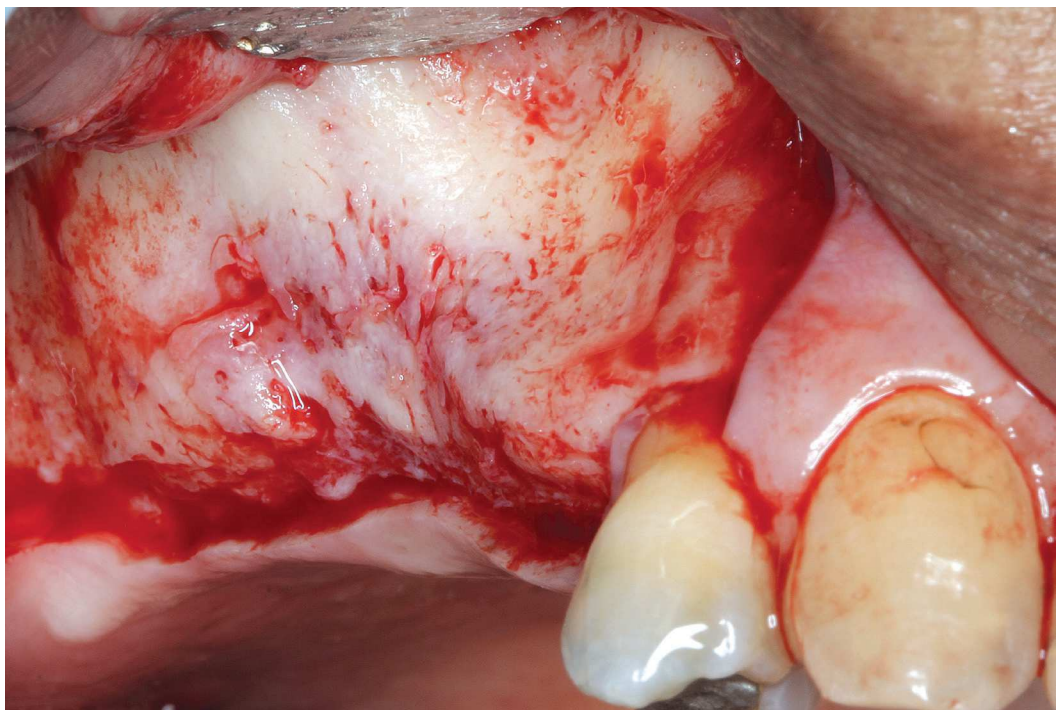
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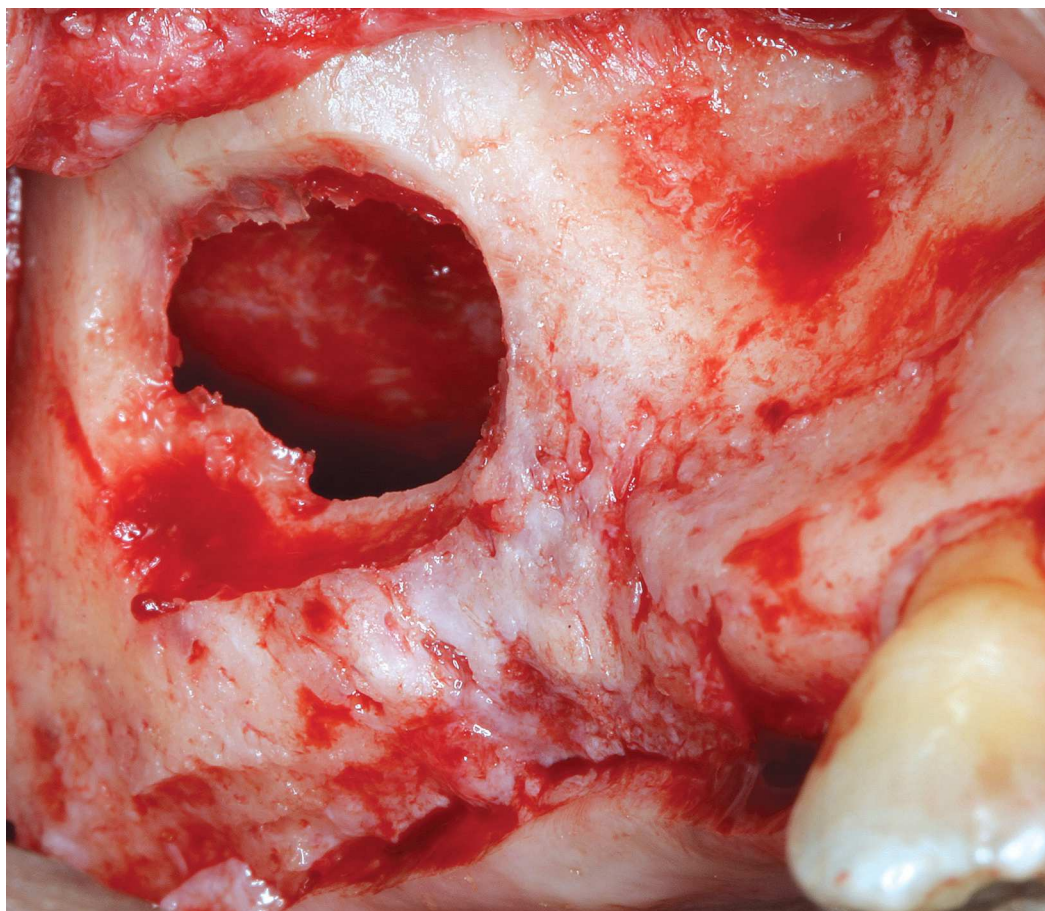
**Figure 1.** Partial view of the panoramic radiograph showing the pneumatization of the maxillary sinus and the consequent loss of bone height in the area.



**Figure 2.** Bone exostosis on the midline of the palate (palatal tonsil).



**Figure 3.** Clinical view of the anterior wall of the maxillary sinus after the incision and mucoperiosteal displacement.

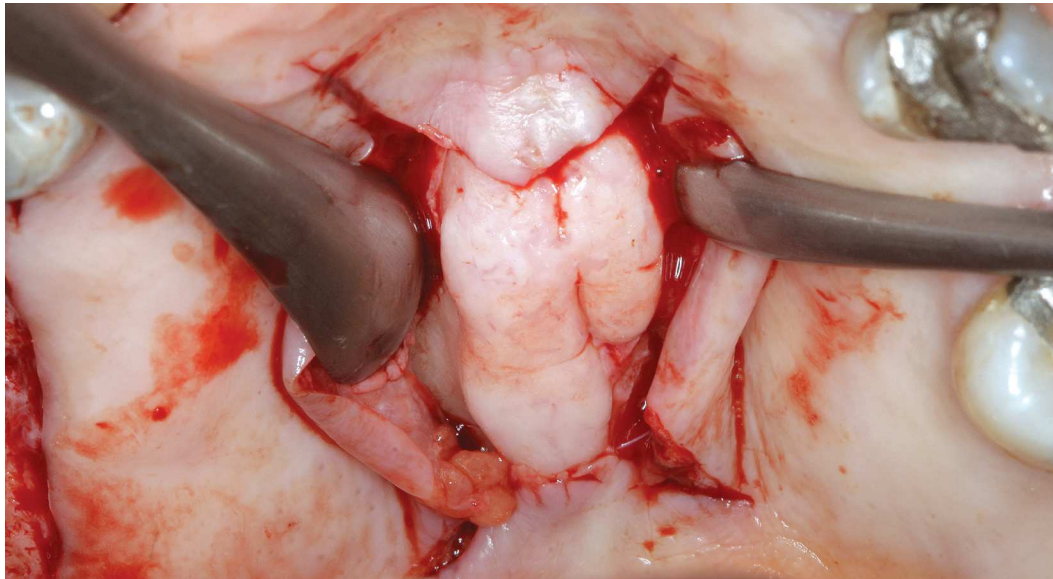


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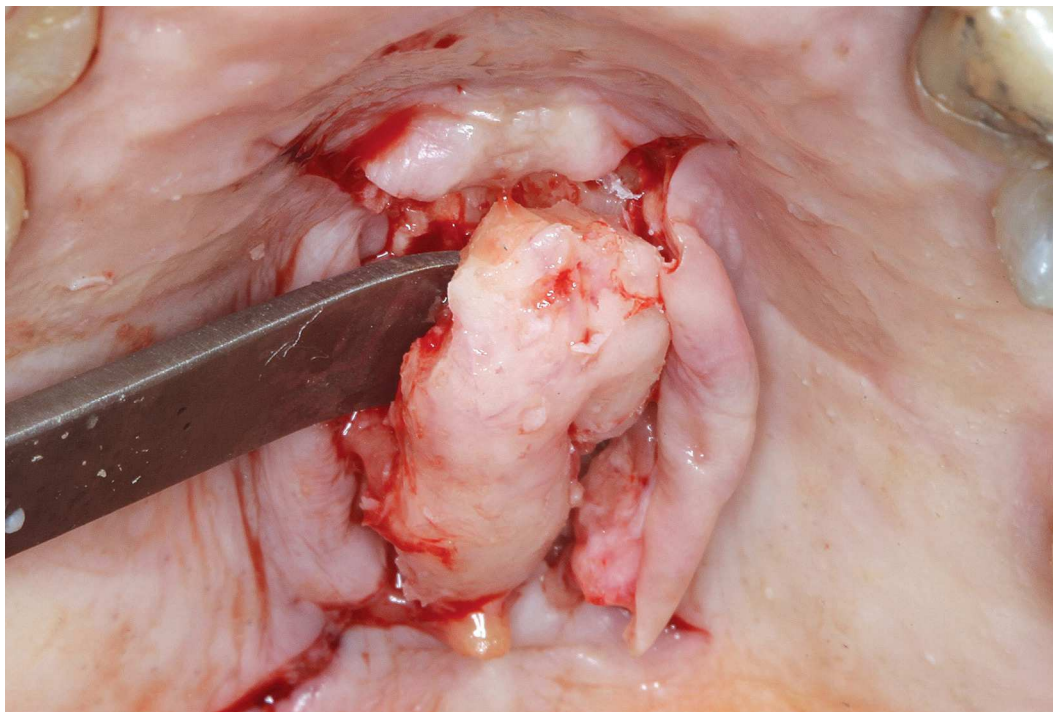
**Figure 4.** Access to the maxillary sinus through the lateral window. Note the displacement of the sinus membrane in order to create space to insert the graft.

The next stage of the surgical procedure involved a double Y incision of the bone exostosis on the palatal midline, as well as mucoperiosteal displacement in the area to expose the palatal torus (Fig 5). The removal of the torus was carried out through osteotomy, using a Wagner curved chisel and hammer, taking care not to communicate with the nasal cavity (Figs 6 and 7).

The palatal torus was ground into particles using bone crushers and osteoconductive biomaterial of bovine origin (Lumina-Bone, Criteria) was then added to increase the volume and fill the maxillary sinus (Fig 8). To finish the surgical procedure, suture of the donor and receptor areas was performed using catgut 3-0 suture (Point-Suture).



**Figure 5.** After the double Y incision and mucoperiosteal displacement in the area, it was possible to observe the aspect and characteristics of the torus.

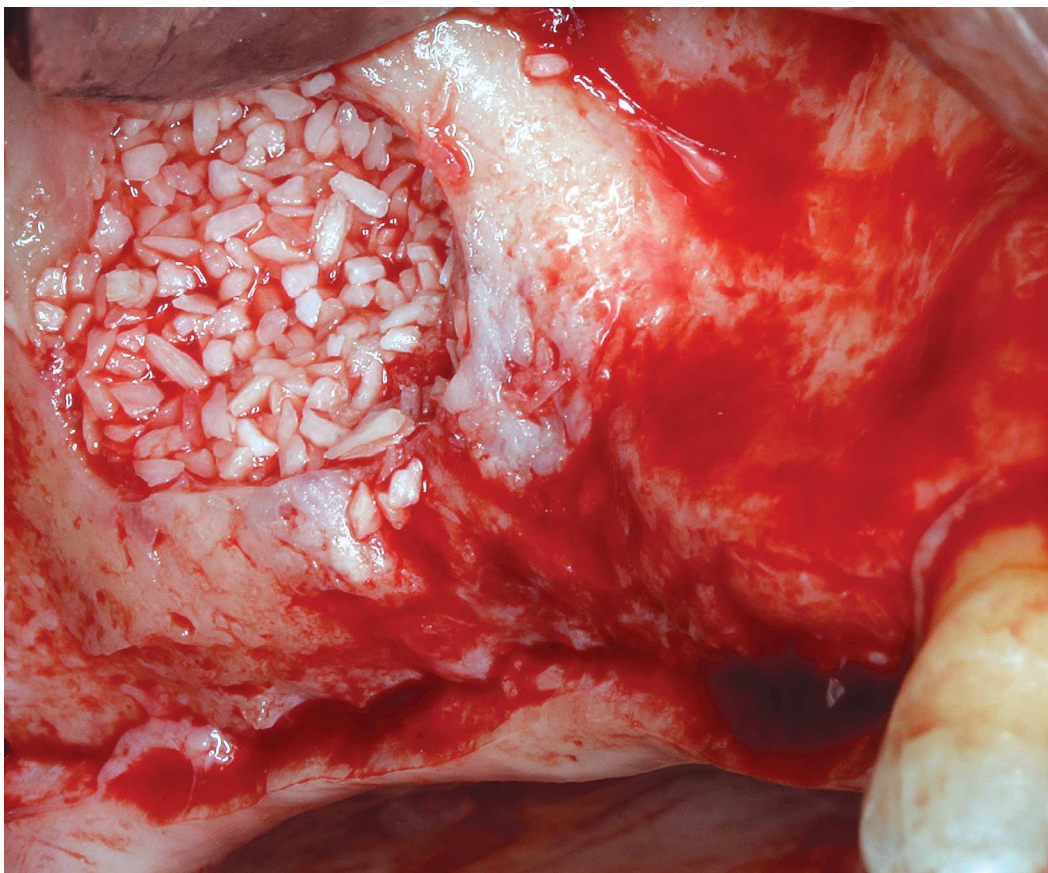


**Figure 6.** Removal of the torus through osteotomy, using a Wagner curved chisel. Special care should be taken to avoid communication with the nasal cavity.



**Figure 7.** Palatal torus removed. The torus was subsequently ground into particles and associated with biomaterial (Lumina-Bone, Criteria) to increase the volume.

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**Figure 8.** Maxillary sinus adequately filled with the association of torus particles and heterogeneous biomaterial.

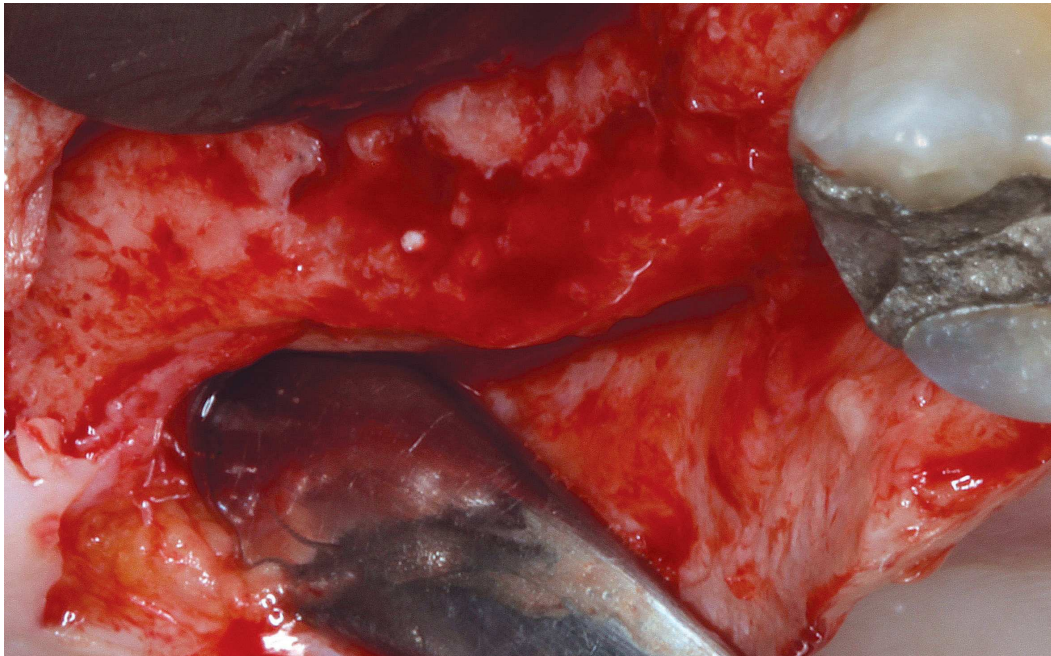
After five months, the patient was re-assessed and the imaging revealed a bone height of approximately 12 mm in the graft area, which indicated a height gain of approximately 8mm (Fig 9).

Based on the satisfactory results found in the imaging examination, the patient underwent surgery to install dental implants in the area. Three implants (3.75x 11.5mm) were installed (Easy Grip, Conexão), according to the reverse planning and surgical guide (Figs 10, 11, 12 and 13).



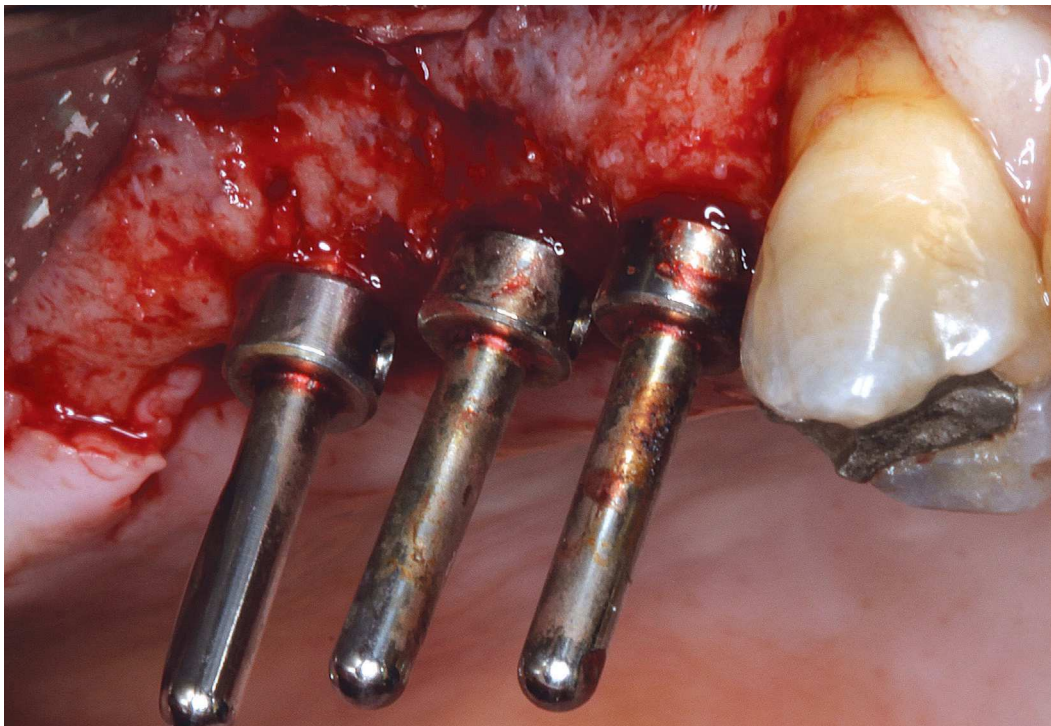
**Figure 9.** Radiographic aspect five months after the procedure. Note the gain in bone height of approximately 8mm.



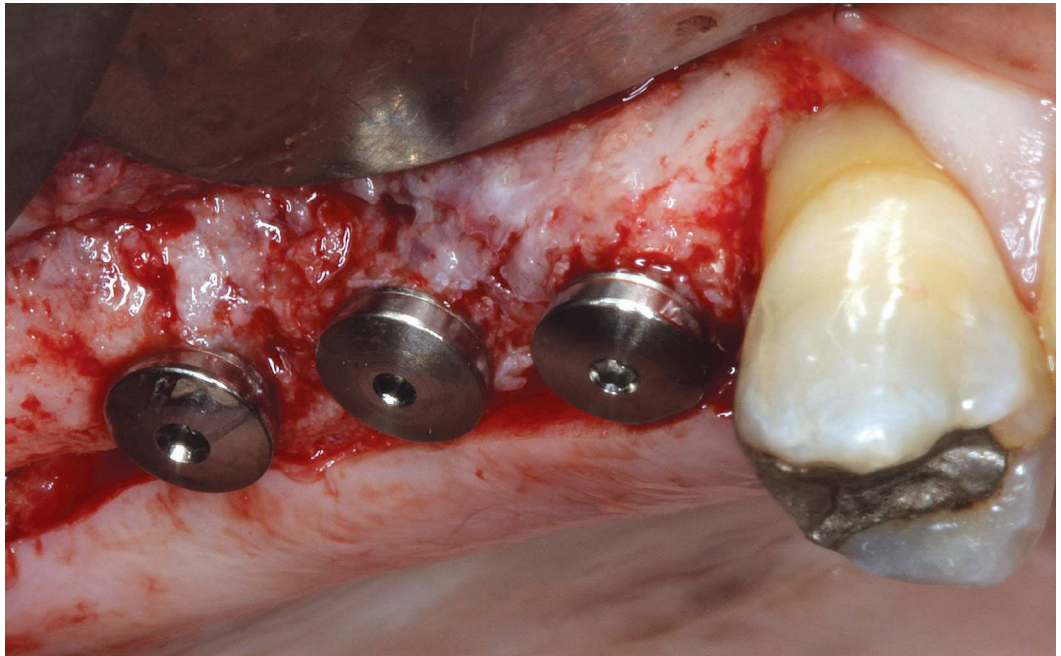


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**Figure 10.** Incision and mucoperiosteal displacement aiming at installing the dental implants.



**Figure 11.** Paralleling pins used during the preparation and milling for implant placement.



**Figure 12.** Dental implants installed. The torque obtained was greater than 30 Ncm for all of the implants installed.



**Figure 13.** Partial view of panoramic x-ray with implants placed.

## DISCUSSION

Currently, the main objective of Odontology is to restore the masticatory function and esthetics of patients, regardless of the existence of wounds, tumors, atrophy or bone deficiencies in the jaws.<sup>12</sup> After tooth loss, it is common for patients to experience atrophy of the alveolar ridge, often resulting in bone deficits that hinder the installation of implants.

Tori or bone exostoses refer to the gradual growth of benign abnormalities that do not usually lead to clinical implications. Occasionally, however, they need to be removed surgically as they can lead to negative psychological effects, hinder the patient's speech, chewing and phonation, or prevent the installation of prostheses.<sup>1-4</sup>

Since this scenario involves additional bone growth, it can be used as a donor site in cases that require a bone graft prior to the installation of dental implants.<sup>11,13-17</sup> The great advantage associated with their use is that the patient's own tissues are reused, providing the ideal properties for new bone formation. Therefore, whenever a patient requires bone graft surgery, the surgeon should examine the existence of possible bone exostoses that could be removed/used.

On the other hand, one must consider that the quantity of bone obtained from a torus depends on the size of the bone exostosis, which is usually small, thereby

limiting their use to the treatment of small defects.<sup>12-17</sup> In this clinical case, the authors opted to associate the torus with osteoconductive biomaterial of bovine origin. The results of this type of material have been previously reported by Nóia et al.<sup>18</sup> and Goulart et al.<sup>19</sup>, both of whom highlighted the viability and efficiency of this strategy.

It is important to take great care when handling the bone that will be collected. At the time of collection, we recommend the removal of the bone in blocks, which can later be fixed using screws, or ground into particles if required.

If drills are used to wear down the torus material, extreme care must be taken to prevent the bone from being contaminated by the patient's saliva at the time of collection, as this would increase the risk of post-operative infections.

According to Proussaefs<sup>11</sup>, the success of grafts removed from the area of a torus is similar to that of grafts from other intra-oral areas, which is reassuring in terms of their usage. The same author reported that the potential complications involved in this technique are low, while success rates are high.

Despite the scarcity of scientific literature on the use of bone exostoses as a donor site for bone grafts, the results of the present study are contrary to those found by Proussaefs<sup>11</sup>, since there were no complications in this case and the surgery was deemed a success.

## FINAL CONSIDERATIONS

The use of existing bone exostoses, associated with osteoconductive biomaterial, provided an excellent gain in bone height in the maxillary sinus, thereby enabling the installation of implants of adequate conditions and proportions.

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