

# Use of homologous bone in partial reconstruction of the maxilla: a case report

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**Introduction:** *This study aims to show the completion of a clinical case using homologous bone grafts in Dentistry for partial reconstruction of the maxilla. The grafts decrease in morbidity, when compared to the need for a second intra or extraoral surgical site to use autogenous bone, made us choose this alternative bone reconstruction of the patient and have shown to be able to receive implants and prosthetic rehabilitation safely.* **Methods:** *a portion of homologous bone (iliac crest) derived from the bone bank at the Federal University of Paraná was used. Part of the graft was ground and used to fill the maxillary sinus and placed in apposition of the anterior region.* **Results:** *The execution of a CT scan of the grafted area 08 months after the surgery showed enough bone availability to receive 08 immediately loaded implants.* **Conclusion:** *The result of homologous bone graft achieved in the clinical case allowed 8 implants to be placed in areas that received grafts and proved capable of receiving stable and asymptomatic masticatory forces with immediate loading and during 15 months of followup.* **Keywords:** *Dental implants. Transplantation, homologous. Tissue banks.*

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**How to cite:** Sallé MR, Vieira RA, Fonseca AV. Use of homologous bone in partial reconstruction of the maxilla: a case report. *Dental Press Implantol.* 2015 July-Sept;9(3):90-9.

DOI: <http://dx.doi.org/10.14436/2358-2553.9.3.090-099.oar>

**Submitted:** January 28, 2015 - **Revised and accepted:** July 07, 2015

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\* The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

\* Patients displayed in this article previously approved the use of their facial and intraoral photographs.

## INTRODUCTION

The frequent need to make bone reconstruction in patients that will receive dental implants induce dental surgeons to resort to surgical techniques that make bone tissue available for grafting.<sup>1,2</sup>

Among the bone grafting materials, autogenous bone is considered the gold standard. Besides acting as an important osteogenic and osteoinductive material, the autogenous bone expresses osteoconductive properties due to the release of growth factors during the healing process. For bigger reconstructions, where the defects comprehend extensive areas of the maxillary ridge, there is the need for extraoral areas.<sup>3</sup>

The use of autogenous grafts aiming the application of bone integrated implants was described by Breine and Brånemark<sup>4</sup> and currently, after countless published works,<sup>5-9</sup> it is accepted without restrictions as a procedure for the mouth and maxillary facial rehabilitation.

On the other hand, autogenous grafts are followed by great morbidity in patients that require bone reconstructions, due to the access to the donor area. In intraoral donor areas, the amount of graft is often insufficient when facing major bone reconstructions. However, although extraoral donor areas have enough graft available, they also have higher morbidity, cost and complexity.<sup>7,9,10</sup>

The absence of enough supply and surgical morbidity enhances the clinical ap-

plications for frozen homografts, obtained through organ and tissue banks as a suitable synthetic substitute for the grafts.<sup>11,12</sup>

Reduced surgical morbidity due to the absence of donor area has been related as the main upside in the use of homografts. Besides, complications associated with donor areas such as infections, hematomas, vascular and nervous injuries would be avoided with the frozen homologous bone.<sup>5,6,7</sup>

In a retrospective study, Sheerlinck et al.<sup>13</sup> included patients that had been previously subjected to reconstructive procedures using autogenous bones collected from the iliac crest, calvarial or mandibular ramus bones. The removal of the iliac crest had the most postoperative problems percentage (36.4%), the calvarial graft had 19.2% postoperative problems, while the ramus removal had the least complication percentage (5.6%).

Clinically, frozen homologous bone grafts have been presenting satisfactory results concerning the preparation of bone beds that will receive implants in the future.<sup>6,8,14</sup>

The main proposal of this article is to present the use of frozen homologous bone for maxillary reconstruction in the form of clinical case.

## MATERIAL AND METHODS

Male patient, 42 years old, with a totally edentulous maxilla since he was 18 years old, satisfactory health (ASA I), mainly complained about the lack of stability on

the full upper prosthesis. During the clinical and radiographical evaluation, it was found that the absence of bone structure would not allow the correct stabilization of the full prosthesis or the installation of bone-integrated implants. The thin bone

structure and extended pneumatization of the maxillary sinus showed the need for jaw reconstruction through grafts (Fig 1). Reverse planning was made to determine what kind of prosthesis would be better for an implant-supported rehabilitation.

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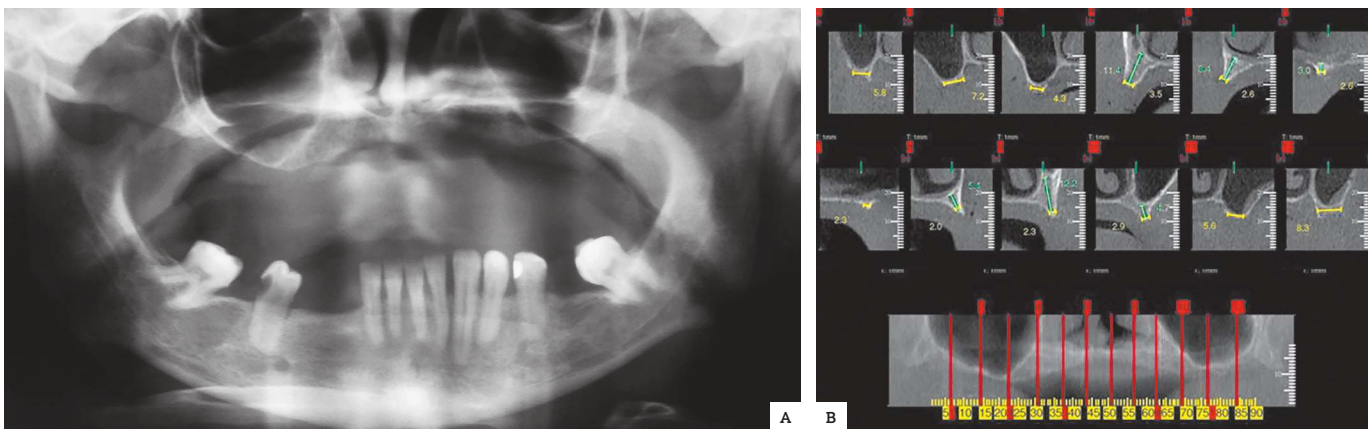
**Figure 1.** Intraoral occlusal aspect of the maxilla.

It has been proposed to the patient three implant rehabilitation techniques described in literature: Surgery for the reconstruction of the jaw with autogenous bone removed from the iliac crest; reconstruction of the jaw with homologous bone taken from bone banks; installation of two zygomatic anchorages and two implants in the anterior region.

Knowing the advantages and disadvantages of each technique, the patient opted for the jaw reconstruction using homologous bone. Based on the radiographic and CT examinations (Fig 2), as well as

previous evaluation, jaw reconstruction was planned with homologous bone in blocks on the premaxilla and ground on the maxillary sinuses.

The patient was subjected to surgery with local infiltrative anesthesia 1:100,000 Articaine for lifting the left and right maxillary sinuses' floor and the installing bone blocks on the premaxilla region to increase thickness. The graft material of choice was a homologous block of the iliac bone (Fig. 3A and 3B) taken from the *Universidade Federal do Paraná's* bone bank (BTME, UFP).



**Figure 2.** A) Initial panoramic radiography. B) CT scan showing the initial bone condition.



**Figure 3.** **A)** Corticomedullary iliac bone block. **B)** ID tag for the material's source.

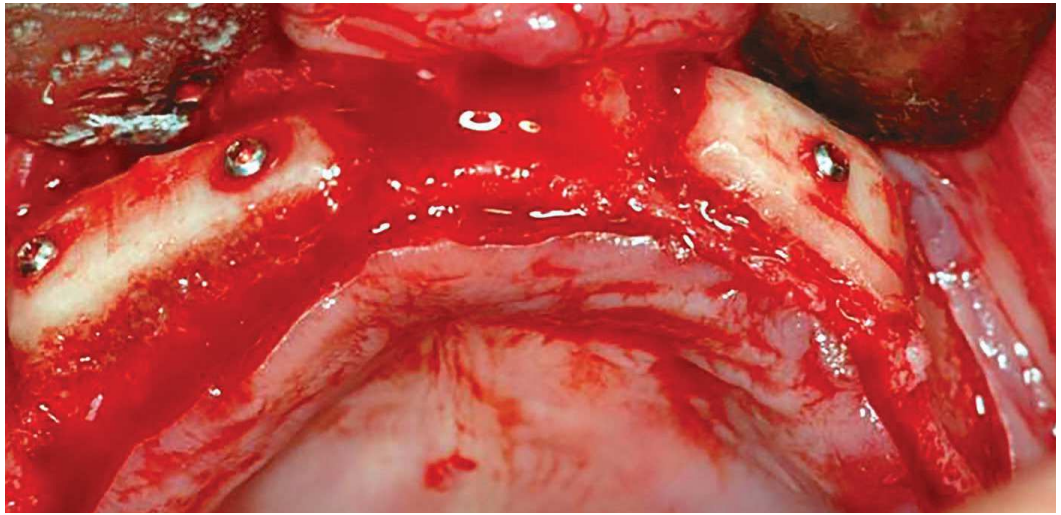
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The periosteum was carefully detached with flap debridement and the bone bed of the anterior region was prepared with spherical drills to create decorticalization and small perforations aiming better nutrition. Part of the block was cut and shaped in two parts – to fit the existent defects – in order to be installed in apposition on the receiving bed, while the other part was ground and associated with Platelet-Rich Plasma (PRP) achieved by double centrifuging the patient's blood to be inserted in the left and right maxillary sinuses. The maxillary sinuses were accessed through windows made with low speed number 6 drills with then

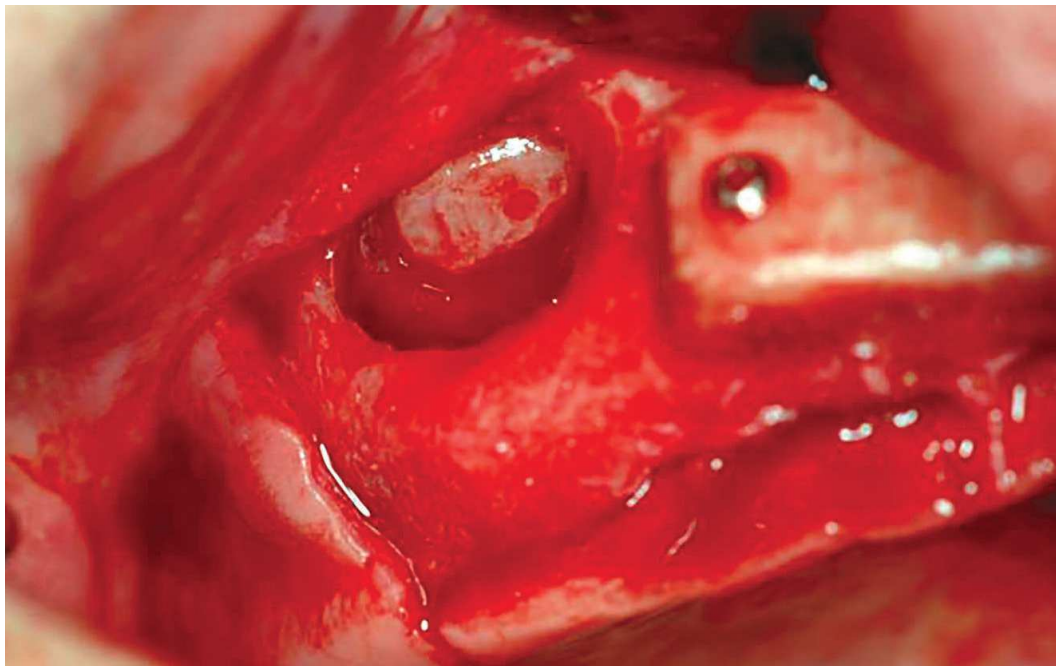
duplicating part (Kavo, São Paulo, Brazil) and the elevated membranes without any perforation (Figs 4 and 5).

The blocks were fixed with 1.3mm thick, 12mm long screws (Neodent, Curitiba, Paraná, Brazil).

After the grafting surgery, the patient was told not to use his full prosthesis for 10 days, and after this period the prosthesis was readapted and rebased with soft resin, and was held stable with the aid of denture fixatives for a period of 8 months, according to the recommendations of the protocol of the tissue bank.



**Figure 4.** Bone blocks fixed on the anterior region of the maxilla.



**Figure 5.** Whole and raised floor membrane of the right maxillary sinus.

## RESULTS

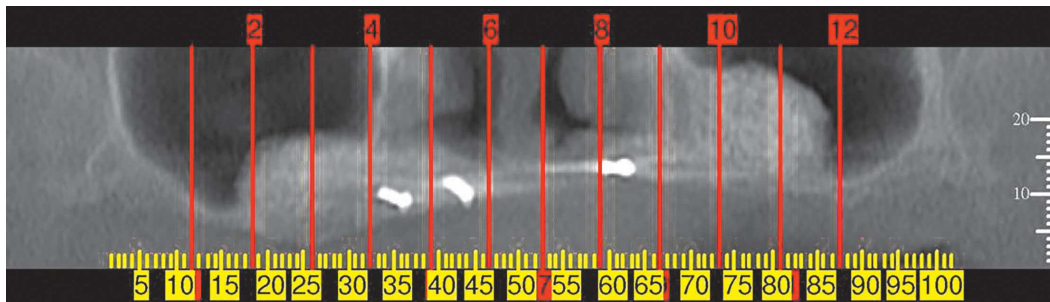
After 8 months of healing, the patient was subjected to new CT scans where the success of the procedure was verified, due to the increased bone volume on the maxillary sinuses and the increased thickness of the premaxilla (Fig 6). Then the surgical plan for the installation of 8 implants was made.

The surgery for the installation of 8, 3.75mm thick with varying heights from 11 to 15mm, external hex implants (Titamax, Neodent, Curitiba, Paraná, Brazil) was then executed. All the implants had initial torque over 40Ncm and it was hence decided for the immediate load with the installation of conical mini-implants (Neodent, Curitiba, Paraná,

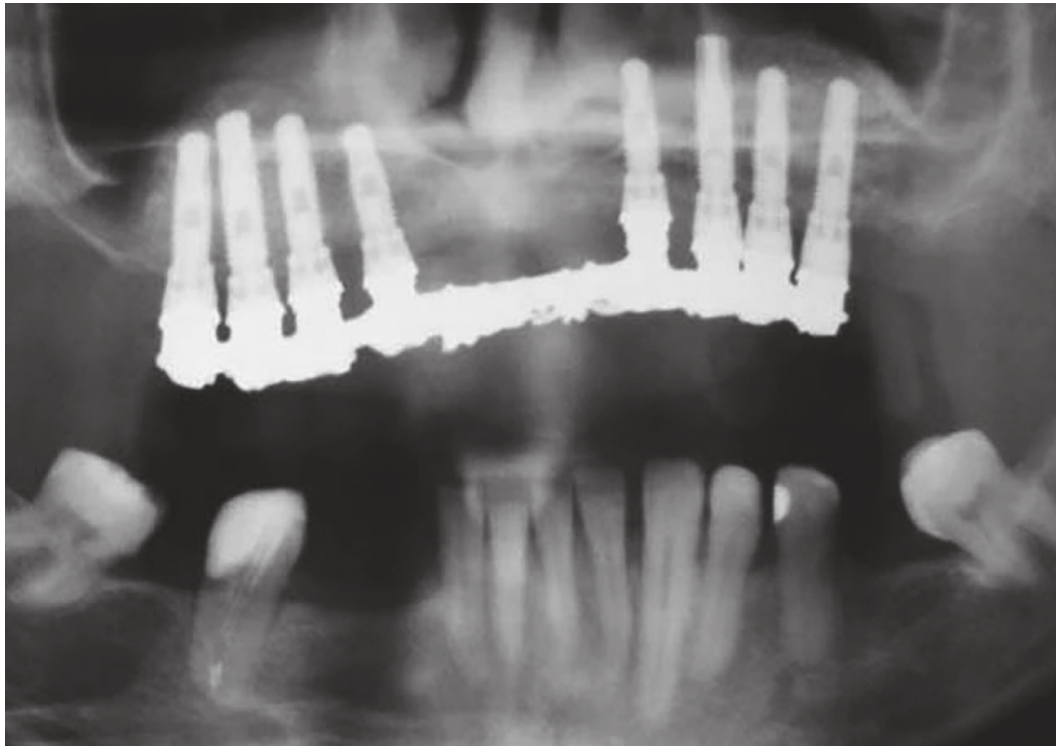
Brazil) over the implants and the molding for the confection and later installation of a protocol type prosthesis with vertical and horizontal gingival compensation according to the initial reverse planning (Figs 7 and 8).

At the latest checkup, made after 15 months, the implants showed themselves stable, with clinical and radiographical periimplantar health. The fixing screws of the prosthesis didn't show signs of unscrewing, confirming the stability and absence of harmful occlusal contacts (Fig 9 and 10). The patient reported a high degree of satisfaction with the rehabilitation due to enhanced masticatory function, quality of life and self-esteem.

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**Figure 6.** CT scan after 8 months.

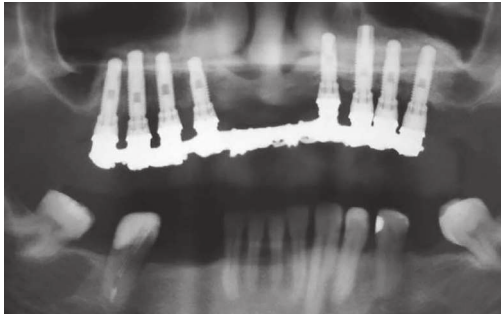


**Figure 7.** Implants and miniimplants installed and the adapted cast bar.



**Figure 8.** Prosthesis with immediate load installed.





**Figure 9.** Radiographical aspect after 15 months.



**Figure 10.** Clinical aspect after 15 months.

## DISCUSSION

Autogenous bone grafts are considered the gold standard for reconstructions, although in the presented case the need for a higher amount of bone graft for the jaw reconstruction made us choose frozen human bone from bone banks instead. Certain grafts characteristics, such as the unlimited availability of bone supply, low morbidity due to the absence of donor areas and good predictability, already described in literature, encourage us to discuss and make use of the material.

The morbidity for patients in need of bone reconstruction using autogenous bone due to the access to the area to serve as donor is indisputable. When this area is intraoral, the amount of grafting is often insufficient for large bone reconstructions.<sup>7,10</sup> On the other hand, with the use of bone bank the material quantity is unlimited<sup>14</sup> and facilitates the reconstruction.

The study by Sheerlinck et al.<sup>13</sup> including patients who underwent reconstructive procedures using autogenous

bone grafts showed that the removal of iliac crest had the highest percentage of problems in the immediate postoperative period (36.4%). On the other hand, several authors<sup>5,6,7,10</sup> demonstrated that other complications associated with donor sites such as infections, hematomas, vascular and nerve damage would be prevented by the frozen homologous bone

The reconstruction of severely reabsorbed jaws has been widely discussed in literature and the use of autogenous bone presents predictable results.<sup>5,7,14</sup> However, other authors have demonstrated that homologous bone from bank bones used in grafted areas has been able to correct the defects of the osseous ridge for the posterior reception of implants and prosthesis that function without any longterm problems.<sup>7,9,12</sup> Studies such as the one from Pelleg et al.<sup>15</sup> using homologous blocks in 41 patients with defective jaw and maxillary thickness had as result an increased vestibular reabsorption in only one graft and from the 84 implants made, only

one was lost. Wallace and Gellin,<sup>9</sup> also showed that it is possible to obtain success in maxillary reconstructions with the use of homologous blocks of cortical spongy bone.

The use of homologous bone grafts coming from tissue banks that are legalized and supervised by the Health Ministry can be considered a viable option in Brazilian Implantology. The strict control for the selection of donors by the tissue banks and ANVISA (National Agency of Health Surveillance) makes contamination and disease spreading risks through homologous grafts practically void. Cases that need major

reconstructions, such as atrophic maxillae, can be more easily solved with bone bank bones due to the available supply of material.

## CONCLUSION

Based in literature reports, in the presented clinical case we opted to reconstruct the patient's maxilla with homologous bone from bone banks (BTME, Curitiba, Paraná, Brazil) and later installing a protocol type prosthesis with immediate load over 8 implants. The patient reports a high degree of satisfaction with the obtained results and during the reevaluations the implants were stable and with maintained bone level.

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