



Regenerative properties of collagenated porcine bone grafts in human maxilla: demonstrative study of the kinetics by synchrotron radiation microtomography and light microscopy

ABSTRACT

As bone dimensional changes normally occur after tooth extraction, the management of extraction sockets needs a particularly careful attention by the clinician. After tooth extraction, in order to reduce the soft and hard tissue loss, preservation of the alveolar ridge volume is recommended and different types of biomaterial have been used to graft fresh extraction sockets and the majority of them showed favourable clinical outcomes. The aim of the present study was to analyze the regenerative potential of collagenated cortico-cancellous (OsteoBiol® mp3®, Tecnos®, Giaveno, Italy) bone by synchrotron radiation X-ray micro-CT and histology in order to quantitatively investigate the kinetics of healing in post-extraction sockets. To the best of the authors' knowledge, this is the first study on kinetics of bone regeneration using cortico-cancellous porcine bone substitutes, which are biomaterials developed with a structure similar to the human bone. Specifically, OsteoBiol® mp3® is a pre-hydrated collagenated heterologous cortico-cancellous bone mix made of 600 - 1000 µm thick granules (90 vol%) and collagen gel (10 vol%).

Ridge preservation was performed on 21 patients using a flapless approach and a secondary soft tissue closure. Extraction sockets were filled and slightly condensed with cortico-cancellous porcine bone (mp3®), and a trimmed collagen membrane (OsteoBiol® Evolution, Tecnos®) was used to completely cover the socket. At the time of implant surgery, the bone cores were harvested and evaluated by micro-CT and histology. Both micro-CT and histology confirmed the good performances of the collagenated cortico-cancellous porcine bone as substitute for the preservation of human maxillary post-extraction sockets.

CONCLUSIONS

As the Authors concluded: *"the OsteoBiol® mp3® bone substitute, 12 months after grafting, was shown to offer better biomechanical performances than the spontaneously healed bone after the same period. Indeed, an increased density, due to a significant increase of the trabecular number, seems to guarantee an improved strength of the socket, starting point favorable to the success of the next implant"*.

ALVEOLAR REGENERATION

115

A Giuliani¹
G Iezzi²
S Mazzoni¹
A Piattelli²
V Perrotti²
A Barone^{3,4}

1 | Department of Clinical Sciences, Polytechnic University of Marche, Ancona, Italy

2 | Department of Medical, Oral and Biotechnological Sciences, University of Chieti-Pescara, Italy

3 | Department of Surgery, Unit of Oral Surgery and Implantology, School of Dental Medicine University of Geneva, Geneva, Switzerland

4 | Department of Surgical, Medical, Molecular Pathology and of the Critical Area, University of Pisa, Italy

ORIGINAL ARTICLE

Clinical Oral Investigations
2017;22(1):505-513

Grafted with

BONE SUBSTITUTE
OsteoBiol® mp3®

MEMBRANE
OsteoBiol® Evolution