

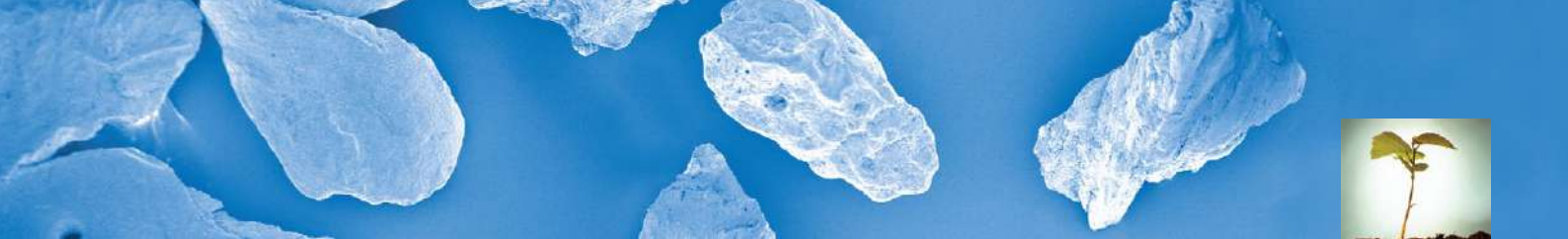
# SCIENTIFIC ABSTRACTS

INTERNATIONAL PUBLICATIONS ON OSTEOBIOL® BIOMATERIALS

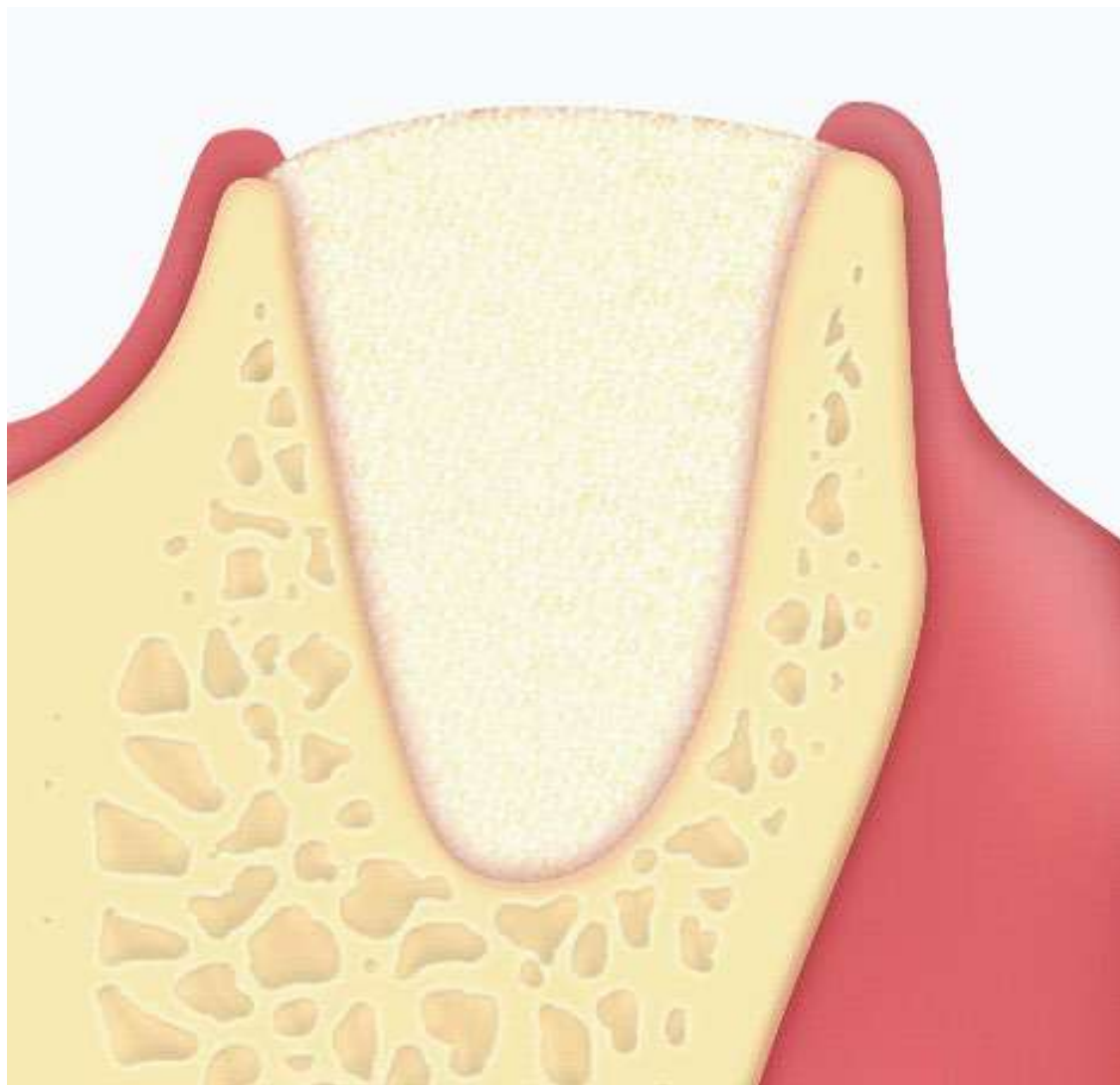
**OsteoBiol®**  
by Tecnos

REGENERATION SCIENCE

INSPIRED BY NATURE



## Regeneración alveolar



**OsteoBiol<sup>®</sup>**  
by Tecnos

REGENERATION SCIENCE

INSPIRED BY NATURE



**OsteoBiol®**  
by Tecnos

## ALVEOLAR REGENERATION

087

A Barone<sup>1,2</sup>

P Toti<sup>1,2</sup>

A Quaranta<sup>3</sup>

F Alfonsi<sup>1,2</sup>

A Cucchi<sup>4</sup>

JL Calvo Guirado<sup>5</sup>

B Negri<sup>5</sup>

R Di Felice<sup>6</sup>

U Covani<sup>1,2</sup>

## Volumetric analysis of remodelling pattern after ridge preservation comparing use of two types of xenografts. A multicentre randomized clinical trial

### ABSTRACT

This paper is a report of the results of a multicentre, single-blind, prospective and randomized clinical trial, performed by the Authors in order to analyse and compare the volumetric changes after ridge preservation procedures using two different biomaterials. Moreover, they evaluated the associations between outcome variables and pristine three-dimensional aspects of the ridges.

For the study, 38 patients subjected to single-tooth alveolar ridge preservation were selected and randomly allocated to each experimental group. The extraction sockets of the coll group were grafted with pre-hydrated collagenated cortico-cancellous porcine bone, with graft particle size between 600 and 1000  $\mu\text{m}$  (OsteoBiol® mp3®, Tecnos®, Giaveno, Italy). In cort group, the extraction sockets were grafted with cortical porcine bone alone, with particle size between 600 and 1000  $\mu\text{m}$  (OsteoBiol® Apatos, Tecnos®). A collagen membrane (OsteoBiol® Evolution, Tecnos®) was used to completely cover the socket, left intentionally exposed to the oral cavity and stabilized with the use of sutures. A secondary soft tissue healing was obtained for all experimental sites. By means of scanned plaster casts, an analysis of volumes and areas was performed, and all measured variables were statistically compared.

Intragroup analyses at 3 months revealed that the two biomaterials showed similar behaviours with a minor loss in volume and ridge surface. Intergroup analysis at 3-month survey revealed that volume resorption of the coll group was significantly lower than that of the cort group.

### CONCLUSIONS

Considering the 3<sup>rd</sup> month analysis, in their conclusions the Authors affirm that *“coll group showed a significantly lower reduction of ridge volume and a significantly smaller shrinkage of the basal area when compared to the cort group; moreover, the coll group experienced a smaller superior surface shrinkage when compared to the cort group, even though no significance was evaluated”*.

#### ORIGINAL ARTICLE

Clinical Oral Implants Research  
2016 Nov;27(11):e105-e115

#### Grafted with

BONE SUBSTITUTE

**OsteoBiol® Apatos**  
**OsteoBiol® mp3®**

MEMBRANE

**OsteoBiol® Evolution**

PAG 56

Abstract author: Cristina Rodighiero, dental journalist, free publication, not for resale. Printed by Tecnos® Dental s.r.l.



**ALVEOLAR REGENERATION**

106

A Barone<sup>1,3</sup>

P Toti<sup>2,3</sup>

A Quaranta<sup>4</sup>

F Alfonsi<sup>1</sup>

A Cucchi<sup>5</sup>

B Negri<sup>6</sup>

R Di Felice<sup>7</sup>

S Marchionni<sup>2,3</sup>

JL Calvo Guirado<sup>2,3</sup>

U Covani<sup>2,3</sup>

U Nannmark<sup>8</sup>

1 | Unit of Oral Surgery and Implantology, Department of Surgery, University of Geneva, Switzerland

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

3 | Tuscan Dental Institute, Versilia General Hospital, Lido di Camaiore (LU), Italy

4 | Department of Dentistry, University of West Australia, Perth, Australia

5 | Department of Surgery, University of Verona, Verona, Italy

6 | Department of Implantology, University of Murcia, Spain

7 | Private Practice, Ascoli Piceno, Italy

8 | Department of Oral & Maxillofacial Surgery, the Sahlgrenska Academy Gothenburg University, Gothenburg, Sweden

**ORIGINAL ARTICLE**

Journal of Clinical Periodontology  
2017 Feb;44(2):204-214

**Grafted with**

BONE SUBSTITUTE

**OsteoBiol® Apatos**  
**OsteoBiol® mp3®**

MEMBRANE

**OsteoBiol® Evolution**

**Tissue changes after ridge preservation with two xenografts. Preliminary results from a multicenter randomized controlled clinical trial.**

**ABSTRACT**

Ridge preservation procedures can counteract the tissue changes occurring after tooth loss. The aim of this randomized controlled trial was to compare and evaluate the clinical and histological outcomes of extraction sockets grafted with cortical porcine bone (OsteoBiol® Apatos, Tecnos®, Giaveno, Italy) (*cort*-group) to those grafted with collagenated cortico-cancellous porcine bone (OsteoBiol® mp3®, Tecnos®) (*coll*-group) both covered with a collagen membrane (OsteoBiol® Evolution, Tecnos®) left exposed and fresh extraction sockets which healed naturally (*nat*-group).

The two different xenografts were also compared to each other to determine their respective efficacy in preserving the alveolar ridge dimensions following tooth extraction. The anatomical measurements were taken at baseline and at 3 months after tooth extraction. The following variables were registered to the nearest millimeter: vertical bone changes; buccal-lingual width; histomorphometric parameters such as newly formed bone (NFB), non-mineralized tissues (NMT) and residual graft particles percentages (RGP).

The grafted sites showed a significant ( $P<0.0001$ ) lower vertical bone loss at buccal and lingual/palatal aspects than that registered at the no-grafting sites. Moreover, the grafted groups behaved significantly better than the non-grafted group in terms of horizontal bone resorption. The *cort*- and *coll*-groups had a horizontal bone loss of  $1.33\pm 0.71$  mm and  $0.93\pm 1.25$  mm, respectively, while the *nat*-group had a horizontal bone loss of  $3.60\pm 0.72$  mm. No statistically significant differences were registered between the grafted groups for any of the variables, except for vertical bone loss at the lingual/palatal aspect ( $P=0.0039$ ).

**CONCLUSIONS**

The present study showed that porcine bone, resorbable membrane and a flapless approach were more effective in controlling the bone changes after tooth extraction when compared to no grafting. The ridge preservation procedures had significantly better outcomes when compared to natural healing. The biomaterials did not differ for maintenance of bone width; even though, the bone height seemed to be better preserved with the cortical porcine bone.

Based on these findings, the Authors affirm: "Alveolar ridge preservation with cortical or collagenated cortico-cancellous porcine bone is an effective way to maintain the ridge dimensions after tooth extraction compared to spontaneous healing, though a complete prevention of remodeling is not achievable irrespective of the biomaterial employed. No significant differences were found between the two pertaining to the ridge width. Furthermore, no significant differences regarding the histomorphometric analysis were registered between the two grafted groups".

## Molecular, cellular and pharmaceutical aspects of filling biomaterials during the management of extraction sockets

### ABSTRACT

After a tooth extraction, both hard and soft tissues undergo dimensional changes and the aim of grafting and/or guided bone regeneration procedures is to counteract these changes by using different biomaterials and surgical techniques. In this article, the Authors reviewed the clinical, histological, volumetric and molecular results reported in different studies, so to evaluate which are the best surgical techniques and biomaterials for ridge preservation procedures.

Among the biomaterials tested for bone augmentation procedures, the one made of cortico-cancellous granules of porcine bone showed to be very similar to human mineral bone. Its natural micro-porous consistency is supposed to facilitate new bone tissue formation in defect sites and accelerate the regeneration process. Moreover, the studies evaluated in this review reported that this biomaterial is gradually resorbable and able to preserve the original graft shape and volume (osteoconductive property). Other important observations about porcine bone are related to the integration of collagenated porcine bone graft with the new bone and its capability to support the new bone formation when used in extraction sockets. Among the advantages of porcine bone, osteoconductivity and absence of adverse reaction and inflammatory response were mentioned. The histomorphometrical analysis of the reviewed studies showed that the percentage of new bone tissue was 22.5% of the total bone.

### CONCLUSIONS

In their review, the Authors pointed out that cortico-cancellous porcine bone satisfied the characteristics of osteoconductivity and volume maintenance during the healing period, allowing new bone formation and reabsorption of the xenograft, without any signs of inflammatory cells.

### ALVEOLAR REGENERATION

107

F Alfonsi<sup>1</sup>  
V Borgia<sup>2</sup>  
G Iezzi<sup>3</sup>  
A Piattelli<sup>3</sup>  
U Covani<sup>2</sup>  
P Tonelli<sup>1</sup>  
A Barone<sup>2</sup>

1 | Department of Public Health, Section of Dentistry, University of Florence, Florence, Italy  
2 | Unit of Oral Surgery and Implantology, School of Dental Medicine, Department of Surgery, University of Geneva, Switzerland  
3 | Department of Medical, Oral and Biotechnological Sciences, Dental School, University G. D'Annunzio of Chieti-Pescara, Chieti, Italy

### ORIGINAL ARTICLE

Current Pharmaceutical Biotechnology  
2017;18(1):64-75

### Grafted with

BONE SUBSTITUTE  
**OsteoBiol® Gen-Os®**  
**OsteoBiol® mp3®**  
**OsteoBiol® Apatos**

MEMBRANE  
**OsteoBiol® Evolution**

BARRIER - BONE SUBSTITUTE  
**OsteoBiol® Lamina**

PAG 61



**OsteoBiol®**  
by TecnoSS

## ALVEOLAR REGENERATION

114

A Barone<sup>1</sup>  
P Toti<sup>2,3</sup>  
GB Menchini-Fabris<sup>2,3</sup>  
G Derchi<sup>2,3</sup>  
S Marconcini<sup>2,3</sup>  
U Covani<sup>2,3</sup>

1 | Unit of Oral Surgery and Implantology,  
Department of Surgery, University of Geneva,  
Genève, Switzerland

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

3 | Tuscan Dental Institute, Fortis Dental Center, Forte  
dei Marmi, Italy

### ORIGINAL ARTICLE

Clinical Implant Dentistry and Related Research  
2017;19(4):750-759

### Grafted with

BONE SUBSTITUTE  
**OsteoBiol® mp3®**  
**OsteoBiol® Apatos**

## Extra oral digital scanning and imaging superimposition for volume analysis of bone remodeling after tooth extraction with and without 2 types of particulate porcine mineral insertion: a randomized controlled trial

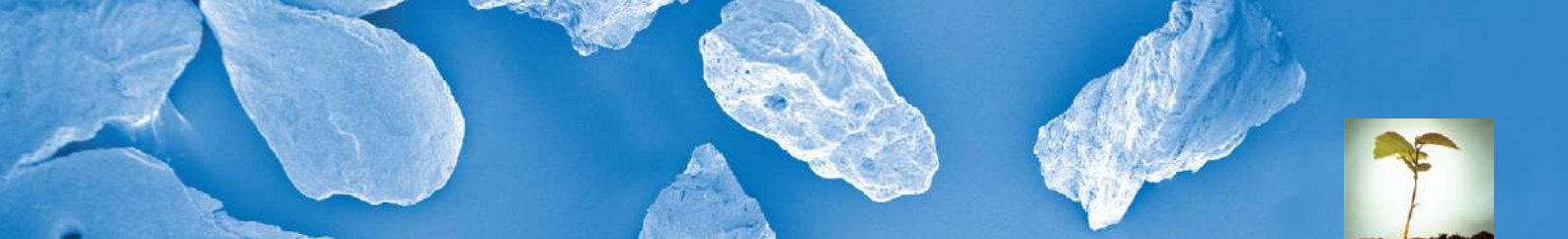
### ABSTRACT

In case of progressive tissue and volume loss with dimensional changes of the alveolar ridge contour, it has been demonstrated that incorporation of bone substitute material into the extraction socket can minimize the edentulous ridge volume loss or maximize the bone formation within the healing area. This technique, called socket grafting or “alveolar ridge preservation” (ARP), showed to be effective. The aim of this multi-center single-blind randomized control trial was to test the effectiveness of socket grafting with 2 biomaterials (cortical or pre-hydrated collagenated cortico-cancellous porcine bone) covered with a resorbable barrier in maintaining contour stability of the extraction area when compared to control extraction sockets that had a natural healing. The observation was performed by means of a laser scanner that provided the possibility of 3-dimensional evaluation to be performed on patients’ dental arches plaster cast models. Following tooth extraction, 55 patients were assigned to their treatment group using a random sequencing: 15 patients (*cort*) were grafted with cortical porcine bone (particle size 600-1000  $\mu\text{m}$ , OsteoBiol® Apatos, TecnoSS®, Giaveno, Italy); 15 patients (*coll*) were grafted with collagenated cortico-cancellous porcine bone (particle size 600-1000  $\mu\text{m}$ , OsteoBiol® mp3®, TecnoSS®); 25 patients (*nat*) had natural healing without grafting.

At the 4-month intergroup analysis, the test groups (cortical or pre-hydrated collagenated cortico-cancellous porcine material) seemed to behave significantly better than the naturally-healing group in terms of volume and contour conservation. No differences were seen, however, between the 2 test groups, although the volume loss and linear height reduction seemed to slightly favour the collagenated material.

### CONCLUSIONS

Based on the results of the present randomized trial, Authors concluded that “the present investigation attested that post-extractive sockets grafted with either cortical or pre-hydrated collagenated cortico-cancellous porcine material covered with a resorbable collagen membrane showed reduced bone loss when compared to naturally-healing sockets. Moreover, the 2 grafting materials were not able to preserve the alveolar crest, and a reduction close to 30% in the estimates was registered after healing”.



## Comparison of magnesium-enriched hydroxyapatite and porcine bone in human extraction socket healing: a histologic and histomorphometric evaluation.

### ABSTRACT

After tooth extraction, the physiological reduction of alveolar height and width may cause problems with implants placement, especially in the anterior upper arch where bone volume preservation is essential for both biological and aesthetic reasons. In order to counteract bone resorption in fresh sockets and avoid invasive ridge augmentation procedures, the use of several biomaterials has been proposed. Thanks to its excellent biocompatibility and bioactivity, hydroxyapatite is widely used in bone grafting and it has a good potential as a scaffold for bone tissue engineering. The aim of this study was to compare the use of synthetic magnesium-enriched hydroxyapatite (MHA) with that of a xenogenic bone substitute consisting of cortico-cancellous porcine bone (PB) (OsteoBiol® Apatos, TecnoSS®, Giaveno, Italy), in fresh sockets by means of histological and histomorphometric analyses. Histological examinations revealed newly formed bone, biomaterial particles, connective tissue and an absence of inflammatory cells in all treated sites.

### CONCLUSIONS

The histological findings from the present study showed that cortico-cancellous PB and MHA could be used successfully for ridge preservation. Moreover, they both resulted safe and biocompatible. The authors concluded that *“within the limits of this study, the results showed similar biological behaviour with respect to bone formation and resorption for magnesium-enriched hydroxyapatite and porcine bone used for socket preservation”*.

### ALVEOLAR REGENERATION

123

R Crespi<sup>1</sup>  
P Capparrè<sup>1</sup>  
E Gherlone<sup>1</sup>

<sup>1</sup> | Department of Dentistry, Vita Salute University, San Raffaele Hospital, Milan, Italy

### ORIGINAL ARTICLE

Int Journal of Oral and Maxillofacial Implants  
2011 Sep-Oct;26(5):1057-62

### Grafted with

BONE SUBSTITUTE  
**OsteoBiol® Apatos**



S Corbella<sup>1</sup>  
S Tascherie<sup>1</sup>  
L Francetti<sup>1</sup>  
R Weinstein<sup>1</sup>  
M Del Fabbro<sup>1</sup>

<sup>1</sup> | Dental Department of Biomedical, Surgical and Dental Sciences, Università degli Studi di Milano, Milan, Italy; IRCCS Istituto Ortopedico Galeazzi, Milan, Italy

**ORIGINAL ARTICLE**

Int Journal of Oral and Maxillofacial Implants  
2017 Sep/Oct;32(5):1001–1017

**Grafted with**

BONE SUBSTITUTES

**OsteoBiol<sup>®</sup> Gen-Os<sup>®</sup>**

**OsteoBiol<sup>®</sup> mp3<sup>®</sup>**

**OsteoBiol<sup>®</sup> Apatos**

MEMBRANE

**OsteoBiol<sup>®</sup> Evolution**

## Histomorphometric results after postextraction socket healing with different biomaterials: a systematic review of the literature and meta-analysis

### ABSTRACT

In this article, the authors present a systematic review of the literature with data about histomorphometric outcomes after alveolar socket healing following tooth extraction with or without the placement of a bone substitute material. The primary outcome was the percentage of new bone formation. Secondary outcomes were percentage of biomaterial, connective tissue and non-mineralized tissue still present as measured through histomorphometric analysis of samples.

A total of 802 papers were screened and after the application of the inclusion and exclusion criteria, 40 articles were included in the quantitative synthesis and 11 were included in the meta-analysis of comparative studies. In 16 studies, no bone substitute material was used. Bovine bone (BB) was used in 14 studied; allograft (AG) was used in 5 studies; porcine bone (PB) was used in 4 studies; hydroxyapatite (HA), was used in 6 studies and HA enriched with magnesium in 4 studies; freeze-dried bone allograft (FDBA) was used in 4 studies; calcium sulphate (CS) was used in 4 studies, beta-tricalcium phosphate ( $\beta$ -TCP) was used in 2 studies and other biomaterials were used in 7 studies.

The meta-analysis of the results showed that the use of BB is associated with a lower proportion of vital bone compared to ungrafted sockets, while PB and magnesium-enriched HA seemed to enhance bone formation. Sites grafted with AG showed a proportion of new bone comparable to that of sites that did not receive any bone substitute.

### CONCLUSIONS

Within the limits of this review, from the results it is possible to conclude that there is no evidence for the superiority of a given biomaterial over the others in terms of new bone formation. With reference to new bone volume, comparative studies reported that BB caused a reduced proportion of new bone volume (NBV), while PB and magnesium-enriched HA induced a significantly higher amount of NBV, compared to sites healed without bone substitutes.





G Troiano<sup>1</sup>  
K Zhurakivska<sup>1</sup>  
L Muzio<sup>1</sup>  
L Laino<sup>2</sup>  
M Cicciù<sup>3</sup>  
L Lo Russo<sup>1</sup>

1 | Department of Clinical and Experimental Medicine,  
Foggia University, Foggia, Italy  
2 | Multidisciplinary Department of Medical- Surgical  
and Dental Specialties, Second University of Naples,  
Naples, Italy  
3 | Department of Human Pathology, School of  
Dentistry, University of Messina, Messina, Italy

ORIGINAL ARTICLE

J Periodontol. 2018;89:46–57

**Grafted with**

BONE SUBSTITUTES

**OsteoBiol® Gen-Os®**

**OsteoBiol® mp3®**

**OsteoBiol® Apatos**

MEMBRANE

**OsteoBiol® Evolution**

**OsteoBiol® Lamina**

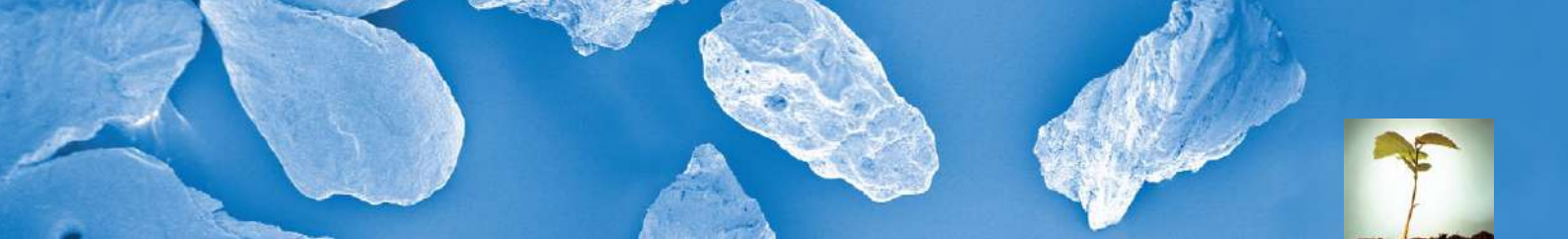
## Combination of bone graft and resorbable membrane for alveolar ridge preservation: a systematic review, meta-analysis, and trial sequential analysis

### ABSTRACT

It is well known that, after tooth extraction, the alveolar ridge undergoes remodelling and resorption, with the undesired result of a reduction of the height and width of the residual ridge. Consequently, alveolar ridge preservation (ARP) techniques are advocated in order to counteract these events and a variety of grafting materials has been tested in the postextractive socket. The aim of this systematic review was to analyze evidence regarding potential benefits of ARP procedures performed with allogenic/xenogenic grafts in combination with a resorbable membrane coverage in comparison with spontaneous healing. Consequently, in this paper seven studies comparing the use of a bone substitute combined with a resorbable membrane in the test group and spontaneous healing of the extraction socket in the control group were included. Materials used in the included studies were the following: six studies reported use of xenogenic grafting materials consisting of cortico-cancellous porcine bone, collagenated cortico-cancellous porcine bone, and bovine bone mineral associated with a collagen membrane, whereas one study reported the use of FDBA combined with a collagen membrane. In all studies, the control group was characterized by spontaneous healing. Horizontal ridge width reduction (HRWR) and vertical ridge height reduction (VRHR) were investigated as primary outcomes and volume changes (VC) as a secondary outcome. Meta-analysis revealed that the combination therapy resulted in a lower rate of resorption for both HRWR (−2.19 mm, 95% confidence interval [CI]: −2.67 to −1.71 mm) and VRHR (−1.72 mm, 95% CI: −2.14 to −1.30 mm).

### CONCLUSIONS

According to the results of the meta-analysis, the evidence currently available in the literature is strong enough to conclude that filling postextraction sockets with a bone substitute covered by a resorbable membrane results in a lower rate of resorption, both in vertical and horizontal dimensions, compared with spontaneous healing. The Authors concluded that *“further studies should be directed to compare use of different bone substitutes and membranes and investigate potential and significant variability related to them, as well as to flap design”*.



## Clinical outcomes of implants placed in ridge-preserved versus nonpreserved sites: a 4-year randomized clinical trial

### ABSTRACT

After tooth extraction, alveolar bone undergoes remodelling resulting in dimensional changes, which can complicate implant insertion. In order to limit dimensional changes, alveolar ridge preservation procedures using different grafting materials are commonly used. As the long-term effect of ridge preservation on implant success rate is still unclear, the aim of the present randomized clinical study was to evaluate the survival, success, and the aesthetic outcomes of implants placed in extraction sockets. In the study, 90 patients in need for a single premolar/molar tooth extraction and an implant treatment were randomly distributed among 3 groups: spontaneous healing (ctrl), ridge preservation with cortical porcine bone (OsteoBiol® Apatos, TecnoSS®, Giaveno, Italy) (cort) and ridge preservation with collagenated corticocancellous porcine bone (OsteoBiol® mp3®, TecnoSS®) (coll). In the two test groups, the sockets were grafted with the chosen biomaterial and a collagen membrane (OsteoBiol® Evolution, TecnoSS®) was placed under the interdental papillae. The collagen membrane was exposed to the oral cavity.

Three months after tooth extraction, at re-entry, implants were placed (BT Evo; Biotec, Vicenza, Italy). Marginal bone levels were recorded on digital intraoral periapical radiographs, the assessment of the Pink Esthetic Score (PES) was performed on digital photographs. Forty-two patients out of 90 (initial cohort study) completed the entire follow-up of 4 years. Cumulative survival and success rates for all implants were 100% at the 4-year evaluation. With reference to the marginal bone loss, there were no significant differences between the 2 grafting materials, but it was significantly greater in the nongrafted sites (P value < .001). At the 4-year evaluation, the PES resulted significantly better in the cort group than in the coll and ctrl ones.

### CONCLUSIONS

From the results, it is evident that ridge preservation was more effective than natural healing in preserving marginal bone and better aesthetic outcomes were achieved. Although none of the grafting materials in this study could entirely preserve the pristine ridge contour of the post extractive socket, cortical porcine bone showed the best clinical outcomes in maintaining the vertical bone dimension. On the other hand, the collagenated corticocancellous porcine bone showed the best outcome in maintaining the horizontal dimension.

## ALVEOLAR REGENERATION

169

S Marconcini<sup>1</sup>  
E Giammarinaro<sup>2</sup>  
G Derchi<sup>1</sup>  
F Alfonsi<sup>1</sup>  
U Covani<sup>1</sup>  
A Barone<sup>3</sup>

1 | Department of Surgical, Medical, Molecular and Critical Area Pathology, University of Pisa, Pisa, Italy  
2 | Department of Dentistry, Tuscan Stomatologic Institute, Lido di Camaiore, Italy  
3 | Department of Surgery, Unit of Oral Surgery and Implantology, University-Hospital at Geneva, School of Dental Medicine, Geneva, Switzerland

**ORIGINAL ARTICLE**  
Clin Implant Dent Relat Res  
2018;1-9

### Grafted with

BONE SUBSTITUTE  
**OsteoBiol® mp3®**  
**OsteoBiol® Apatos**

MEMBRANE  
**OsteoBiol® Evolution**