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CASE REPORT

The challenges of reconstruction and rehabilitation of atrophic jaw with an autogenous graft from skull cap – a case report

Os desafios da reconstrução e reabilitação de mandíbula atrófica com enxerto autógeno de calota craniana – relato de caso

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Abstract

Introduction: One of the challenges of maxillofacial surgery is the rehabilitation of patients with severe bone loss, using implant-supported prostheses. This challenge is based on the small remaining bone structure, and on the need to reconstruct the structure for the rehabilitation with autogenous or exogenous grafts. **Case report**: We report the case of a patient with severe maxillary atrophy, where a skullcap graft was performed associated with implant placement and prosthetic completion 14 months after the start of treatment. **Final considerations**: We demonstrate clinical safety for the use of extraoral grafts without complications, representing a good alternative treatment for this group of patients.

Keywords: Maxilla; Edentulous Jaw; Skull. Bone Transplantation; Oral Reconstruction.

Resumo

Introdução: um dos desafios da cirurgia bucomaxilofacial é a reabilitação de pacientes com perda óssea severa, utilizando próteses implantossuportadas. Este desafio baseia-se na pequena estrutura óssea remanescente e na necessidade de reconstrução da estrutura para a reabilitação com enxertos autógenos ou exógenos. **Relato de caso**: Relatamos o caso de um paciente com atrofia maxilar grave, onde foi realizado enxerto de calota craniana associado à instalação de implante, com finalização protética 14 meses após o início do tratamento. **Consideracoes finais**: Demonstramos segurança clínica para o uso de enxertos extrabucais sem complicações, representando uma boa alternativa de tratamento para este grupo de pacientes.

Palavras-chave: Maxila; Maxila edêntula; Crânio; Transplante Ósseo; Reconstrução Bucal.

INTRODUCTION

The search for materials for bone grafting of lost human tissues is increasingly studied[1]. For more than 40 years, autogenous grafts have been considered the gold standard for bone recovery of defective areas of the facial skeleton representing osteoconductive, osteoinductive, and osteogenic properties[2]. Intra- (mandible, pubic, chin) and extra-oral (rib, iliac crest, tibia, skull cap) donor sites can be used. However, the viability of the donor site and the associated morbidity have been subjects of great discussion[3,4]. Skull cap grafts are characterized by having a thick cortex and a dense medullary layer, associated with a low rate of resorption[3].

Aiming at the aesthetic and functional establishment of patients with severe bone atrophy caused by long periods of edentulism, the installation of endosseous implants has been used for the complete rehabilitation of the patient (5). The objective of this study was to report a clinical case of free bone graft from the skull cap in a female patient with severe maxillary atrophy, where bilateral maxillary sinus lifting was associated with complete gain in height and maxillary alveolar width for rehabilitation with implantation protocol type.

CASE REPORT

A 52-year-old female patient, leukoderma, without allergies and comorbidities, attended the outpatient clinic of Maxillofacial Surgery and Traumatology at the Federal University of Uberlândia (UFU, Uberlândia/MG-Brazil) with an aesthetic and functional complaint. Upon clinical examination, upper and lower edentulism associated with severe maxillary atrophy was observed. Limited thickness and vertical deficiency were noted in the alveolar ridge, being associated with complaints of lack of prosthesis retention by the patient.

Radiographic and tomographic exams (Figure 1A-B) were requested to diagnose the bone condition of the region and showed severe resorption of the maxillary ridge. We opted for reconstruction under general anaesthesia with a skullcap graft

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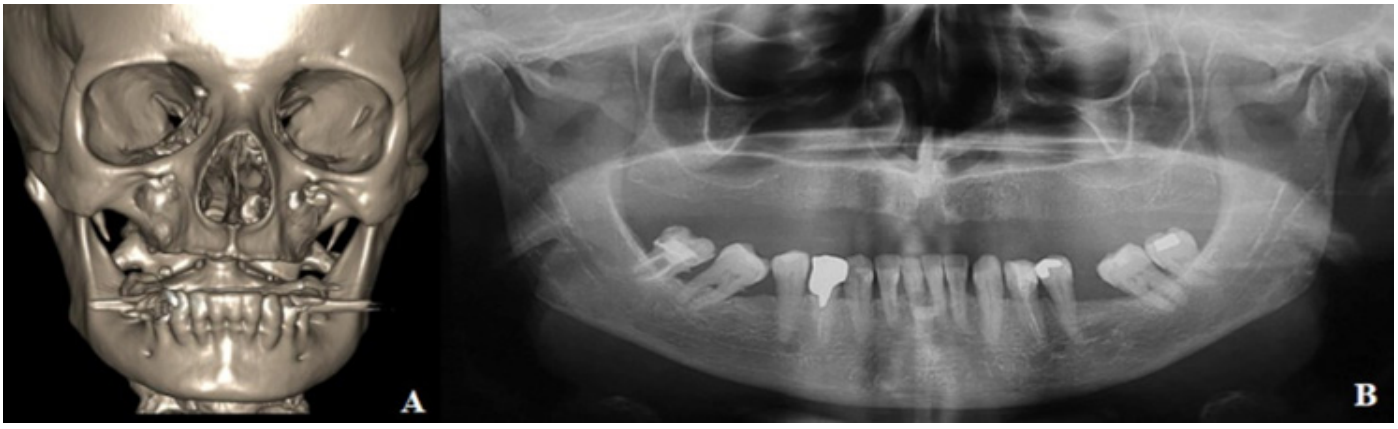
to restore the volume of the upper ridge, with the association of bilateral maxillary sinus lifting to increase the height of the posterior region with a view to later restoration with endosseous implants.

Under general anaesthesia and nasotracheal intubation, the skull cap graft was harvested with the help of the Neurosurgery team at Hospital das Clínicas/UFU.

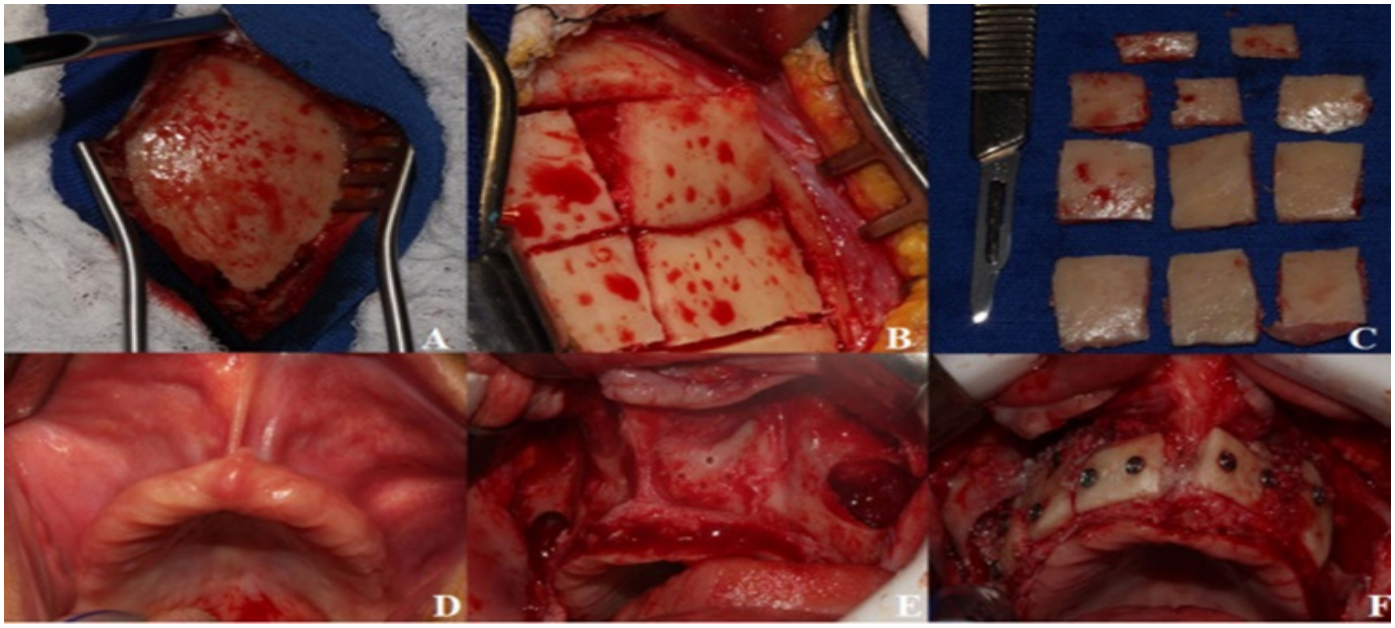
Figure 1. Initial evaluation. (A) A panoramic x-ray and (B) computed tomography demonstrating severe maxillary atrophy



The incision in the parietal bone region, with total mucoperiosteal detachment, was performed (Figure 2A), followed by osteotomy with a carbide bur 701 for delimitation of the blocks to be removed (Figure 2B). With the aid of a curved chisel, 11 blocks (1x1cm) were collected (Figure 2C), which are preserved in the saline solution until grafting. There were no complications during the removal of the blocks. After local osteoplasty, the donor region was protected with methacrylate, with subsequent suture in planes with absorbable monofilament suture and closure by the first intention with nonabsorbable monofilament suture.

Subsequently, bilateral maxillary vestibular access (Figure 2D) was performed with exposure of the entire maxillary ridge through total mucoperiosteal detachment. After performing a bilateral maxillary sinus survey, the bone blocks were prepared for grafting (Figure 2E). Five blocks were particulate and installed below the maxillary sinus membrane to complete the maxillary sinus surveys. Using 9mm bicortical screws, five skull cap graft blocks were modelled and fixed in the anterior maxillary ridge. The last block was also particulate and was installed throughout the region between grafts (Figure 2F). The mucosa was sutured with absorbable monofilament suture by the first intention.

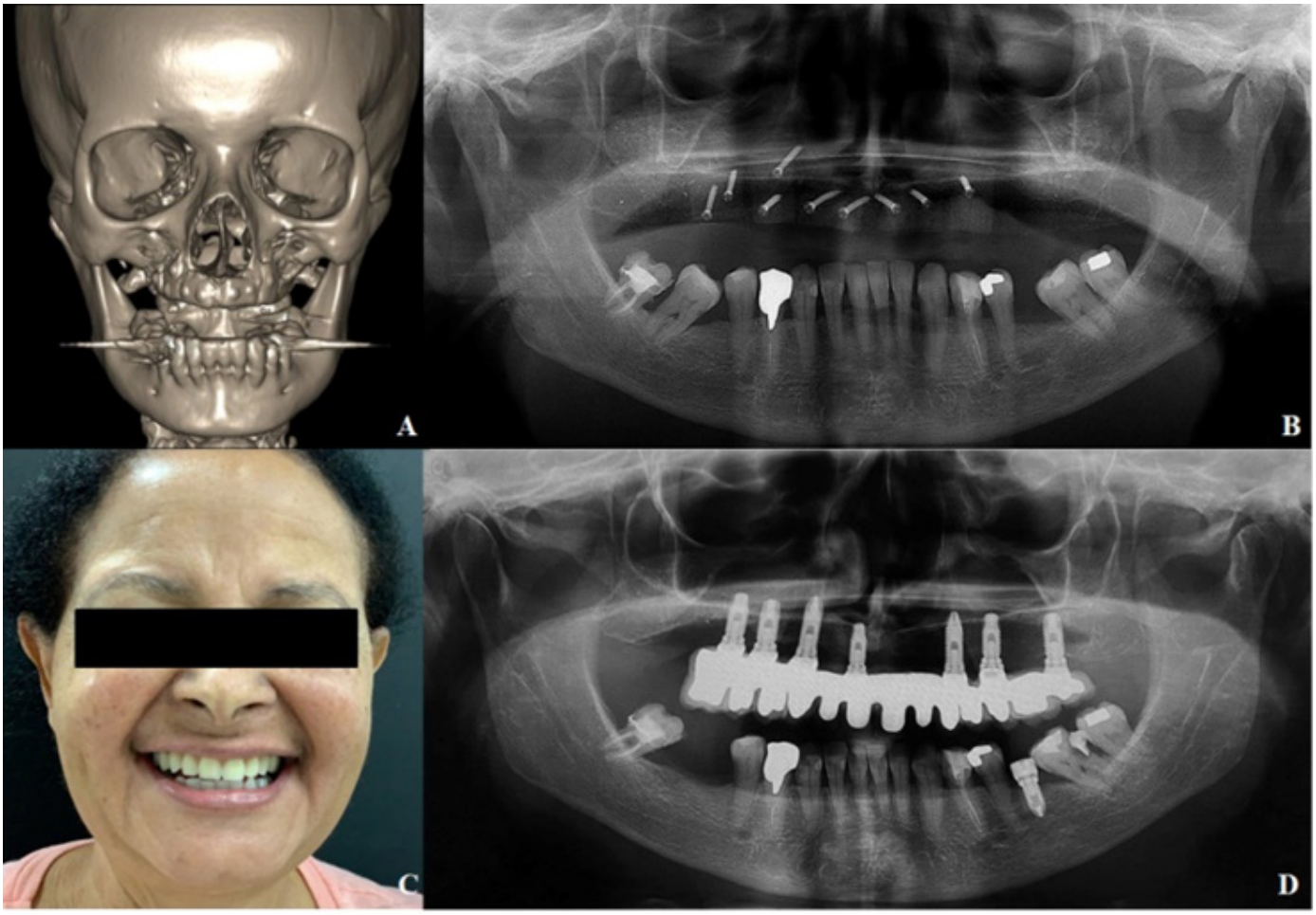
Figure 2. Removal of the autogenous graft from the skull cap and maxillary bone grafting. A) Skull incision with total mucoperiosteal detachment. B) Delimitation of blocks to be harvested with a 701 carbide bur. C) Removal of blocks of autogenous bone from the skull cap (1x1cm). D) Initial intraoral appearance. E) Total mucoperiosteal detachment to expose the entire maxillary ridge and bilateral maxillary sinus lift, without rupture of the trans-operative maxillary sinus membrane, followed by filling the cavities with previously particulate bone. F) Installation of graft blocks with 9 mm screws across the maxillary rim, filling the entire surface with autogenous particulate bone from the skullcap.



The patient was discharged the day after the surgery, without complaints, using Amoxicillin 500 mg and Ibuprofen 300 mg every 8 hours, and Dipyrone Sodium 1g in case of pain. Immediate postoperative computed tomography and panoramic x-ray were performed (Figure 3A-B) showing a gain in thickness and height in the maxilla. The skin sutures were removed on the tenth postoperative day, showing good local healing, without signs of inflammation. The patient evolved without complaints, infections, or complications.

After 6 months of the grafting procedure, the postoperative radiograph showed signs of graft osseointegration and a satisfactory bilateral maxillary sinus survey. After 8 months, eight external hexagon implants (3.75x11cm) were installed, with a minimum of 35N of torque. After 6 months, the ceramic prosthesis was installed on implants (Figure 3C-D), restoring function and definitive aesthetics.

Figure 3. Comparative imaging evaluation. (A) An immediate postoperative panoramic x-ray and (B) computed tomography, showing a gain in thickness in the maxilla on the three-dimensional reconstruction. Twenty months after the bone graft, (C-D) final panoramic x-ray after complete implant-prosthetic rehabilitation.



DISCUSSION

The need for jaw reconstruction represents a current challenge for surgical specialties in dentistry[1]. The search for restoring the volume, height, and width of the alveolar edges for later rehabilitation with osseointegrated implants, as well as restoring the height and facial profile, represent the main clinical challenges in the reconstruction of atrophic jaws.

Grafts represented the most common approach for the treatment of severely atrophic jaws[6]. Calvarial bone grafts have several advantages over other donor sites, including lower resorption rates[6,7], scar hidden by the capillary region[7], low morbidity and postoperative complication[3,7], good bone quality (volume and quantity available)[3], minimal postoperative pain[3], and few complications related to the donor (alopecia, damage to dura mater, meningitis)[8,9,6]. Despite these benefits, what is observed is that the indication for reconstruction with extra-oral autogenous grafts is not always passed on to patients due to the fear of the professional himself, who is not always familiar with the technique, concerning the procedure. Therefore, it is necessary to disseminate this technique, which,

although complex, has an excellent postoperative and favorable prognosis in elderly patients. In this case report, no trans- and postoperative complications were observed, corroborating the findings in the literature of low incidence of complications, confirming the safety of the use of skullcap grafts.

Complication rates of this technique are extremely low (0.25%) (6). One of the biggest concerns when opting for grafts is their rate of resorption, which can lead to insufficient bone volume and/or quality for subsequent implant installation (5,6). The histological aspects of these grafts demonstrate that skull bone transplants have more osteoblasts and less osteoclastic activity when compared to iliac crest grafts (3,5,6). Smolka et al. (2006) found a rate of bone resorption in skull cap grafts of 16.2% after 6 months in 51 grafts and 19.2% resorption after 1 year in 26 grafts, corroborating the low rates of resorption associated with this graft reported in the literature (10). Another important factor for the viability of the bone graft is the positive effect of preserving the periosteum to promote repair. Grafts whose periosteum has been preserved and placed in contact with soft tissues have shown improved survival since the periosteum is probably one of the sources of osteogenic cells (8). We observed a low rate of resorption of the cap graft, which made it possible to install dental implants in eight months, where adequate torque and stability were achieved in all implants, factors that were fundamental for the favorable prognosis of the case.

Resorption causes not only a reduction in bone volume, but also decalcification and reduction of trabecular bone, leading to a decrease in bone density, and insufficient bone volume and quality, making subsequent insertion of endosseous implants difficult (10). Thus, in choosing the best maxillomandibular reconstruction technique, multiple factors must be taken into account, where the region to be operated and the purposes of rehabilitation should be carefully evaluated and planned, thus choosing the best material for grafting.

CONCLUSION

Reconstruction of atrophic jaws with bone grafts allows the restoration of lip support and the restoration of facial height. Low rates of resorption and complications are observed with skull cap grafts. Corroborating with the literature, this case report demonstrated clinical safety for the use of a skullcap graft, without trans and postoperative complications, and graft osseointegration after 6 months of grafting, with full implant-prosthetic functional and aesthetic rehabilitation in 20 months of treatment.

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