

## Preservation of dental sockets filled with composite bovine bone: A single-blind randomized Clinical trial

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### Abstract

The increase in human life expectation demands that medical sciences adopt an attitude focused on prevention and health promotion, to provide better quality of life. However, a large number of people continue to need restorative and rehabilitative treatments. This is no different in oral health. Brazilian public health data reported that around 70% of the Brazilian population of approximately 40 years of age present with the loss of one or more teeth. These rates rise as the age range evaluated increases. Thus, osseointegration becomes the first choice for rehabilitating these patients, because it is a safe and predictable technique both for rehabilitating single and multiple tooth losses. The end purpose is to re-establish function and esthetics. However, as a result of the etiology of tooth loss and time elapsed after extraction, accentuated alveolar bone resorption may occur. These cases may require additional procedures for reconstructing the alveolar bone, for later insertion of osseointegrated implants in a more favorable prosthetic position. Alveolar bone resorption after tooth loss is a continuous and irreversible process. The mean rate of alveolar bone resorption in the anterior maxillary region during the first year after tooth loss is around 25% of total bone volume; the reduction in alveolar bone thickness may reach up to 40-60% by the 3rd year after tooth loss. For the posterior region of the maxilla, alveolar bone loss may reach up to 50% of total volume during the course of 3 years. However, studies have pointed out that the initial volume of the posterior maxilla is twice as large as the anterior maxilla.

Therefore, the dimensional changes of the dental alveolus after tooth loss are a factor causing great concern in oral rehabilitation with the use of osseointegrated implants. In this sense, great importance is attached to the development of techniques that make it possible to maintain the alveolar bone volume after the extraction procedure. Guided bone regeneration (GBR) techniques are the most used type for alveolar bone maintenance, by using the biologic property of osteopromotion. The biologic concepts of osteopromotion seeks to maintain a biologic space by

means of barriers and membranes, so that cells that have a faster metabolism than cells of osteoblastic origin do not differentiate first, forming fibrous tissue, and impeding differentiation into bone

tissue. The final purpose will be to promote osseous proliferation. The technique may be associated with the use of biomaterials that serve as a structure to keep the membrane in position, allowing a more effective result.

The purpose of this study was to evaluate the preservation of alveolar dimensions in human fresh extraction sockets filled with a composite bovine bone graft by means of design of single-blind randomized clinical trial. Forty participants had monoradicular teeth extracted (one teeth in each participant), and after were randomly divided into 2 groups: individuals whose fresh sockets were filled with the composite heterologous bone graft (Biomaterial Group), or with blood clot (Control Group). After extraction, the fresh sockets were measured at their greatest mesiodistal (MD) and bucco-lingual/palatal (BL/P) distance. Primary closure of the soft tissue was performed with a fibro-mucosal plug. After 120 post-operative days, the re-entry procedure was performed and the largest MD and BL/P measurements were again obtained to calculate the remodeling of the alveolar bone measured in percentage. In the biomaterial group, a percentage reduction of 1.62% and 3.29% in the MD and BL/P dimensions was observed 120 days after the extractions, whereas a reduction of 4.97% and 7.18% in the MD and BL/P dimensions occurred in the control group. There was a statistically significant difference ( $p < 0.05$ ) between the two groups for the bucco-palatal and mesiodistal measurements in the maxilla. In view of the results obtained, it can be concluded that composite bovine bone graft limited but did not impede alveolar bone remodeling. Misch, 3rd Ed. 2009 (page 876,877), describes that in a 5-wall socket, regeneration completely restores the morphology and bone volume of the residual alveolar ridge.

The regional acceleration for healing (FAR) phenomenon, which increases the repair rate and adds morphogenetic protein (BMP) to the site, is related to the process of extraction. The walls protect and stabilize the graft and ruptured blood vessels of the LPD, release growth factors

### *Extended Abstract*

within this region, platelet-derived growth factor (PDGF) and transforming growth factor (TGF). In the proposed study, we did not find the same result, even in alveoli with 5 walls and with minimally traumatic extractions; we noticed different results between the Control Group (CG), filled only with blood clot. Especially in the maxilla, in the vestibulo-palatal measure, not observing a great difference in measurements between the mesio-distal walls. We could see that the biomaterial, when properly accommodated in a post-surgical socket, minimizes clot retraction, being one of the contributing factors in maintaining the alveolar volume.

The technique proposed in the present work demonstrated that the maintenance of alveolar bone volume after tooth extraction is possible; and that maneuvers such as minimally traumatic extraction, surgical technique without flap lifting, adequate accommodation of the biomaterial in the alveolus and alveolar sealing through a fibromucosal plug are important factors to be considered. It also demonstrated that the average of the results between the treated and control groups and in the arches, maxilla and mandible, regardless of the measurement location (MD or VL), one can notice the influence of the treatment with the biomaterial regardless of the analyzed arch. The statistically significant difference was pointed out only for the region of the treated maxilla group that presented bone resorption levels up to 70% lower than the control group. And that when using biomaterial to fill the socket, the resorption rate was quite similar between maxilla and mandible. According to the literature, we found greater resorption in the maxilla, in this study, on average, 74% greater than in the mandible. The same can be seen at the measurement site, and the VL (vestibulo-lingual) region has always undergone greater changes than the MD region, which presented 47% less changes compared to the first. In view of the results obtained, it is concluded that the whole bone of bovine origin limited, but did not prevent, alveolar bone remodeling. he entire organism.