International Journal of Biomedicine 15(3) (2025) 605-607
http://dx.doi.org/10.21103/Article15(3)_CR5

CASE REPORT

INTERNATIONAL JOURNAL OF BIOMEDICINE

Bone Ring Technique: A Case Report

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Abstract

Tooth extraction is accompanied by vertical reduction of the alveolar ridge as a result of the bone atrophy. In cases involving the upper jaw, changes in alveolar bone dimensions can also be accompanied by pneumatization of the maxillary sinus. These changes are even more common after the extraction of the maxillary first and second molars, and especially after the extraction of two or more teeth in a row in the distal maxillary region. Different techniques and materials are used to provide adequate bone support for dental implants in these cases. In the presented case, the autogenous bone ring (bone ring technique) transplantation technique, combined with the immediate placement of the implant during the same surgical session, was applied. (**International Journal of Biomedicine. 2025;15(3):605-607.**)

Keywords: tooth extraction • bone resorption • implant • autogenous bone rings

For citation: Arllati S, Syka K. Bone Ring Technique: A Case Report. International Journal of Biomedicine. 2025;15(3):605-607. doi:10.21103/Article15(3)_CR5

Introduction

Early extraction of the teeth of the distal region of the maxilla is often accompanied by a large bone loss, and as a result, it leads to the reduction of the vertical dimension of the alveolar ridge. In cases involving the upper jaw, changes in the dimensions of the alveolar bone can also be associated with the pneumatization of the maxillary sinus.[1,2] These changes are more pronounced after the extraction of the first or second maxillary molar, and especially in cases of the extraction of two or more teeth in a row in the distal region. The replacement of an extracted natural tooth with an osseointegrated implant represents one of the most important advances in contemporary dentistry.

Various procedures and materials are in use to provide adequate bone support for dental implants.[3-5] In cases with advanced bone resorption and maxillary sinus pneumatization,[6] the autogenous bone ring transplantation technique, combined with immediate implant placement in the same session, is an advanced method that significantly reduces the time compared to other methods.[7-11] For the application of this technique, the specific indication is the thickness of the remaining bone, which must be under 2 mm. Through this technique, vertical regeneration is achieved through the autogenous bone.

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The peculiarity of this technique lies in the immediate placement of the dental implant alongside the bone ring. The bone ring in this case serves as the primary stabilizer of the implant, simultaneously acting as a bone deposit to increase the level of deficient bone.

Case Presentation

During an intraoral examination of a 46-year-old male patient, it was discovered that tooth #16 was absent, having been extracted 10 years prior. In the 3D CBCT digital radiological examination, a low level of the alveolar ridge in that region with pronounced pneumatization of the maxillary sinus was found (Figure 1).

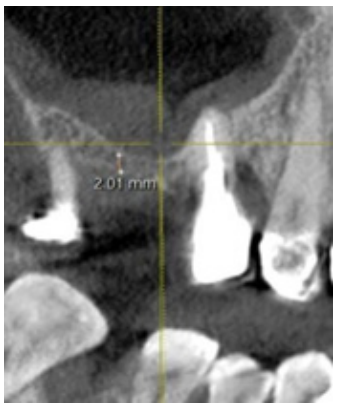

Fig. 1. *Photo 1. 3D CBVT digital radiography, analysis of the bone in the distal part of the maxilla, in the region of tooth #16, marked bone insufficiency is observed in the alveolar ridge (>2 mm).*

From the anamnestic data, there is no evidence of any health condition that would contraindicate surgical intervention. He does not smoke, and biochemical laboratory tests show normal values. Bone augmentation after raising the maxillary sinus is performed using an autogenous bone ring taken from the patient, bone particles in the form of Xenograft artificial granules, and a self-absorbing collagen membrane fixed in place with titanium screws, each with a length of 4-6 mm. The surgical technique with an autogenous bone ring enables the immediate placement of the dental implant by facilitating vertical augmentation of the alveolar ridge in the distal region of the upper jaw.

Surgical Intervention

In the lower jaw, in the retromandibular region, a bone ring is taken, which is pulled through special trephines to collect the bone, which remains in physiological digestion in order not to lose organic matter until the moment of augmentation. After the bone osteotomy in the region of tooth #16, the window for lateral access to the maxillary sinus was opened, the membrane (Schneiderian) was carefully raised, and sufficient space was created for vertical augmentation with autogenous bone rings. The dental implant was immediately placed and fixed through the autogenous bone ring. Augmentation was done with xenograft and autograft in a 50/50% ratio. To secure the augmenting material, a self-absorbing collagen membrane was applied (Figures 2-4).

Fig. 2. *Bone ring.*

Fig. 3. *Immediate placement of the dental implant and its fixation through the autogenous bone ring.*

Fig. 4. *Augmentation with xenograft (Geistlich Bio-Oss) and autograft (Bone ring), as well as placement of a collagen membrane (self-absorbing), to provide the augmenting material.*

Four months after the surgical intervention, a digital radiological check-up was performed, which revealed that the bone augmentation and osseointegration of the dental implant were complete. The bone ring showed very low rates of resorption, as well as high rates of integration into the xenograft artificial bone (Figure 5). The physical parameters of the measurements indicate that the length of the bone ring was 9.3 mm, and the total length was 17.4 mm. The autogenous bone ring also did not undergo internal resorption during the time of osseointegration of the implant. From 10 mm at the time of placement, it was rooted to 9.3 mm of bone height, which proves a satisfactory regenerative result.

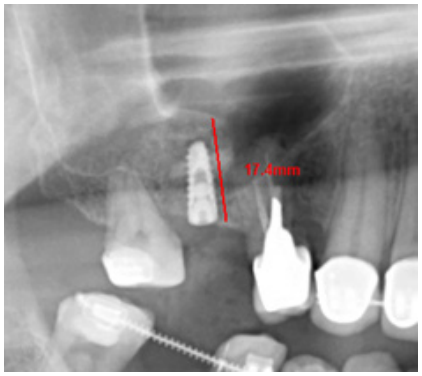

Fig. 5. *The vertical level of the alveolar ridge marks a significant increase from 2.1 mm to 17.4 mm bone height.*

Discussion

Alveolar bone augmentation is often necessary when planning the placement of dental implants. Invasive augmentation procedures frequently require staged implant placement, which increases the overall treatment duration.

The innovative approach, which combines ring-shaped autogenous bone grafts with dental implant placement in a

single session, has been demonstrated to be efficient and safe for alveolar ridge augmentation. Autogenous bone ring grafts are safely stabilized through dental implants. Their dimensions were determined by the diameter of the dental implant and the degree of bone atrophy, ensuring adequate stability of the implant and good biocompatibility with both the alveolar bone and the implant. The application of this technique results in less bone resorption compared to other bone regeneration techniques.

In conclusion, scientific sources demonstrate the advantages of the autogenous bone ring augmentation technique for regenerating vertical bone defects in the distal region of the upper jaw,[10-14] particularly in cases where the pneumatization of the maxillary sinus is pronounced. This technique significantly reduces the waiting time for the patient's final prosthesis, eliminates the need for multiple surgical interventions, and utilizes autogenous bone to compensate for the resorbed vertical dimension over time.

Competing Interests

The authors declare that they have no competing interests.

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