15455 POSTER DISPLAY
CLINICAL RESEARCH – PERI-IMPLANT BIOLOGY

The particulated dentin – an autogenous reliable bone graft substitute in socket site preservation

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Background: The potential use of autogenous teeth to serve as an alternative material for the reconstruction of alveolar ridge deficiencies has been reported. The chemical composition of dentin is similar to bone. It is composed of hydroxyapatite (HA) deposited on type I collagen matrix and non-collagenous glycoproteins like bone sialoprotein (BSP) and MMPs. Milled extracted and or auto-transplanted teeth have also been successfully used to promote bone regeneration in experimental animal models.

Aim/Hypothesis: The aim of this study is to evaluate on the clinical, histopathological and histomorphometrical level the efficacy use of Particulated Dentin (P-Den) as a suitable bone substitute alternatives, in human socket preservation procedures.

Material and Methods: 15 Patients were scheduled for single implant reconstructive procedures in a periodontally endodontically pathological situation. All extracted teeth were cleaned and prepared according to the Smart Dentin GrinderTM (SDG) protocol. They were then ground to particle size of 250–1200 μm. These particles, mainly dentin (P-Den) were replanted to the original socket site as a biomaterial filler and were covered by a resorbable membrane followed by a rotated pedicle flap in order to achieve full soft tissue closure. CT was then took place. At 6 months, biopsies were obtained by a 2.5 cylindrical trephine burs followed by the implant placement phase. During follow-up healing was monitored clinically and radiographically. Histological analysis was performed using H&E, Trichrome and Paragon staining methods. Histomorphometry was conducted using Bioquant image analysis to calculate direct bone to P-Den, newly-formed bone (NFB) and P-Den area fraction.

Results: All cases healed uneventfully. CT scan showed that P-Den kept the three dimensional volume of the socket sites. De novo bone formation was shown to fill the entire grafted area previously occupied by the roots. The resulted radio-opacity of the CT section cuts along with the clinical follow-up, indicates that the ridge is convex and wide enough for future implant placement. Histologically, NFB was observed in the entire grafted area, particularly around the grafted P-Den. The majority of particles were surrounded with direct contact with newly formed osseous tissue enriched by osteocytes. At the P-Den – osseous tissue contact, it seems that biodegradation process is underway. In some cases, Dentin particles were found to be encircled by connective tissue with no inflammatory reaction in the surrounding area. Histomorphometrical measurements in a designated ROI showed an average of 25% NFB, while an average of 30% is captured by P-Den. Direct P-Den to NFB showed a range of 30–80%.

Conclusion and Clinical Implications: The P-Den, prepared by the SDG protocol is proven to be total biocompatible and excellent osteoconductive biomaterial in order to enhance hard tissue formation in socket site preservation procedures. NBF ankylosed to P-Den becomes a solid matrix enabling implant anchorage and preserving the ridge dimension. It appears that P-Den could be served as a suitable autologous bone graft alternative to preserve alveolar ridge volume when teeth are available for future implant placement procedures.