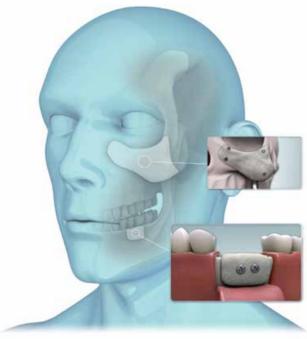


NEW FRONTIERS IN BONE REGENERATION BONE GRAFT ON-DEMAND

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Introduction

Bone grafting has always been considered a **challenge** for dentists. Initially the diffusion of this procedure was conditioned by the need of invasive surgery, bone harvesting and the morbidity of the patient. Now its diffusion will be ever more necessary due to the spread of implantology. SmartBone allows dentists to **reduce** the patient's morbidity, have an optimal osteointegration in order to achieve the best outcomes in implant surgery. In particular, the service "SmartBone on Demand" allows to obtain a custom-made graft to provide the exact required quantity of bone for the specific needs of the patient.

Objectives

The aim of this study is to demonstrate the **reliability** and **low invasivity** using **Bone Graft on_demand**

Material and Methods

Two patients with severe horizontal bone atrophies were enrolled in this study. To place the implants, a staged approach was chosen after a horizontal and light vertical ridge augmentation using 2 different methods.

The first case was carried out using the service called **SmartBone On Demand** (by IBI SA - Industrie Biomediche Insubri SA). From a CBCT scan of the patient, a stereolytographic model was produced, and the ideal piece of graft needed to fill the atrophy was shaped on it with a light cured acrylic resin. This piece of resin was subsequently scanned with a HD scanner and a .STL file was obtained. From the .STL file IBI SA produced the **SmartBone on Demand** graft that perfectly matched the recipient site.

The graft was fixed with two osteosynthesis screws and covered by a slow resorption equine collagen membrane (Resodont Forte Resorba). After 6 months of healing, the bone was in good condition, both quantity and quality wise, and therefore the implants were inserted (Osstem Implant TSIII 4x8,5) 1 mm under the crestal ridge. The biopsy was harvested and the histological analysis is still in progress. The width of the ridge was measured before and after the ridge augmentation.

The second case, on the other hand, was carried out with the method of directly shaping SmartBone graft on the stereolytographic model (3D-Block technique by Dr. Jacotti) using a standard block of SmartBone 7x7x7 mm (manufactured by IBI SA – Industrie Biomediche Insubri). After obtaining a CBCT scan, a stereolytographic model was created and sterilized. In a sterile condition, the **SmartBone block** was shaped to create the ideal graft to fill the atrophy. After that, the patient underwent surgery in order to secure the graft on the receiving site with fixation screws. The graft was covered by a slow resorption equine **collagen membrane** (Resodont Forte Resorba). After 7 months of healing, the bone was in good condition, both quantity and quality wise, and therefore the implants were inserted (Osstem Implant TSIII 4x8,5) 1 mm under the crestal ridge. The biopsy was harvested and the histological analysis was performed. The width of the ridge was measured before and after the ridge augmentation.

Results

In the first case the width of bone ridge at the beginning was 3 mm at premolar level up to 2 mm at molar level. The final horizontal ridge augmentation was 6 mm at premolar level up to 8 mm at molar level. The vertical ridge augmentation was 3 to 4 mm (Fig A, Fig B).

Fig A: CT pre-op

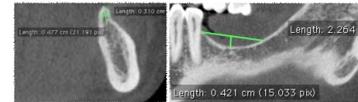


Fig B: CT post-op



In the second case the width of the ridge at the beginning was 2 mm up to 3 mm. The final ridge augmentation was 3,5 mm at premolar level and 3 mm at molar level where a minimal absorption occurred without compromising the insertion of the implants.

Conclusions

A very minimal bone resorption occurs after grafting heterologous SmartBone with low invasive procedures. Patients had no complications, no swelling, no pain and faced a very short and comfortable surgery if compared to the standard procedure of harvesting bone from the retromolar area. Clinical and histological results seem to be encouraging. Computer aided procedures are supposed to become increasingly common and provide an very effective alternative to the standard procedures which are very invasive and difficult to bear for the majority of the patients.

First Case: Bone Graft On-Demand

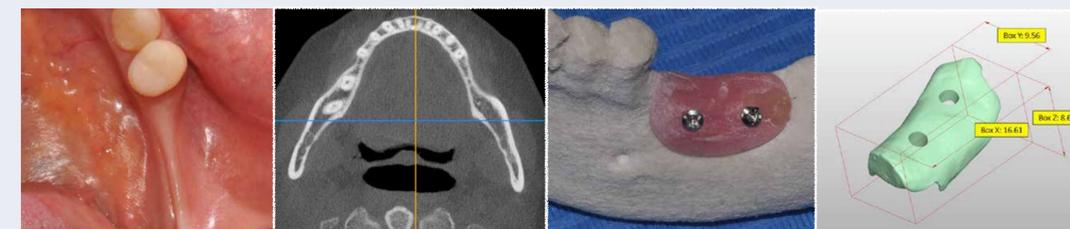


Fig 1: Clinical initial situation

Fig 2: CT scan pre-op

Fig 3: Acrylic resin graft shaped on stereolytographic model

Fig 4: STL file after scan of resin graft

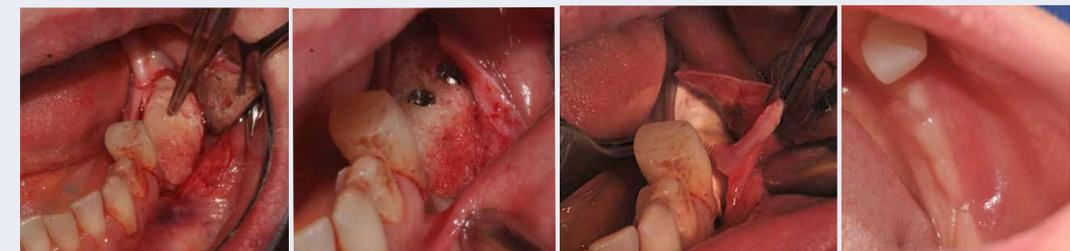


Fig 5: Perfectly matching bone graft placement

Fig 6: Bone graft screwed to the mandible

Fig 7: Equine collagen membrane

Fig 8: Healing after 1 month



Fig 9 and Fig 10: Healing after 6 months, very minimal resorption if compared with fig 6 both in vertical and in horizontal

Fig 11: Implant placement in the same session

Fig 12: Rx post-op

Second Case: 3D-Block



Fig 1: Start point CBCT scan axial view

Fig 2: SmartBone block shaped on a stereolytographic model

Fig 3: Bone graft appearance at the end of shaping



Fig 4: Clinical status upon fixing the graft on the mandible

Fig 5: Healing after 3 months

Fig 6: CBCT scan after 4 months

Fig 7: Second stage surgical procedure



Fig 8: Implant placement in the same session

Fig 9: Healing abutment placement

Fig 10: Histology - New young bone tissue with osteocytes in lacunae and with a good lamellar structure