Rehabilitation of Atrophic Maxilla Using the Combination of Autogenous and Allogeneic Bone Grafts Followed by Protocol-Type Prosthesis: A 3-Year Follow-Up Study

Rogério Margonar, DDS, MSc, PhD,* Pamela Leticia dos Santos,† Thallita Pereira Queiroz, DDS, MSc,‡ and Elcio Marcantonio, DDS, MSc, PhD‡

Abstract: Currently, there are several techniques for the rehabilitation of atrophic maxillary ridges in literature. The grafting procedure using autogenous bone is considered ideal by many researchers, as it shows osteogenic capability and causes no antigenic reaction. However, this type of bone graft has some shortcomings, mainly the restricted availability of donor sites. In recent years, several alternatives have been investigated to supply the disadvantages of autogenous bone grafts. In such studies, allogeneic bone grafts, which are obtained from individuals with different genetic load, but from the same species, have been extensively used. They can be indicated in cases of arthroplasty, surgical knee reconstruction, large bone defects, and in oral and maxillofacial reconstruction. Besides showing great applicability and biocompatibility, this type of bone is available in unlimited quantities. On the other hand, allogeneic bone may have the disadvantage of transmitting infectious diseases. Atrophic maxillae can be treated with bone grafts followed by osseointegrated implants to obtain aesthetic and functional oral rehabilitation. This study aimed to show the viability of allogeneic bone grafting in an atrophic maxilla, followed by oral rehabilitation with dental implant and protocol-type prosthesis within a 3-year follow-up period by means of a clinical case report.

Key Words: Homologous, bone transplantation, dental implantation

At present, there are several techniques for the rehabilitation of atrophic maxillary ridges in literature. Among these procedures, autogenous grafts are considered the most acceptable by surgeons.1–3 Bone grafts performed with the use of autogenous bone is considered ideal by many researchers, as it demonstrates osteogenic capability and causes no antigenic reaction, and there is no risk of cross-contamination. However, this type of bone graft presents limitations, including restricted donor sites and morbidity caused by surgical intervention, among others.4,5

In recent years, several alternatives have been investigated to supply the disadvantages of autogenous bone: from the use of allogeneic, xenogeneic, and alloplastic bone grafts, to different placement methods, such as zygomatic or inclined implants and electromagnetic and ultrasonic waves.1,6–8

Allogeneic or homogenous grafts have been extensively used, and according to Leonetti and Koup,9 they correspond to grafts obtained from individuals with different genetic load, but from the same species. This type of graft can be indicated for arthroplasty, surgical knee reconstruction, large bone defects caused by traumas, infections, or tumors; neurologic surgeries; and oral and maxillofacial surgical reconstruction.10

Besides showing great applicability, an allogeneic graft is biocompatible, exhibits good postoperative response, and reduces postoperative discomfort, and there is no morbidity to the donor site and is available in unlimited quantities.2 However, this type of graft may have the disadvantage of transmitting infectious diseases.11 Allogeneic grafts come from dead or alive donors who lose a body member by amputation. Commonly, the tibia and femur are the best donor sites.3,5

Atrophic maxillae can be treated with bone grafts followed by osseointegrated implants, to obtain aesthetic and functional oral rehabilitation. This study aimed to show the viability of the combination of allogeneous and autogenous bone grafts in the restoration of an atrophic maxilla, followed by osseointegrated implant and protocol-type prosthesis within a 3-year follow-up period by means of clinical case report and literature review.

CLINICAL REPORT

A 60-year-old female patient visited the clinical dental office of the School of Dentistry of Araquara, São Paulo State University, complaining functionally and aesthetically about her complete denture. In the preoperative evaluation, during the inspection and palpation examination, total absence of the upper teeth associated with loss of bone width was noticed. Panoramic radiograph showed limited bone availability (Fig. 1). Based on these preoperative examinations, severe resorption in the maxilla was diagnosed, which contraindicated the placement of dental implant.

The treatment suggested to the patient was bone grafting, using autogenous bone associated with allogeneic bone. The latter was obtained from the tissue bank of the University of Marília (UNIMAR, São Paulo, Brazil) in the form of corticocancellous block graft taken from the tibia, as the patient hesitated undergoing

From the *Discipline of Implantology, University Center of Barretos; †Department of Surgery and Integrated Clinic, Discipline of Oral and Maxillofacial Surgery, UNESP–São Paulo State University, Araçatuba; and ‡Department of Diagnostic and Surgery, Discipline of Oral and Maxillofacial Surgery, UNESP–São Paulo State University, Araraquara, São Paulo, Brazil.

Received March 8, 2010. Accepted for publication April 25, 2010.

Address correspondence and reprint requests to Pamela Leticia dos Santos, Rua José Bonifácio, 1193, CEP: 16015-050, Araçatuba, São Paulo, Brazil; E-mail: pamela.santos@hotmail.com

The authors report no conflicts of interest.

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medical procedures to obtain bone from extraoral donor sites. Subsequently, implant placement and prosthesis were planned.

In the first step, the maxillary area was surgically prepared. Briefly, a local incision was made in the alveolar ridge followed by 2 relieving incisions in the posterior region; the allogeneic block graft was sculpted and carefully adapted to the recipient bed (Fig. 2).

In the second step, 2 autogenous bone blocks were removed from the mental region of the mandible. For this purpose, mental, incisive, and lingual nerves were initially anesthetized, a perpendicular incision along the teeth axis was made on the mucosa, and the mucoperiosteal flap was unattached and positioned down. With the donor site exposed, osteotomy was carried out under abundant irrigation with sterile saline solution, and 1 bone block was removed from each hemiarch. The autogenous bone collected was triturated for later use in combination with allogeneic bone (Fig. 3).

The previously prepared allogeneic graft tissue was fixed by using bone screws (13 × 1.6 mm; Conexao Sistemas de Prótese Ltda, São Paulo, Brazil). Spaces between the allogeneic blocks and the recipient bed were filled with the mixture of allogeneic and autogenous particulate bone. The deep tissue layers were sutured with 5-0 Vicryl, and the superficial mucosa was sutured with 5-0 nylon.

Six months after osseous reconstruction of the alveolar ridge, 9 external hexagon implants were placed (Conexao Sistemas de Prótese Ltda), with the following measurements: four 3.5 × 10-mm and one 4.3 × 10-mm implants on the left side; two 3.5 × 10-mm, one 4.3 × 10-mm, and one 4.3 × 11.5-mm implants on the right side (Fig. 4). Prosthetic rehabilitation was carried out 6 months after implant placement, through microunit abutments and screw-retained implant-supported prosthesis (Fig. 5).

**DISCUSSION**

In 2002, the Brazilian Ministry of Health regulated the operation of bone tissue banks, where parameters for adequate donor selection, processing, and storage of the collected materials were established. These parameters considerably reduced the transmission of infectious diseases.10

The first consideration in a surgical planning to restore the adequate osseous architecture for implant placement is to determine the type of graft that will be used. This choice should be based on the amount of bone needed and on the patient’s expectations.7

In the present clinical case, the allogeneic-type implant was chosen because great volume of bone tissue was needed to carry out the prosthesis rehabilitation. Another reason that led to the choice of this grafting material was that the patient had no interest in undergoing medical surgery to collect autogeneic bone extraorally. Another option to rehabilitate the atrophic maxilla would be to use the zygomatic or inclined implant. Some points were considered in the present case, such as how to treat a possible loss of implants, the reduced alveolar ridge and its surgical restoration, and adequate lip support that the grafting procedure may provide. These
The use of allogeneic bone graft is an additional option for restoration of atrophic maxillae with subsequent placement of dental implants and protocol-type prosthesis, as it can be obtained in unlimited quantities, avoiding the need for a second site of operation in the patient.

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**FIGURE 5.** Final panoramic radiograph, after 3 years of follow-up.
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