



Healing by Secondary Intention in Fresh Sockets Filled with Bio Oss[®]: A Case Report Study

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Authors' contributions

This work was carried out in collaboration between all authors. Authors PLS and JLG designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors EJF and MMK did surgical and prosthetics procedure. Author FDA did follow-up the patient and managed the analyses of the study. Authors TMV and TC managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

After dental extraction, the corresponding alveolar bone suffers remodeling, and the bone volume decreases as time goes by, becoming atrophic. The Bio-Oss[®] is a biomaterial which presents similar crystallinity and chemical composition to the mineral natural bone, and it acts as a framework due to its osteoconductive properties. The objective of this study is to evaluate, through a literature review and a case report, the efficiency of the biomaterial Bio Oss[®] regarding the alveolar maintenance for the rehabilitation with osseointegrated implants after dental extraction. The atraumatic extraction of the teeth 11 and 21 was performed in a male patient, and after that,

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the respective alveoli were filled with the biomaterial Bio Oss[®]. Two and a half months after the dental extraction and the filling with Bio Oss[®], a new surgical procedure for the installation of the osseointegrated implants was performed. It was possible to observe through tomographic image that the alveoli of the teeth 11 and 21 were completely filled with mineralized tissue. We can conclude that the biomaterial Bio Oss[®] is efficient for the preservation of the alveolar bone after dental extraction, acting as a framework for the bone neoformation for a later installation of osseointegrated implants.

Keywords: Alveolar ridge preservation; Bio-Oss[®]; bone graft; Xenograft.

1. INTRODUCTION

1.1 Aims

Although there has been a rising interest in the immediate implant placement, it has been reported that this procedure may be affected by the presence of infection, lack of soft tissue for suture and defects between the bone and implants. Therefore, the late installation of the implant is still one of the main options for clinicians. It is recognized, however, that the resorption of the residual edge following the dental extraction is inevitable, especially in cases where there are multiple sites of adjacent extraction [1-2]. The aim of this study was to evaluate, through a literature review and a case report, the effectiveness of Bio-Oss[®] biomaterial regarding the alveolar maintenance for the rehabilitation with osseointegrated implants after dental extraction.

2. CASE REPORT

A male patient, 29 years old, complaining about the teeth number 11 and number 21. In the physical and tomographic examinations, we observed that the region had bone resorption around the teeth and an unsatisfactory restoration with the crowns and intra-canal pins (Figs. 1 and 2). We carried out an atraumatic extraction of the teeth number 11 and number 21, after that, the respective alveoli were filled with small granules (0,25 – 1 mm) of the biomaterial Geistlich Bio-Oss[®] (Geistlich Pharma AB, Wolhusen, Switzerland). A provisional removable partial prosthesis was rebased, and installed after its filling with the biomaterial, without placing the membrane for the guided bone regeneration or carrying out a suture (Figs. 3A and 3B). At the same time, we carried

out a cone-beam computed tomography to visualize the filling of the alveoli.



Fig. 1. Initial situation of the patient

Fifteen days after the surgical procedure, it is possible to observe the conditioning of the gingival emergence condition and the persistence of the biomaterial in the region (Figs. 3C and 3D).

After 84 days of the extraction and the dental filling with Bio-Oss[®], (Figs. 3E and 3F) we carried out a new surgical procedure for the installation of the osseointegrated implants. The implant system used was Neodent (Neodent[®], Curitiba, Brazil). Implant with prosthetic connection of cone type morse with size of 3.5 x 15 mm. We observed through tomographic image that the alveoli of the teeth number 11 and number 21 were completely filled with Bio Oss particles, thus enabling the installation of the implants in the region. We carried out a dental milling for the installation of the implants, starting with a spear drill, and proceeding with a helical drills of 2.0 mm; 2.8 mm followed by the installation of the implants. The procedure was performed with the aid of a surgical guide and under abundant irrigation with 0.9% saline solution (Fig. 4).

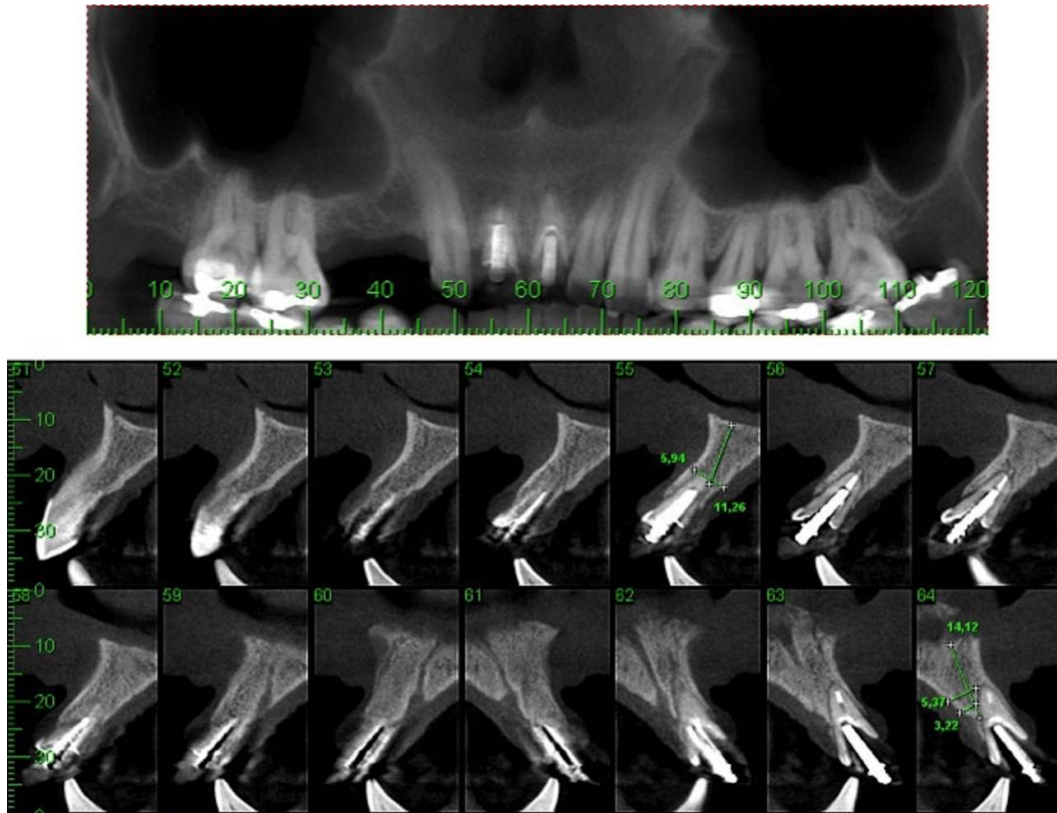


Fig. 2. Computed tomography of cone beam, demonstrating the bone loss around the teeth 11 (sections 54-58) and 21 (sections 61-64)

Two months after the installation of the implants, we carried out a new computed tomography to evaluate the surgical procedure. We observed the presence of the well-positioned implant, aiming the rehabilitation with the prosthesis on the implant and we also observed the presence of a structure compatible with the bone tissue around the implants. The implant-supported prosthesis was made after three months of the implantation surgery.

Clinical and tomographic examinations were performed in a one -year follow-up after implants insertion. No alteration was observed to suggest infection, prosthesis instability and implants mobility (Fig. 5).

3. DISCUSSION

After the dental extraction, a significant alteration in the contour of the alveolar ridge occurs due to bone resorption and remodeling. As a result of these processes, the post-removal dimensions of the region are smaller than the alveolar bonedimensions previous to dental extraction [3-5].

Procedures of preservation of the alveolar ridge aim to fill the extraction cavities immediately after the extraction [6]. This helps to avoid alveolar crest atrophy and keep the appropriate dimensions, which facilitates the installation of implants in prosthetically favorable positions or the maintenance of an acceptable bone contour in areas of aesthetic concern [7].

It was suggested that the placement of dental implants in fresh alveoli, after extraction, could neutralize the alveolar resorption [8].

Findings from experiments on dogs [9-11] and from clinical trials [9] showed; however, that the installation of dental implants immediately after the dental extraction cannot prevent the resorption of the buccal bone plate on edentulous patients [12-13]. Furthermore, the implant position isn't often favorable for the subsequent rehabilitation with prosthesis, it places an implant where there is bone.

Aesthetic implants or dental prosthesis, especially in the anterior region, require an

appropriate bone contour for complete reconstruction, in order to achieve an aesthetically favorable emergence profile in edentulous areas. In order to preserve the original dimensions of the alveolar bone after the dental extraction and to promote the bone regeneration of the residual alveolus, several grafts and bone substitutes are used in combination or not with membranes for guided tissue regeneration (GTR). Among these graft materials, the deproteinized bovine bone mineral (DBBM), has a biological structure similar to that of human bone, is capable of promoting bone regeneration and preserving the pre-removal

dimensions of the alveolar bone when grafted on alveoli immediately after the extraction [4,14-15].

The search for the ideal material for alveolar ridge preservation continues. Although the autogenous bone is generally well accepted by most patients, it always involves more surgery in the donor area and, therefore, its morbidity. Besides, if you mix the biomaterial with autogenous bone, as often said, may there still be a need for an extra donor area in case enough bone tissue isn't got near the implant installation [9,16].



Fig. 3. A: Frontal view - Installation of removable partial prosthesis provisional for conditioning the gingival emergence profile and biomaterial barrier to the on-site maintenance. B:Occlusal view -fresh sockets filled with Bio Oss® without insertion membrane for guided bone regeneration or performing suture. C: Postoperative 15 days – Frontal view - Observes the gingival conditioning and recoating of the biomaterial; D: Postoperative 15 days – Occlusal view - observes the gingival conditioning and recoating of the biomaterial. E-Postoperative 84 days - Conditioning gingival profile for rehabilitation. F: Postoperative 84 days - Occlusal view displays discreet presence of the biomaterial granules



Fig. 4. Surgical procedure for the installation of dental implants. A: Region of the teeth 11 and 21, with the filling with Bio Oss®. B: The receptor bed of implants made by drilling. C: Implant installation. D: Suture the area

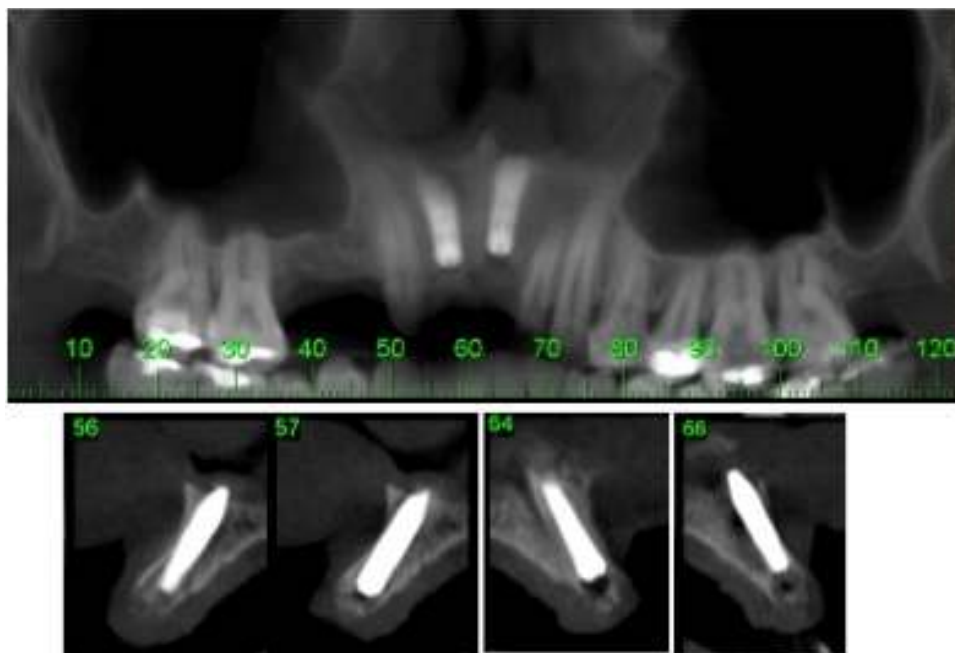


Fig. 5. Computed tomography cone beam postoperative 1 year of implant installation

According to Meijndert et al. [17], the use of autogenous bone graft associated with Bio Oss® can provide a safe base for the implants placement. This corroborates with De Santis et

al. [18] who states that the use of either autogenous bone or DBBM to dehiscence in implants immediately placed in cavity after extraction, resulted in the highest level of regeneration of defects with a satisfactory bone-implant interface (BIC) on surface of the denuded implant. Raghoobar et al. [19] observed that the combination of autogenous bone graft and Bio Oss[®] in a proportion 2:1 in dental cavity immediately after extraction, promoted a satisfactory treatment with sufficient bone volume for the implant placement, with a success rate of 100%.

The results obtained with the reported case corroborate with literature findings, as the cavity was filled with mineralized tissue, with a suitable volume and height for the implants placement and they presented osseointegration, obtaining a success rate of 100% in the treatment.

4. CONCLUSION

With data obtained and the clinical follow-up of the case presented, we can conclude that the biomaterial Bio Oss[®] is efficient for the preservation of the alveolar bone after the dental extraction, acting as a framework for the bone neof ormation for later placement of osseointegrated implants.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this paper and accompanying images.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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