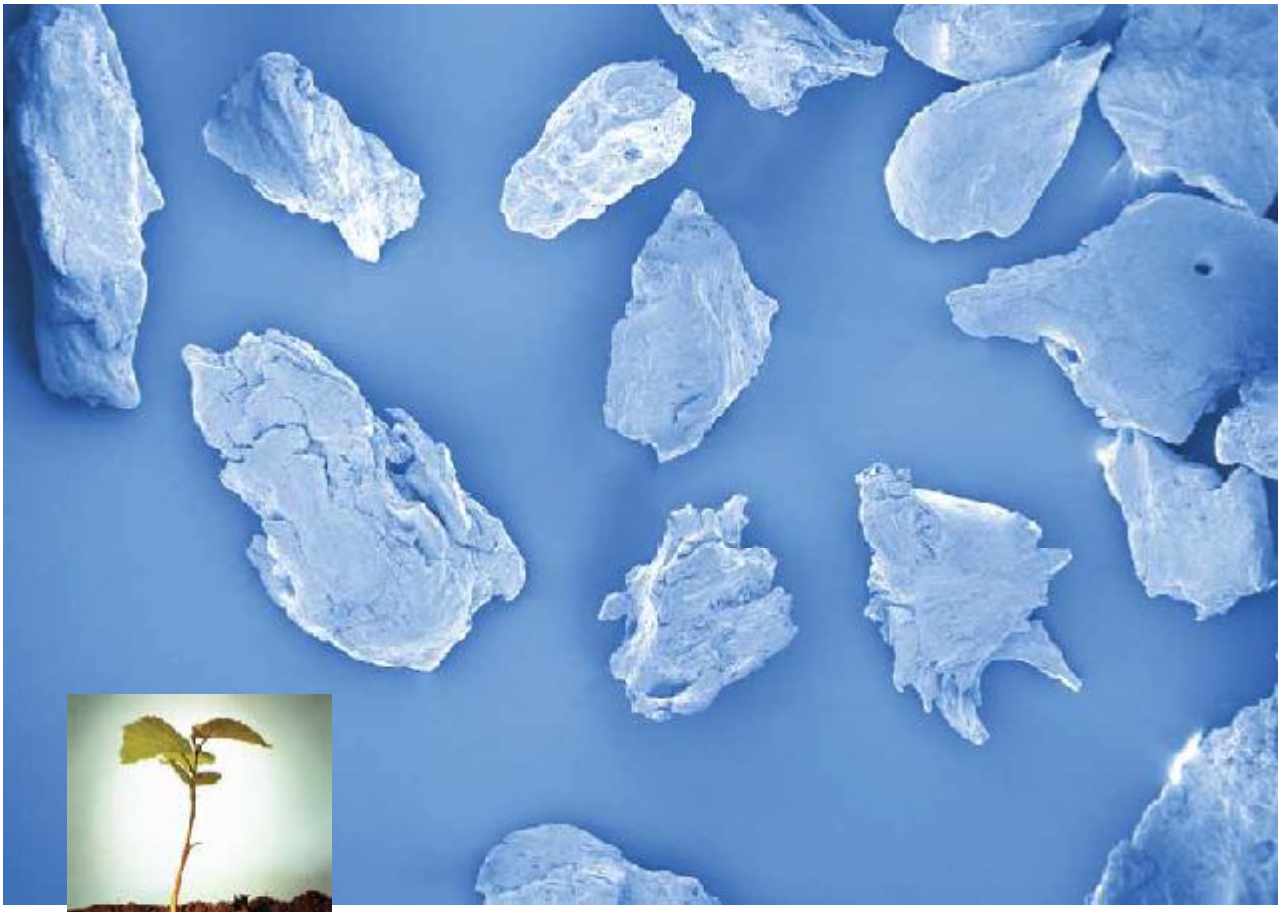

OsteoBiol®
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SCIENTIFIC ABSTRACTS

REGENERATION SCIENCE

INSPIRED BY NATURE

Table of contents

OsteoBiol by Tecnoss

Table of contents

OsteoBiol by Tecnoss

Table of contents

OsteoBiol by Tecnoss

Table of contents

OsteoBiol by Tecnoss

Laboratory tests

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REGENERATION SCIENCE

INSPIRED BY NATURE

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LABORATORY TESTS

010

The performance of human periodontal ligament mesenchymal stem cells on xenogenic biomaterials

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ORIGINAL ARTICLE
International Journal of Immunopathology and Pharmacology
2007 Jan-Mar;20(1suppl.1):87-91

ABSTRACT

Periodontal diseases are the most frequent cause of tooth loss, due to the destruction of the tooth supporting tissues. Consequently, the reconstruction of healthy periodontium is a major goal of periodontal therapy.

Mesenchymal stem cells from periodontal ligament (PDL-MSCs) hold great promise for bone regeneration. Most studies regarding the osteogenic differentiation of stem cells from periodontal tissue suggest that PDL cells may have many osteoblast-like properties, including the ability to form calcified nodules in vitro. This study in vitro investigated the use of autologous mesenchymal stem cells, easily obtained from oral tissues, seeded on a xenogenic porcine bone substitute, consisting of cortical porcine bone particles (Apatos, OsteoBiol®, Tecnoss®, Coazze, Italy). This grafting material is a xenogenic bone substitute consisting of sterilized cortical pig bone in the form of particles with a high porosity and with a diameter ranging from 600 to 1000 µm. This biomaterial appears physically identical to human bone and has been reported to be osteoconductive, well integrated in the host site and to show an incomplete resorption.

The results indicated high affinity of the cells towards the three-dimensional biomaterial. This scaffold was able to supply an excellent support for cell structures, with evident cellular proliferation and colonization on the bone substitute. Moreover, the examinations revealed that a considerable part of the surface of the biomaterial was covered and an elaborated form of attachment was evident.

CONCLUSIONS

As demonstrated by several studies, cortical porcine bone derived biomaterial may promote bone formation and can be used for maxillary sinus augmentation because it does not interfere with bone regeneration processes and implants osseointegration. Moreover, this study revealed that porcine bone-derived biomaterial did not interfere with the PDL-MSCs development, demonstrating an osseointegration process within the bone microenvironment. Consequently, it seems reasonable to suggest that the bone regeneration in oral and maxillo-facial surgery could be improved by this kind of hard scaffold, which have been shown to be perfectly biocompatible and able to support cell growth and differentiation.

Material tested

BONE SUBSTITUTE
OsteoBiol® Apatos

LAB

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

OsteoBiol by Tecnoss

Physicochemical characterization of biomaterials commonly used in dentistry as bone substitutes – comparison with human bone

ABSTRACT

Xenografts have been regarded as promising alternatives to autografts, thanks to their unlimited supply of available material and because they can reduce morbidity by eliminating the donor site. The main purpose of this study was the characterization of a variety of granulate mineral-based biomaterials, chosen to encompass materials of different origins (bovine, porcine and coralline) and different types (cortical and cancellous bone and mineral based). The biomaterials examined included grafting materials of different origins: bovine (BioOss® and PepGen P-15®), porcine (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) and coralline (Biocoral®). These samples were tested with no further treatment. The results obtained for these biomaterials were compared with those of human bone. Besides a classical rationalization of chemichal composition and crystallinity, a major emphasis was placed on the measurement of various morphostructural properties, specifically particle size, porosity, density, and surface area. Each material was used in a granular form (easier to accommodate and more quickly resorbed) with the lowest particle size range available, recommended for application in the treatment of oral, periodontal, and maxillo-facial bone defects. Mercury intrusion revealed a significant variation in the samples porosity: 33% for OsteoBiol®, 50% for PepGen P-15®, and 60% for BioOss®. Moreover, it showed that a significant percentage of that porosity corresponded to submicron pores. Biocoral® was not analyzed by this technique as it possesses larger pores than those of the porosimeter upper limit. The density values determined for the calcined samples were close to the theoretical values of hydroxyapatite. However, the values for the collagenated samples were lower, in accordance with their lower mineral content. The specific surface areas ranged from less than 1 m^2/g (Biocoral®) up to 60 m^2/g (BioOss®).
FTIR spectra of OsteoBiol® Gen-Os and natural human bone showed collagen bands clearly visible in addition to those of hydroxyapatite, while diffractograms of these samples represent the dual-phase composition: hydroxyapatite (sharp peaks) and collagen (broad band).

CONCLUSIONS

In evaluating these biomaterials, the Authors detected significant differences in terms of particle size, crystallinity, porosity and pore size distribution, surface area, and mineral content. Consequently, they concluded that “although these morphological characteristics greatly influence the in vivo behavior of the samples, they are often not taken into consideration when the samples’ biological performance is evaluated. This may be responsible for the conflicting results frequently found in the literature. It is believed that the results provided for the materials investigated will be most useful to fully interpret their clinical responses”.

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

LABORATORY TESTS

026

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ORIGINAL ARTICLE
Journal of Biomedical Materials Research Part B: Applied Biomaterials
2010 Feb;92(2):409-19

Material tested

BONE SUBSTITUTE
OsteoBiol® Gen-Os

LABORATORY TESTS

060

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ORIGINAL ARTICLE
European Journal of Inflammation
2011;9(3 Suppl):103-7

Material tested

BONE SUBSTITUTE
OsteoBiol® Apatos

LAB

OsteoBiol® influences osteogenic differentiation of adipose derived stem cells

ABSTRACT

In order to achieve a successful implant rehabilitation, often it is necessary to perform a bone regeneration treatment, involving the substitution of damaged tissues by using biomaterials able to act as scaffolds for bone growth, without any foreign body reaction. To increase the bone volume, it is possible to use autologous bone grafts; anyway, these present some disadvantages, due to their limited availability, their tendency to partially resorption, the need for an additional surgery, and the increased morbidity. This is why xenografts - derived from porcine or bovine origin - are considered valid alternatives to autografts. Actually, they represent an unlimited supply of available material, reduce disease transmission or infection and have good osteoconductive properties.

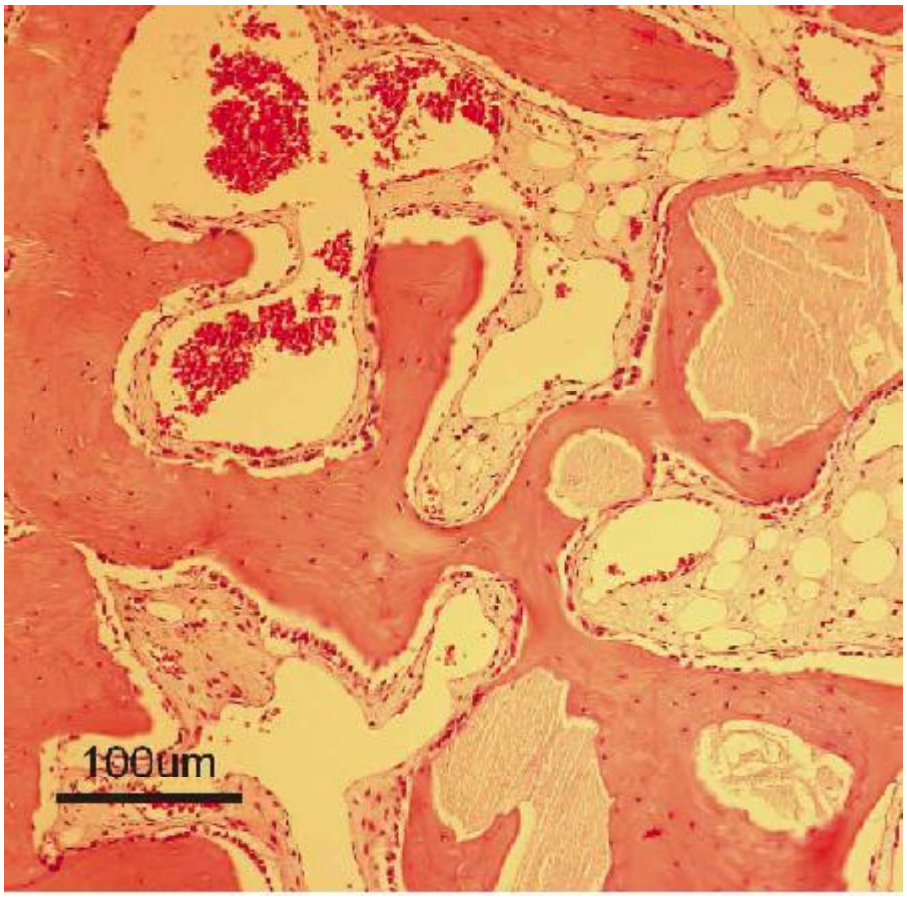
In this study, the Authors tested the osteogenic potential of OsteoBiol® (Tecnoss®, Italy), a cortical collagenated porcine bone, that shows good biocompatibility and osteoconductive properties. To study how cortical porcine bone can induce osteoblast differentiation and proliferation in mesenchymal stem cells, the expression levels of bone related genes (RUNX2, SP7, ALPL, SPP1, COL1A1, COL3A1 and FOSL1) and mesenchymal stem cells marker (ENG) were measured in Adipose Derived stem cells (ADSCs) and Human Osteoblasts (HOb) cultivated with OsteoBiol®. For the test purposes, OsteoBiol® at the concentration of 10 mg/ml was added at ADSCs and HOb cultures. The treatment was performed at two time point: 15 days and 30 days.

CONCLUSIONS

The results of this study demonstrate that OsteoBiol® induces matrix synthesis and deposition in osteoblasts in the late stages differentiation; it has a potential role in stem cells osteodifferentiation and osteoinductive properties. Moreover, the up-regulation of SPP1 showed that this biomaterial is actively resorbed by human osteoclasts.

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

Experimental studies



OsteoBiol®
by Tecnoss

REGENERATION SCIENCE

INSPIRED BY NATURE

EXPERIMENTAL STUDIES

019

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ORIGINAL ARTICLE
Clinical Implant Dentistry and Related Research 2008 Dec;10(4):264-70, Epub 2008 Jan 30

The bone tissue responses to prehydrated and collagenated cortico-cancellous porcine bone grafts: a study in rabbit maxillary defects

ABSTRACT

Bone substitutes of xenogeneic origin are frequently used as grafting materials for filling bone defects and maxillary sinus floor augmentation procedures. To be effective, bone substitutes must have osteoconductive properties and be completely replaced with new bone with time. In order to improve the clinical handling, it is possible to add collagen gel to prehydrated and collagenated porcine bone (PCPB) particles, with the result of a sticky and moldable material which facilitates its application in the site to be filled.

As the possible influence of the gel on the bone tissue response is not known, the objective of the study was to histologically evaluate the bone tissue responses to PCPB graft with or without collagen gel and to evaluate the resorption/degradation properties of the biomaterials.

For these study, bilateral bone defects (dimensions: 5x8x3 mm) were created in the maxilla of 14 rabbits. The defects were filled with prehydrated and collagenated cortico-cancellous porcine bone (PCPB) particles (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy - granulometry: 250-1000 µm) as control material, or PCPB particles mixed with collagen gel (mp3®, OsteoBiol®, Tecnoss®, granulometry: 600-1000 µm) as test material. A collagen membrane (Evolution, OsteoBiol®, Tecnoss®) was used to cover the defect and to prevent migration of the particles and the wounds were closed with resorbable sutures. Animals were killed after 2 (n=3), 4 (n=3), and 8 weeks (n=8) for histological and morphometrical evaluations.

According to the results of these evaluations, there was no obvious difference between the test and control materials. There were no signs of adverse reactions, and both osteogenesis and angiogenesis followed ordinary time frames. Both materials showed bone formation directly on the particles by typical osteoblastic seams. The bone area increased with time (2-8 weeks) for both sides, from 16,2% (control) and 19,2% (test) to 42,7 and 43,8%, respectively. The PCPB, whether mixed with collagen gel or not, was resorbed by osteoclasts as well as part of remodeling with the formation of osteons within the particles. Morphometry showed a decrease of PCPB area from 19,4% (control) and 23,8% (test) after 2 weeks to 3,7 and 9,3% after 8 weeks, respectively. The histology showed that the membrane had fulfilled its function and was well integrated with the overlaying soft tissues.

CONCLUSIONS

From the findings of this study, it is possible to conclude that mixing collagen gel and PCPB to facilitate the clinical handling does not influence the bone tissue responses to the material, which exhibited osteoconductive properties and was resorbed with time. Both graft materials exhibited osteoconductive properties as bone formation with typical osteoblastic seams was observed directly on the surface of the grafted particles. The morphometric measurements showed increased bone area with time in parallel with a decrease of the graft area. The Authors concluded that “collagenated porcine bone exhibits good biocompatibility and osteoconductive properties, whether mixed with collagen gel or not. In this model, the material was resorbed by surface osteoclasts as well as part of remodeling with the formation of osteons”.

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

OsteoBiol by Tecnoss

Melatonin plus porcine bone on discrete calcium deposit implant surface stimulates osteointegration in dental implants

ABSTRACT

Bone grafts are normally placed in bone defects or into extraction sockets in order to facilitate healing, to increase the width of the crest or for augmentation of the maxillary sinus floor prior to an implant placement.

As several studies have documented that melatonin is an important mediator in bone formation and stimulation and that acts directly on osteoclasts in the bone metabolism, this study aimed to evaluate the effect of the topical application of melatonin mixed with collagenized porcine bone mp3® (OsteoBiol®, Tecnoss®, Coazze, Italy) to accelerate the osteointegration on the rough discrete calcium deposit (DCD) surface implants in Beagle dogs 3 months after their insertion. After a 4-week treatment period, melatonin significantly increased the perimeter of bone that was in direct contact with the treated implants ($P<0,0001$), bone density ($P<0,0001$), new bone formation ($P<0,0001$) in comparison with control implants. Melatonin combined with collagenized porcine bone covered discrete calcium deposit surface implants and reveals more bone to implant contact at 12-week follow up study compared with implants covered with melatonin and control implants. In implants with melatonin plus porcine bone mp3® it was observed less crestal bone resorption than implants covered with melatonin and implants control group at 12 weeks.

CONCLUSIONS

The findings of this study suggest that the combination of melatonin and mp3® increases bone-to-implant contact (BIC) and reduces crestal bone loss and that the topical application of melatonin on DCD surface may act as a biomimetic agent in the placement of endo-osseous dental implants, enhancing the osseointegration.

Consequently, the Authors affirmed that “these actions of melatonin on bone tissue are of interest as it may be possible to apply melatonin during endosseous dental implant surgery as a biomimetic agent. As a result, the process of healing may be more precise, initial conditions of receptor tissues may be enhanced, the period of osseointegration and settling of the implant may be reduced, and therefore the quality of life of the patient may be improved”.

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

EXPERIMENTAL STUDIES

022

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ORIGINAL ARTICLE
Journal of Pineal Research
2009; 47(2):164-72

Grafted with

BONE SUBSTITUTE
OsteoBiol® mp3®

EXPERIMENTAL STUDIES

033

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ORIGINAL ARTICLE
Journal of Pineal Research
2010; 48:194-203

Actions of melatonin mixed with collagenized porcine bone versus porcine bone only on osteointegration of dental implants

ABSTRACT

Several studies have documented that melatonin is an important mediator in bone formation and stimulation, suggesting an osteogenic effect of melatonin that may be of clinical importance. Consequently, the aim of this study was to evaluate the effect of the topical application of melatonin mixed with collagenized porcine bone on the osseointegration on the rough discrete calcium deposit (DCD) surface implants in Beagle dogs 3 months after their insertion. In preparation for subsequent insertion of dental implants, lower molars were extracted from 12 Beagle dogs. Each mandible received two parallel wall expanded platform implants with a DCD surface of 4 mm in diameter and 10 mm in length. The implants were randomly assigned to the distal sites on each mandible in the molar area and the gaps were filled with 5 mg lyophilized powdered melatonin mixed with porcine bone mp3® (OsteoBiol®, Tecnoss®, Coazze, Italy) in test sites and collagenized porcine bone alone (mp3®) in control sites.

The histomorphometric evaluations showed that after a 4-week treatment period, melatonin plus porcine bone significantly increased the perimeter of bone that was in direct contact with the treated implants ($P < 0,0001$), bone density ($P < 0,0001$), and new bone formation ($P < 0,0001$) in comparison with porcine bone alone around the implants.

CONCLUSIONS

The Authors choose to use this porcine bone-derived biomaterial because of its very good biocompatibility, focusing on the possibility that the topical application of porcine bone graft and melatonin synergistically promote in vivo bone formation by enhancing the differentiation and the proliferation of osteogenic cells. As the findings of this study demonstrate the effect of porcine bone graft mixed with melatonin on osseointegrated DCD surface dental implants, augmenting bone-to-implant contact (BIC: 84,5 ±1,5%) compared with implants treated with porcine bone alone (BIC: 66,17 ± 1,2%) at 12-week follow-up study, the Authors concluded that “melatonin plus collagenized porcine bone on DCD surface may act as a biomimetic agent in the placement of endo-osseous dental implants and enhance the osseointegration”.

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

OsteoBiol by Tecnoss

Short communication: collagenated cortico-cancellous porcine bone grafts. A study in rabbit maxillary defects

EXPERIMENTAL STUDIES

031

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ABSTRACT

In a previous study, the Authors evaluated the bone tissue responses to collagenated porcine bone (CPB), with and without prehydration, finding that CPB exhibits good biocompatibility, osteoconductive properties, and that the material was resorbed by surface osteoclasts as well as part of the remodeling with the formation of osteons. Moreover, they found that the dehydration process made the graft material sticky, facilitating clinical handling. As the influence of different ratios between bone particles and collagen on bone response is not known yet, the aim of this short communication was to evaluate the bone tissue response to CPB, with different collagen gel content, when placed in defects in the rabbit maxilla. In this study, bilateral bone defects, 5x8x3 mm, were created in the maxilla of 8 rabbits. The defects were filled with prehydrated (20% collagen I/III) collagenated cortico-cancellous porcine bone mix (Putty, OsteoBiol®, Tecnoss®, Coazze, Italy – granulometry up to 300 µm) (A) or prehydrated (40% collagen I/III) collagenated cortico-cancellous porcine bone mix (Gel 40, OsteoBiol®, Tecnoss® - granulometry up to 300 µm). Animals were killed after 8 weeks for histological and morphometrical evaluations that evidenced that both materials showed a high degree of new bone formation, 42% and 46%, respectively, and clear signs of resorption at time of the animals sacrifice.

CONCLUSIONS

The present study clearly demonstrates that CPB with different collagen gel content induces bone formation in defects in rabbit bone and that resorption of the porcine bone particles takes place. The high presence of collagen might induce adhesion of both mesenchymal cells and osteoclasts to the surface of the material because these cells are shown to link to different proteins. Also, collagen has been shown to have a chemotactic and differentiation effect on mesenchymal stem cells.

On the basis of the findings of this study, the Authors concluded that “CPB with different ratios of collagen exhibits good biocompatibility and osteoconductive properties. In this model, the two materials were equal with respect to both bone formation and resorption which had started at the endpoint at 8 weeks”.

ORIGINAL ARTICLE
Clinical Implant Dentistry and Related Research
2010 Jun 1;12(2):161-3

Grafted with

BONE SUBSTITUTES
OsteoBiol® Putty
OsteoBiol® Gel 40

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

OsteoBiol by Tecnoss

EXPERIMENTAL STUDIES

042

Experimental model of bone response to collagenized xenografts of porcine origin (OsteoBiol® mp3®): a radiological and histomorphometric study

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ORIGINAL ARTICLE
Clinical Implant Dentistry and Related Research
2013 Feb;15(1):143-51. Epub 2011 Mar 31

ABSTRACT

In case of atrophied ridges, it is necessary to reconstruct an adequate bone volume in order to perform a successful rehabilitation with implants. Nowadays, the clinician has the possibility to choose between several techniques for reconstructing atrophied ridges, all with advantages and limitations. One of these techniques is the use of bone substitute grafts. These have been for many years the subject of the clinical dental research aimed to find the ideal biomaterial that must be biologically safe, reliable, biocompatible and without toxicity.

The aim of this study was to carry out radiological and histomorphometric evaluations of bone response to a xenograft of porcine origin over a 4-month period following the insertion in rabbits' tibiae. The biomaterial tested was mp3® (OsteoBiol®, Tecnoss®, Coazze, Italy), an antigen-free bone consisting of 90% collagenized granules between 600 and 1000 µm mixed with 10% pure Type-I porcine collagen gel. 20 collagenated porcine bone xenografts in granulated form of 600 to 1000 µm, were inserted in the proximal metaphyseal area of 20 New Zealand rabbits' tibiae. In the same animals, 20 control areas were created. Following implantation, the animals were sacrificed in four groups of five, after 1, 2, 3, and 4 months, respectively.

After 4 months, the radiological examination revealed in the bone defects, into which the collagenated xenografts had been placed, images of a complete repair of the osseous defect, with a decrease in graft volume. The anatomopathological study showed the presence of mature osseous bone in the cortex of the implant insertion site and a bone remodeling of osseous trabeculae around the implant.
Histomorphometric analysis at 4 months found that the newly formed bone was represented by a value of 31,5±2,4%, the residual graft material by a value of 33,1±2,3%, and the nonmineralized connective tissue was represented by a value of 35,4±3,4%. No healed or residual bone alterations attributable to the presence of the implants were observed.

CONCLUSIONS

The outcomes of this study suggest that OsteoBiol® mp3® is a biocompatible material and it has osteoconductive properties. The material acted as a scaffold for bone cells, leading to progressive increases in bone growth in and around the xenograft. The Authors concluded that "the said biomaterial may be considered a satisfactory substitute for bone tissue, a material that does not interfere with the bone's normal reparative processes".

Grafted with

BONE SUBSTITUTE
OsteoBiol® mp3®

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

OsteoBiol by Tecnoss

Bone response to hydroxyapatites with open porosity of animal origin (porcine [OsteoBiol® mp3®] and bovine [Endobon®]): a radiological and histomorphometric study

ABSTRACT

Nowadays, implant treatment has achieved a high success rate thanks to the development of advanced implant systems and techniques. In the meanwhile, the use of grafts for the substitution regeneration of bone tissue has risen too. In case of bone deficiency, clinicians can use autologous bone grafts, allografts and xenografts. In particular, xenografts are gaining more and more popularity among clinicians for their osteoconductive properties and effectiveness.

In this article, the authors investigated the bone response to two xenografts of animal origin, one porcine, and the other bovine, inserted in the tibiae of 20 albino New Zealand rabbits in order to ascertain their biocompatibility and osteoconduction. A total of 40 grafts were placed for the evaluation of the two different xenografts: 20 porcine xenografts made up of 90% granulated bone particles of 600–1000 µm in size and 10% pure collagen, in the form of a bone granulate (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy – granulometry: 600-1000 µm) and 20 bovine xenografts with bone granules of 500-1000 µm in size (Endobon®, RegenerOss™, BIOMET3i, Palm Beach Gardens, FL, USA). After 1, 2, 3 and 4 months from graft insertion, the animals were sacrificed in order to perform a radiological and histomorphometric evaluation. At the end of the study, the histomorphometric evaluation showed that there were no significant differences in newly formed bone between the biomaterials, but collagenized porcine xenografts proved to be more resorbable than bovine xenografts. In particular, for the porcine xenograft, the average value for newly formed bone was 22,8 ±1,8%, for residual graft material 23,6±3% and for connective tissue 53,5±2,5%, while for the bovine xenograft the value for newly formed bone was 23,1±1,8%, residual graft material 39,4±3% and non-mineralized connective tissue 37,5±2,5%.

CONCLUSIONS

At the end of the study, after the evaluation of the results achieved, the Authors concluded that “the collagenized porcine xenograft used (OsteoBiol® mp3®) proved to be biocompatible, osteoconductive and more resorbable than bovine bone. Both can be used as possible bone substitutes without interfering with normal reparative bone processes”.

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

EXPERIMENTAL STUDIES

043

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ORIGINAL ARTICLE
Clinical Oral Implants Research
2011 Jul; 22(7): 767-73

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BONE SUBSTITUTE
OsteoBiol® mp3®

EXPERIMENTAL STUDIES

040

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ORIGINAL ARTICLE
Clinical Oral Implants Research
2011 Oct;22(10):1131-7

Bone remodelling after regenerative procedures around implants placed in fresh extraction sockets: an experimental study in Beagle dogs

ABSTRACT

It is known that after a tooth extraction the residual alveolar bone is subjected to dimensional changes and the height of the buccal wall tends to decrease. Although the exact causes of these phenomena are still under discussion, nowadays in order to prevent bone resorption after tooth extraction clinicians have at their disposal different regenerative techniques. Different studies have shown that the different available regenerative techniques have succeeded in improving the bone levels. Keeping this in mind, the Authors of this study aimed to compare the physiological bone remodelling in Beagle dog models after the implant placement in a fresh extraction socket, with or without the application of regenerative procedures. The fourth pre-molar and first molar were selected as experimental teeth and, for each dog, a test and a control site were randomly selected. Two implants were placed both in test and control site of each dog and in the test site porcine collagenated bone (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) was placed in order to fill the gap around the implant. A collagen membrane (Evolution, OsteoBiol®, Tecnoss®) was utilized to cover the grafted area of GBR. The dogs were put downsacrificed at different times (2 weeks, 1 month and 3 months) and the measurements were performed immediately after root extraction and at 2, 4, 12 weeks after implant placement. After 2 weeks, in the control sites the examination showed few signs of resorption at the first molar only, while at the test sites bone levels were placed at the implant shoulder or above. After 4 weeks: on the control site, there was a slight bone remodelling, while on the test site minor signs of resorption or an increase of bone levels were detected. After 12 weeks, the alveolar crest on the control sites showed various degrees of remodeling, while on the test sites the bone levels were stable and in some cases an increase of bone crest was observed. Each site healed without complications. Statistical analysis indicated that differences between test and control sites were significant.

CONCLUSIONS

Although further studies are necessary to confirm the results of this study and within the limits of the present research, the Authors concluded that “the findings showed that GBR techniques were able to limit resorption of the alveolar crest after tooth extraction. A pattern of bone remodelling after tooth extraction and implant placement was observed in the control sites (no GBR) as well as in test sites (GBR), and although the exact cause of this is unclear, surgical trauma could play a role”.

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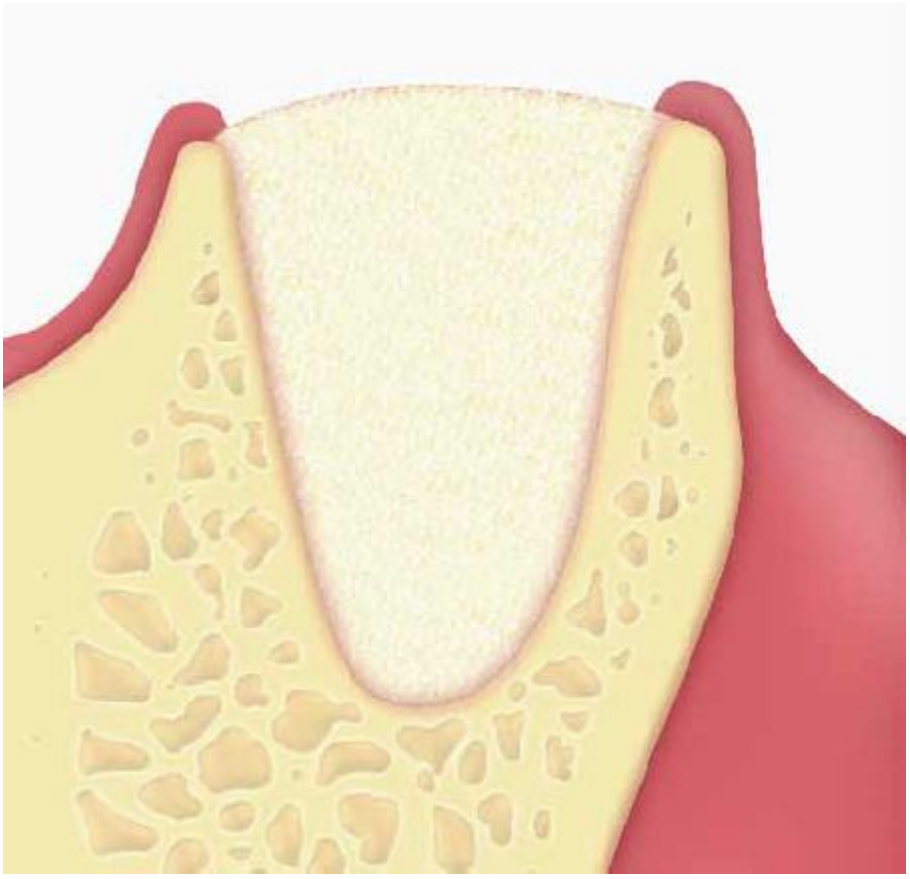
Alveolar regeneration



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ALVEOLAR REGENERATION

003

Clinical and histological study of a xenogenic bone substitute used as a filler in postextractive alveolus

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ORIGINAL ARTICLE
Minerva Stomatologica
2005 Jun;54(6):351-62

ABSTRACT

The remodeling process following a tooth avulsion results in a three-dimensional modification of the alveolar bone, making the insertion of an implant extremely difficult and requiring an augmentation procedure. The aim of this study was to evaluate the clinical behavior and the resorption times of the graft material (Putty, OsteoBiol®, Tecnoss®, Coazze, Italy), an antigen-free bone paste composed of 80% granulated mix and 20% pure collagen. This product has an average resorption time of less than 4 months. 12 patients were included in the study and all of them required an endosseous implant following the loss of a tooth due to root fracture or periodontal pathology. After the flap elevation and the defect examination, OsteoBiol® Putty was inserted in the cavity by means of a sterile spatula and the flaps were sutured. The histological analysis and the x-ray performed after 3 months showed a complete resorption of the heterologous material and its substitution with trabecular bone tissue.

CONCLUSIONS

The Authors appreciated the ideal malleability and plasticity of the product that allow a very simple application. Moreover, this biomaterial support a correct bone tissue regeneration, facilitating and accelerating the physiological processes. In the Authors' opinion, "this material could be the best indication for the insertion of postextractive implants in sites where the bone defects are more than 2 mm". They also concluded that OsteoBiol® Putty can be used also in not prominent or in 3-wall defects, with the advantage of an easy applicability.

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Xenograft versus extraction alone for ridge preservation after tooth removal: a clinical and histomorphometric study

ABSTRACT

In order to allow a proper implant placement from both esthetics and function points of view, it is fundamental to preserve as much as possible the ridge bone volume immediately after tooth extraction. In order to obtain this, different biocompatible materials and autogenous bone have been used to treat the bone atrophy of the alveolar ridges.

The purpose of this randomized clinical trial was to compare the bone dimensional changes following tooth extraction with extraction plus ridge-preservation using cortico-cancellous porcine bone and a collagen membrane. Moreover, the Authors analyzed and compared the histologic and histomorphometric aspects of the extraction-alone sites to the grafted sites.

40 patients who required tooth extraction and implant placement were enrolled in this study and randomly assigned to the control group (EXT; extraction alone) or to the test group (RP; ridge-preservation procedure). In this last group, cortico-cancellous porcine bone (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) was packed into the socket and collagen membrane (Evolution, OsteoBiol®, Tecnoss®) was hydrated in sterile saline and trimmed to completely cover the socket.

The clinical and histologic evaluations showed significant differences between the two treatments. The implants were placed at all sites, although some implants in the extraction-alone group showed a buccal dehiscence that required guided bone regeneration procedures after implant insertion. The bone biopsies taken from the control and test sites 7 months after the surgical treatment and the histologic and histomorphometric analyses showed a significantly greater horizontal reabsorption (4,3±0,8 mm EXT vs. 2,5±1,2 mm RP) and a greater ridge height reduction (3,6±1,5 mm) at the buccal side in the EXT group (RP: 0,7±1,4 mm). The vertical change at the lingual sites was inferior in the ridge-preservation group. The biopsies harvested from the grafted sites revealed the presence of trabecular bone, which was highly mineralized and well structured. The amount of connective tissue was significantly higher in the extraction-alone group than in the ridge-preservation group.

CONCLUSIONS

This study showed that the almost complete incorporation of the cortico-cancellous particles in bone created a dense and hard tissue network in which the porcine bone particles were completely surrounded by vital bone. The results obtained suggest that the ridge-preservation approach using porcine bone in combination with collagen membrane can limit the resorption of hard tissue ridge after tooth extraction. Moreover, the new bone formation observed between the porcine bone particles might indicate that the biomaterial is osteoconductive and acts as a natural scaffold for new bone formation.

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

ALVEOLAR REGENERATION

016

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ORIGINAL ARTICLE
Journal of Periodontology
2008 Aug;79(8):1370-7

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ALVEOLAR REGENERATION

018

Preservation of the postextraction alveolar ridge: a clinical and histologic study

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ORIGINAL ARTICLE
The International Journal of Periodontics and Restorative Dentistry
2008 Oct;28(5):469-77

ABSTRACT

When the treatment planning foresees the placement of an implant following a tooth extraction, it is necessary to preserve the dimension of the post-extraction alveolus. In literature different ridge preservation procedures have been proposed and it has been confirmed that filling and covering the post-extraction alveolus preserve the bone volume in a more predictably way compared to the natural healing. However, some controversy exists regarding the quality of the tissue augmented in the extraction site.

The aim of this investigation was to assess the possibility of preserving the buccal and lingual plates of a post-extraction socket from resorption using a bone filler. Consequently, this study investigated the role of a bone substitute material in preserving the ridge after the extraction of posterior teeth. In order to do this, after the tooth extraction, 10 single sockets in the posterior area were filled with a xenograft material (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy). The granules were then covered with a collagen membrane (Evolution, OsteoBiol®, Tecnoss®) and the soft tissues were sutured over the membrane without obtaining primary closure.

The histologic analysis performed 4 months after extraction on the specimens harvested from the area previously augmented with bone filler evidenced that about 85% of the initial ridge dimensions was preserved, allowing for a correct implant placement. From a histologic point of view, new bone formation was detected in all sites.

CONCLUSIONS

The results obtained in this investigation confirm that the resorption of the crestal width can be significantly reduced thanks to the use of a filling material and that the augmentation of the alveolus after tooth extraction seems to increase the probability of maintaining the original crestal form, allowing ideal implant placement with optimal bone and gingival tissues. In the Author's opinion, "the results promote the use of a bone substitute to fill the post-extraction site of posterior teeth to avoid alveolar bone loss".

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

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Dental implants placed in extraction sites grafted with different bone substitutes: radiographic evaluation at 24 months

ABSTRACT

In case of a post-extraction socket, it may be necessary to adopt surgical procedures such as guided bone regeneration, bone allografts, bone autografts, and xenografts in order to assure the proper biologic and esthetic conditions for the consequent implant placement. For this purpose, different graft materials have been advocated to prevent a bone-volume reduction and the aim of this study was to evaluate radiographic parameters of implants positioned in grafted alveoli with 3 different biomaterials: magnesium-enriched hydroxyapatite (MHA), calcium sulfate (CS), and heterologous porcine bone (PB).

15 patients, 7 women and 8 men, were included in this prospective study, requiring the extraction of 3 teeth for each patient. In total, 45 fresh extraction sockets with three bone walls were selected. 15 sockets received MHA, 15 sockets received CS, and 15 sockets received cortico-cancellous PB (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) as a graft material. After 3 months, in all the grafted sites titanium dental implants were placed and the temporary restoration was performed 3 months after the implant placement.

In order to evaluate the marginal bone level, at baseline and 12 and 24 months after implant placement, follow-up examinations, including intraoral digital radiographs, were conducted.

After 24 months, the results were the following: for the MHA group, a mean mesial bone loss of -0,21±0,08 mm and a mean distal bone loss of -0,22±0,09 mm (mean bone loss: -0,21±0,09 mm) were reported; for the CS group, a mesial bone loss of -0,14±0,07 mm and a distal bone loss of -0,12±0,11 mm (mean bone loss: -0,13±0,09 mm) were measured; for the PB group, a mean mesial bone loss of -0,15±0,10 mm and a mean distal bone loss of -0,16±0,06 mm (mean bone loss: -0,16±0,08 mm) were reported. No statistically significant differences were reported among groups (P>0,05).

CONCLUSIONS

The findings of this study at the moment of the 24-month follow-up showed that all the graft materials allowed the proper conditions for the implant osseointegration and that the placement of implants in grafted sockets was not influenced by the three different biomaterials, as they did not negatively impact the clinical outcome. The absence of statistically significant differences of bone level around implants among groups confirmed the results reported by other studies.

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ALVEOLAR REGENERATION

028

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ORIGINAL ARTICLE
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ALVEOLAR REGENERATION

044

Corticocancellous porcine bone in the healing of human extraction sockets: combining histomorphometry with osteoblast gene expression profiles in vivo

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ORIGINAL ARTICLE
International Journal of Oral and Maxillofacial Implants
2011 Jul - Aug; 26(4):866-72

ABSTRACT

In case of tooth extraction, significant structural changes and bone resorption - both horizontally and vertically - have been reported, with the detrimental consequence of important dimensional changes in the alveolar bone. In order to preserve the alveolar bone volume, it is common to graft a biomaterial into the socket immediately following the tooth extraction. The aim of this study was to evaluate the use of porcine bone graft in fresh sockets via histomorphometric and in vivo gene expression profiling.
For this prospective split-mouth study, 15 patients with a mean age of 53,7 years (range: 32-70 years) requiring the extraction of two teeth - one on each side of the arch in the molar or premolar regions - were selected. The inclusion criteria for the sockets were the presence of three bone walls and loss of the buccal plate. Following a split-mouth design, half the sockets received xenogeneic cortico-cancellous porcine bone (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) (PB group) and the contralateral sockets were left unfilled (control group). Four months after surgery, four cylindrical specimens were taken from each patient (two from the PB-grafted site and two from the control site) and the samples were processed for osteoblast expansion and in vivo gene expression analysis and for histomorphometry. The healing process occurred without complications and the grafted sites showed statistically significantly higher mean vital bone and lower mean connective tissue values than the control sites. The histological examination revealed an absence of inflammatory cells, along with bone formation in all grafted sites (39,6 ± 9,4% in PB vs. 29,5% ± 5,0% in control group) and the presence of biomaterial particles (34,4% ± 5,1%) and connective tissue (26,0% ± 9,9% in PB vs. 57,7% ± 6,9% in control group). In bone samples taken from PB-group, a better bone matrix formation and a decrease in osteoclastogenesis and bone resorption were observed. The consequent higher amount of new formed bone can be explained by the better mRNA gene expression of proteins such as Osteopontin (OPN) and type I collagen, together with a minor expression of Osteoprotegerin (OPG).

CONCLUSIONS

Due to the absence of inflammatory signs around the graft particles, the close contact between graft particles, and the newly formed lamellar bone present in the specimens, this study suggests that cortico-cancellous PB can be used successfully for ridge preservation. Moreover, the histological examination and the biomolecular evaluation confirmed the good biocompatibility and the high osteoconductivity of xenogeneic porcine bone. At any case, the Authors suggest that further studies are needed to better understand the long-term clinical and biological outcomes of this biomaterial.

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

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Porcine-derived xenograft combined with a soft cortical membrane versus extraction alone for implant site development: a clinical study in human

ABSTRACT

Following a tooth extraction, there is a significant reabsorption of the alveolar ridge with quantitative and qualitative changes of its profile. Often, the reabsorption is more pronounced on the buccal aspect of the ridge than on its lingual/ palatal counterpart, with dimensional changes in size and shape. In this article, the Authors report the results of a study performed on 15 patients who required double extraction of contralateral premolars and delayed implant placement who were randomly selected to receive alveolar ridge preservation (ARP) procedure compared with extraction alone (EXT). In this split-mouth study, the test sites (ARP) included 15 sockets treated according to the GBR principle for the ARP procedure with a cortico-cancellous porcine bone xenograft in combination with a soft cortical membrane. The xenogenic bone substitute consisted of cortico-cancellous porcine bone (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) in the form of mixed granules with a diameter ranging from 250 to 1000 µm. The membrane was a soft cortical lamina (Lamina, OsteoBiol®, Tecnoss®) with a porcine bone origin and a plastic consistency. Horizontal and vertical ridge dimensions were recorded at baseline and 6 months after extractions. After 6 months of healing, it was possible to place implants in all sockets, although some EXT sites had a slight buccal dehiscence requiring bone regeneration procedures after implant insertion. The use of porcine-derived xenograft as intrasocket graft combined with a membrane reduced significantly the bone loss: the mean width for the ARP sites showed a reduction of 1,8±1,3 mm versus a reduction of 3,7±1,2 mm for the EXT sites. Moreover, a significant vertical reduction was demonstrated in the EXT sites for mid-buccal and mid-palatal/lingual measurements (3,1±1,3 mm and 2,4±1,6 mm respectively), whereas in the ARP sites the ridge height remained relatively unchanged (0,6 ±1,4 and 0,5±1,3 mm).

CONCLUSIONS

Based on the results of this study, the Authors concluded that “it must be considered that the use of a xenograft in combination with a membrane reduces buccal reabsorption in a ridge crest, which naturally tends to a more palatal/lingual position following tooth extraction, thus decreasing possibility of dehiscence and favoring an ideal implant placement. The ARP approach using porcine bone in combination with a soft cortical membrane significantly limited the bone dimensional changes after tooth extraction when compared with EXT. Therefore, even if some EXT sites allowed an implant placement, the most predictable maintenance of the horizontal and vertical ridge dimensions was achieved only with the ARP procedure”.

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

ALVEOLAR REGENERATION

050

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Clinical Implant Dentistry and Related Research
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ALVEOLAR REGENERATION

053

A randomized clinical trial to evaluate and compare implants placed in augmented vs. non-augmented extraction sockets: a 3-year evaluation

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ORIGINAL ARTICLE
Journal of Periodontology
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ABSTRACT

As the maintenance of long-term stability of implant solutions depends on the quality and quantity of the available alveolar bone supporting implantation, the preservation of the alveolar crest after tooth extraction is essential for the success of the rehabilitation. In order to evaluate the need for additional augmentation procedures at implant insertion, the aim of this randomized clinical study was to test the hypothesis of no difference in success rate, bone tissue remodelling and need for augmentation procedures for implants placed in grafted sites versus implants placed in naturally healed sites. 40 patients having at least one hopeless tooth were enrolled in the study. Extraction sockets allocated in the test group were grafted with cortico-cancellous porcine bone (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) and a collagen membrane (Evolution, OsteoBiol®, Tecnoss®) was used to completely cover the socket. In the control group no biomaterial was grafted. The ridge-preservation approach using porcine bone in combination with a collagen membrane significantly limited the reabsorption of hard tissue ridge after tooth extraction compared to extraction alone. All patients were followed up to 3 years. At the end of the study, the results were: one implant failed in the control group at the second stage of surgery (6 months after placement); one implant failed in the test group after 2 years of loading. The cumulative implant success rate at the 3-year follow-up visit reached 95% for both groups. No statistically significant differences were detected for marginal bone changes between the 2 groups.

CONCLUSIONS

Based on the results of the present investigation, it was concluded that implants placed into grafted extraction sockets exhibited a clinical performance similar to implants placed into non-grafted sites in terms of implant survival and marginal bone loss. However, the Authors underlined that “it seems from these findings that extraction alone may lead to unpredictable healing patterns in which the remaining ridge does not often allow for an aesthetic and functional solution without the aid of an additional bone augmentation procedure simultaneously with implant placement.”

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

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Tissue changes of extraction sockets in humans: a comparison of spontaneous healing vs. ridge preservation with secondary soft tissue healing

ABSTRACT

Different ridge preservation techniques are available in order to control the bone remodeling process after a tooth extraction. The aim of these procedures are the maintanence of the alveolar ridge dimensions. Guided bone regeneration techniques have shown better results when compared to tooth extraction alone and the aim of this study was to evaluate the changes of hard and soft tissues in post-extraction sockets treated with a ridge preservation procedure and to compare them with those of post-extraction sockets which had healed naturally. A total of 58 patients (29 controls, and 29 tests) were enrolled in this study and each patient was randomly allocated to a test group or control group using a specific software package. The control sites received suture without any grafting material. The test sites were grafted with cortico-cancellous porcine bone (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) and a collagen membrane (Evolution, OsteoBiol®,Tecnoss®). At baseline and at implant placement (i.e. at 4 months), vertical bone changes, horizontal bone changes and width of keratinized gingiva were evaluated. The control group showed vertical bone resorption of 1±0,7 mm, 2,1±0,6 mm at mesial and buccal sites, and 1±0,8 mm and 2±0,73 mm at distal and lingual sites respectively. With reference to the changes in horizontal dimension, an average resorption of 3,6±0,72 mm was assessed. The test sites showed a vertical bone remodelling of 0,3 ± 0,76 mm, 1,1±0,96 mm, at mesial and buccal sites, and 0,3±0,85 mm, 0,9±0,98 mm at distal and lingual sites respectively. The horizontal bone resorption at the test sites was 1,6±0,55mm.

CONCLUSIONS

The findings of this study let the Authors affirm that “our data clearly indicate that the use of cortico-cancellous porcine substitute and resorbable membrane left exposed succeeded in reducing alveolar contour from remodeling when compared to non-treated extraction sockets. Furthermore, our research shows that the use of a ridge preservation technique may maintain ridge height when compared to tooth extraction alone”.

ALVEOLAR REGENERATION

057

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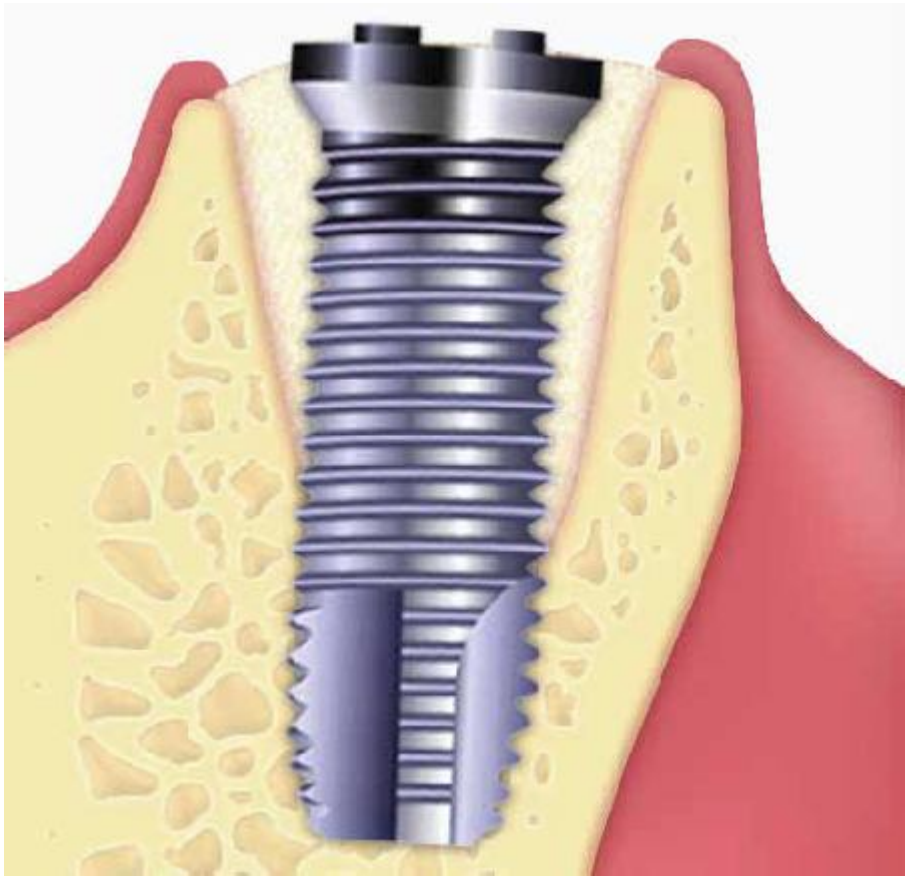

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DEHISCENCES AND FENESTRATIONS

008

Clinical outcome of implants placed immediately after implant removal

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ORIGINAL ARTICLE
Journal of Periodontology
2006 Apr; 77(4):722-7

ABSTRACT

The purpose of this study was to evaluate the clinical success of implants placed immediately after the explantation of failed implants due to fracture at 12 months. 9 patients (3 males and 6 females) aged 35 to 63 years were included in this study in a period ranging from 1999 to 2004. All of the patients selected for this study required the extraction of failed implants and were scheduled for immediate implant replacement.

As the placement of an immediate implant is often associated with a residual bone defect between the outer surface of the implants and the residual bone walls, the Authors considered to apply a GBR protocol only in case of a large bone defect. Consequently, 5 experimental implants which showed the absence of fenestrations or dehiscences of the bone walls and a residual gap between implant surface and surrounding bone walls <2mm, were not treated with any regenerative procedures. The remaining 4 experimental immediate implants, which exhibited bone fenestrations or dehiscences and/or peri-implant bone defects >2mm, were grafted with cortico-cancellous porcine bone particles (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) and covered with bioabsorbable membranes (Evolution, OsteoBiol®, Tecnoss®). The membranes were used for the treatment of large bone defects and where a large portion of the bone recipient site around the implant was missing. A bioabsorbable barrier membrane was used in all instances when necessary. Due to insufficient stiffness of the membrane, cortico-cancellous porcine bone particles were grafted into the defect to prevent the collapse of the membrane and maintain a space beneath the membrane for bone regeneration.

All implants were then restored with fixed prostheses. After 12 months, all the implants were successful and no residual bone defects were observed or probed around any implant. Analogously, the follow-up x-rays showed no significant bone loss pattern.

CONCLUSIONS

Considering the findings of this study, the Authors suggest that it is possible to place implants immediately after a fractured implant explantation, with results that are similar to results obtained with implants placed immediately after tooth extraction.

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

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Immediate postextraction implants: treatment of residual per-implant defects. A retrospective analysis

ABSTRACT

Very often, the placement of an implant in a fresh extraction socket is associated with a bone defect between the neck of the implants and the residual bone walls. This article is a retrospective analysis of the clinical success of immediately post-extractive implants in combination with regenerative procedures performed in order to treat the peri-implant bone defects. 50 patients were enrolled in the study and treated with an immediate implants. The marginal bone defects were treated in different ways. 20 sites were treated with collagen barrier membranes (Evolution, OsteoBiol®, Tecnoss®, Coazze, Italy) and cortico-cancellous pig bone particles (Apatos, OsteoBiol®, Tecnoss®). 10 sites were treated with membranes and autologous bone. 5 sites were grafted with a stratified bone paste (Putty, OsteoBiol®, Tecnoss®) and 6 sites were treated with a collagen membrane (Evolution). The second stage surgery was performed 6 months later for the prosthetic rehabilitation and in order to evaluate the residual peri-implant bone defects. Consequently, it was possible to assess that the 82% of the treated sites showed a complete bone healing without residual defects, while the 16% showed a residual bone defect.

CONCLUSIONS

At the moment of the second stage surgery, most of the peri-implant bone defects showed a complete healing and the residual bone defects did not require any further treatment procedure. Even if in this study it was not possible to evaluate the different behavior of the filling materials, the results of this study confirm the highly predictable success rate of post-extractive implants and of the regenerative procedure for the peri-implant bone defects treatment.

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

DEHISCENCES AND FENESTRATIONS

006

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ORIGINAL ARTICLE
European Journal of Implant Prosthodontics
2006 May-Aug;2(2):99-106

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DEHISCENCES AND FENESTRATIONS

017

Buccal bone augmentation around immediate implants with and without flap elevation: a modified approach

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ORIGINAL ARTICLE
The International Journal of Oral & Maxillofacial Implants
2008 Sept-Oct;23(5): 841-6

ABSTRACT

In literature, there is evidence of the fact that implants placed in fresh extraction sockets reduce not only morbidity rates in patients, but also the total time between tooth removal and the final prosthetic restoration. The aim of this study was to compare the clinical success and bone healing of implants placed in fresh extraction sockets using a flapless procedure compared to those placed with flap elevation. 20 patients (8 male and 12 female) aged 30 to 67 years were included in the study. All the patients selected for this study required the extraction of a natural tooth and were scheduled for immediate implant replacement.

10 implants were placed with flap elevation (control group), and 10 implants were placed without flap elevation (test group). All the sites selected showed a complete bone defect at the facial wall, which required bone augmentation. Bone augmentation was performed with a mixture of collagen gel and cortico-cancellous porcine bone (Gel 40, OsteoBiol®, Tecnoss®, Coazze, Italy). The surgical sites were protected at the level of gingival wound with a collagen membrane (Evolution, OsteoBiol®, Tecnoss®). All grafting procedures were successfully carried out as planned without any complications. All the implants included in this study were 2-stage implants placed at the level of palatal/lingual bone in augmented bone. 6 months after placement, both control and test implants underwent a second-stage surgery and a clinical examination to determine the implant stability quotient (ISQ), the distance between the implant shoulder and the first bone-implant contact (DIB) and the distance between implant shoulder and the crestal bone at the midbuccal aspect (DIC). One implant failed in the test group. Only one implant (test group) showed bone growth over the implant neck at the re-entry procedure. ISQ and DIB did not show any significant differences between the control and test group; however, a higher DIC was found in the test sites compared to the control sites.

CONCLUSIONS

The present study showed that implants placed immediately after tooth extraction in presence of vertical bone defects can be successfully treated either with or without flap elevation, even in the presence of bone defects requiring augmentation procedures. It was also noted that the bone regenerated reached a higher coronal level in the group with flap elevation than in the group without flap elevation. These findings suggest more favorable outcomes in terms of regenerated bone for the flap elevation group.

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

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Immediate implant placement after removal of a failed implant: clinical and histological case report

ABSTRACT

This article reports the clinical success of an implant placed immediately after the explantation of a fractured blade implant due to a fracture caused by biomechanical complications. A healthy 58-year-old male nonsmoker presented with a fractured blade implant that had been subjected to biomechanical overload. A gentle explantation was performed, and a new implant of the same shape was immediately placed. The peri-implant bone defect was grafted with a mixture of collagen gel and cortico-cancellous porcine bone (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) and covered with a bioabsorbable membrane (Evolution, OsteoBiol®, Tecnoss®).

Radiographic evaluation at 6 months after the treatment showed complete bone healing. No residual bone defect was observed or probed during the uncovering phase; moreover, no mobility, pain, suppuration, or presence of peri-implant radiolucency were observed at the second-stage surgery.

CONCLUSIONS

When an implant fails, it must be immediately removed. In case of a new implant placed in a fresh extraction socket, if the contact implant-bone is not ideal or portion of the implant wall is exposed because of a dehiscence in the bone, guided tissue regeneration techniques can be employed using barrier membranes with or without bone graft materials.

The present case report demonstrated the successful immediate replacement of a failed blade implant with a new implant of the same shape in the same location in combination with a graft material and a membrane.

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

DEHISCENCES AND FENESTRATIONS

024

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Journal of Oral Implantology
2009;35(4):189-95

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DEHISCENCES AND FENESTRATIONS

047

Surgical reconstruction of peri-implant bone defects with prehydrated and collagenated porcine bone and collagen barriers: case presentations

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ORIGINAL ARTICLE
Clinical Implant Dentistry and Related Research
2011 Dec 6, Epub ahead of print

ABSTRACT

One of the main concern related to implant treatment is the peri-implant bone loss mainly due to infection. Over the years, various techniques have been proposed in order to solve this problem and barrier technique has been shown to reduce defect depth in case presentations. Some reports have shown enhanced outcome with a combination of barriers and autogenous bone grafts in animal experiments as well as in humans. In this case report, the aim of the Authors was to evaluate the healing capacity of PCPB material in the surgical reconstruction of long-standing chronically infected peri-implant defects. To do so, PCPB particles (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy - granulometry: 600-1000 µm) were used as defect-filling material, combined with a bioresorbable collagen barrier (Bio-Gide®, Geistlich AG, Wolhusen, Switzerland) to cover the defects and the implanted bone mineral. In this case study, three patients enrolled for treatment of advanced peri-implant infection and bone loss around one or more implants participated. After local anesthesia and the preparation of the target sites, mp3® was applied into the defects. The Bio-Gide® barriers were adjusted and placed to cover defects and implants. After 6 and 12 months of healing, clinical and radiographic examinations were done. All defects healed uneventfully. At 6 months, probing depths were reduced by 3-4 mm with no bleeding on probing or pus formation. At 12 months, healthy peri-implant conditions were found. Intra-oral radiographs showed gain of the marginal bone level by 2-4 mm.

CONCLUSIONS

The results of this study show that PCPB have favorable properties enhancing bone regeneration in peri-implant bone defects. In contrast to other xenogenic materials, PCPB seems to activate the Bone. Metabolic Units (BMU) by triggering phagocytosis of the graft material and subsequently favor deposition of new matrix and subsequent mineralization. After discussing the results, the Authors concluded that “the encouraging treatment outcome of reconstructive surgery found here is based on three cases and must consequently be considered with caution. However, it can still serve as a promising topic for future short- and long-term studies”.

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

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Bucco-lingual crestal bone changes around implants immediately placed in fresh extraction sockets in association or not with porcine bone: a non-blinded randomized controlled trial in humans

ABSTRACT

The placement of implants immediately after tooth extraction seems to be useful in order to maintain the alveolar crest width and height and prevent the bone resorption of the post extraction socket. Unfortunately, the immediate placement of implants after tooth extraction is often associated with residual gaps between the post extraction socket and the coronal part of the fixture, owing to the irregularity of the residual bone walls. The aim of the present randomized controlled clinical trial was to assess the bucco-lingual bone changes of implants immediately placed in fresh extraction sockets in association or not with porcine bone. For this study, 17 females and 23 males, ranging in age from 22 to 80 years (mean 45,65) were randomly assigned to the two treatment groups. In the control sites immediate implants were placed with no grafting material, while in the test sites immediate implants were inserted in association to a deantigenated collagenated bone substitute of porcine origin (OsteoBiol®, Gen-Os, Tecnoss®, Coazze, Italy) with granules size ranging from 0,25 mm to 1 mm and was maintained in place by the use of equine collagen sponge to cover the implants and the bone graft. The bucco-lingual bone width was measured at different time points: at the time of surgery (T0), at 90 days (T1), at 110 days (T2) and after 6 months of masticatory function (T3). The values were statistically analyzed between and within the treatment groups ($p > 0.05$).

CONCLUSIONS

At T1, T2 and T3, statistically significant differences were found by comparing the mean width of the bucco-lingual bone between control and test groups. The mean values decreased during the observation period in both groups; statistically significant differences within controls were detected at T1, T2 and T3, and at T2 and T3 within tests. The results of this study suggest that the use of biomaterials to fill the gaps between implants and extraction sockets allowed the preservation of the bucco-lingual crestal width. Consequently, the Authors affirm that "within the limits of the present study, it can be suggested that porcine bone enabled to avoid bucco-lingual crestal bone changes in implants immediately placed in fresh extraction sockets with a flapless approach and that immediate placement and restoration of a single implant can be a valid and successful option of treatment in the case of single compromised tooth".

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

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ORIGINAL ARTICLE
Journal of Periodontology
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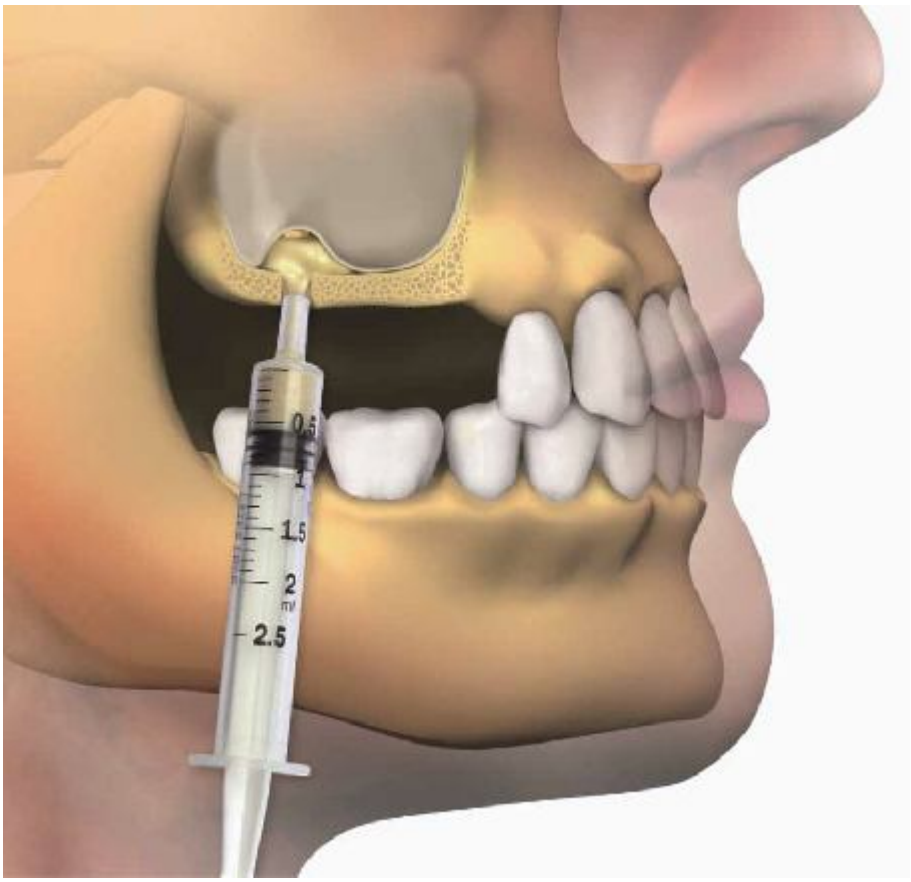
Crestal access sinus lift



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CRESTAL ACCESS SINUS LIFT

015

Implant placement in fresh extraction sockets and simultaneous osteotome sinus floor elevation: a case series

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ORIGINAL ARTICLE
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ABSTRACT

In the posterior maxilla, implant placement immediately after tooth extraction is frequently complicated by the presence of the maxillary sinus and by a lack of adequate bone volume and quality, thus preventing a precise placement and stabilization of the implants. Therefore, in these situations, normally a maxillary sinus augmentation is performed, followed by implant placement in the reconstructed bone.

The purpose of this study was to evaluate the clinical success of implants placed in fresh extraction sockets with simultaneous maxillary sinus floor elevation using the osteotome technique.

12 patients (7 men and 5 women) aged 38 to 56 years were included in this study, requiring the extraction of a maxillary premolar and scheduled for immediate implant placement. The graft materials used in both sinus floor augmentation and peri-implant bone defects were a mixture of collagen gel and cortico-cancellous porcine bone particles (Gel 40, OsteoBiol®, Tecnoss®, Coazze, Italy), covered with bioabsorbable membranes (Evolution, OsteoBiol®, Tecnoss®). The resulting graft material was extremely easy to handle because the collagen gel acted as a sealing material.

All implants were allowed to heal for 6 months prior to prosthetic rehabilitation. One of the 12 experimental implants failed because of an abscess during early healing. No implants failed after definitive prosthetic rehabilitation. No significant bone loss was detected at the final follow-up visit. 18 months after surgery, mean bone gain evaluated by radiographies was 4,2 ± 1,4 mm.

CONCLUSIONS

The results of this study demonstrate that the use of the osteotome technique in order to obtain the sinus floor elevation and the implant placement in fresh extraction sockets can be considered a predictable procedure. Thanks to the lateral condensation of bone performed by this technique during the preparation of the implant site, the resulting bone quality seems to be improved.

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Atraumatic maxillary sinus elevation using threaded bone dilators for immediate implants. A three-year clinical study

ABSTRACT

Different techniques are available in order to create a sufficient volume of supporting bone in and around the maxillary sinus in case of a bone reduction both in height and width of the alveolar process due to atrophy and pneumatization. However, some of these treatments are complex and require specific surgical training.

The aim of this study was to evaluate the efficacy of sinus floor elevation carried out via the alveolar ridge, with collagenated porcine bone grafts and immediate implant placement in a single surgical session through the use of angled osteotomes, threaded and with depth markings and restored 18 weeks later.

30 patients (18 women and 12 men) were included in the study, with atrophy affecting both height and width of the posterior upper maxillary. All implants were placed immediately after the application of convex and concave bone dilators for sinus floor lifting by means of the introduction of porcine bone mp3® (OsteoBiol®, Tecnoss®, Coazze, Italy) with a granulometry of 600-1000 µm. Residual bone height (RBH) varied between 5 and 8 mm for all patients.

From the radiographic analysis it was possible to determine that the average intra-sinus bone gain was 4,13±0,97 SD mm at the time of surgery, 3,90±1,15 SD mm at 12 months, 3,74±1,05 SD mm at 24 months and 3,62±1,75 SD mm at 36 months.

CONCLUSIONS

After a follow-up period of 36 months, it was possible to put in evidence that the alveolar maxillary sinus floor elevation technique with angled threaded osteotomes and collagenated porcine mp3® bone achieved a success rate of 96,6%. Intra-sinus bone biomaterial remodeling was 0,51±0,08 mm from day zero to the 36-month follow-up. The advantage of the bone dilators technique is that it is a less invasive technique with a lower risk of complications both during and following surgery, with advantages from the aesthetic and functional point of view.

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

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ORIGINAL ARTICLE
Medicina Oral, Patología Oral y Cirugía Bucal
2010 Mar 1;15 (2):e366-70

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CRESTAL ACCESS SINUS LIFT

049

Immediate loading of dental implant after sinus floor elevation with osteotome technique: a clinical report and preliminary radiographic results

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ABSTRACT

One of the fundamental criteria for obtaining osseointegration is the possibility to obtain a good initial stability of the implant and to achieve this it is necessary to have a sufficient bone density and volume. As the osteotome technique is an alternative and conservative technique for sinus floor augmentation and immediate implant placement in the posterior region of the upper jaw, the aim of this clinical report was to analyze the possibility of sinus lift and immediate placement and loading of a dental oral implant in the premolar region of the maxilla using this technique. The authors describe the treatment of 46-year-old male patient who needed to replace the maxillary premolar with an implant-supported crown restoration. The fixture and xenogenic bone substitute materials used were: BioHorizons Internal, diameter 4.0 mm and length 12 mm (BioHorizons, Birmingham, Ala), a collagen membrane (Duo-Teck, OsteoBiol®, Tecnoss®, Coazze, Italy), and prehydrated and collagenated cortico-cancellous porcine bone graft (Gel 40, OsteoBiol®, Tecnoss®). The implant osteotomy site was prepared to full dimension by osteotomes of increasing diameter and the collagen membrane was introduced through the osteotomy and placed against the slightly elevated Schneiderian membrane. The graft material was prepared and injected through the osteotomy and into the elevated sinus cavity by means of its syringe. After this, it has been possible to place the implant with a good primary stability, with no intraoperative complications.

CONCLUSIONS

At the follow up after 12 months, the implant was successful, showing that “this simplified treatment modality can make implant rehabilitation of the atrophic maxilla premolar region more accessible in a single stage with immediate loading to facilitate bone density improvement”.

ORIGINAL ARTICLE
Journal of Oral Implantology
2010 Dec; 36(6):485-9

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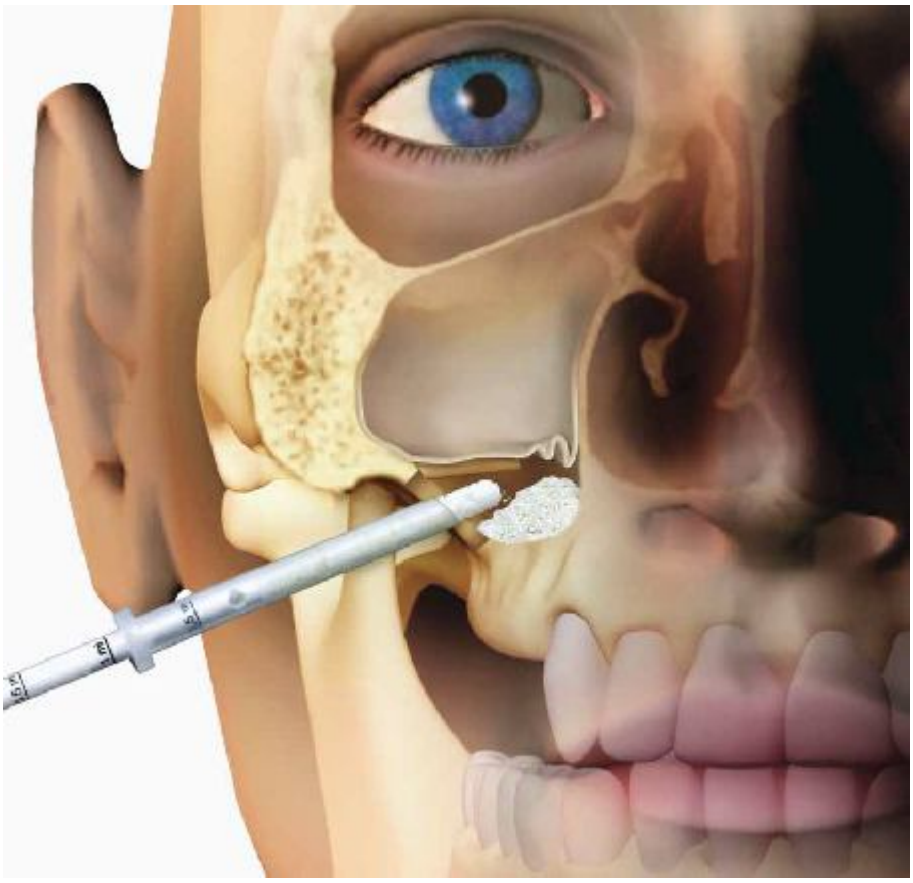

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LATERAL ACCESS SINUS LIFT

004

Maxillary sinus augmentation: histologic and histomorphometric analysis

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ABSTRACT

A limited quantity of bone volume, related to an excessive r esorption of the alveolar bone following a tooth extraction and enlargement of the maxillary sinus, can complicate the implant placement in the posterior maxilla. In order to allow a predictable implant placement, sinus floor lifting and grafting have been proposed. In this study, the Authors aimed to compare from a histological point of view the use of 100% autogenous bone versus a combination of autogenous bone and cortico-cancellous porcine bone for the sinus floor augmentation procedure.

For this study, 18 patients were selected following these criteria: need for bilateral sinus lifting and grafting, presence of severe maxillary bone atrophy, presence of a residual maxillary sinus floor of less than 3 mm and presence of healthy systemic conditions. The surgery was performed under general anesthesia and the bone for grafting was harvested from the iliac crest.

Each patient received 100% autogenous bone in one randomly selected sinus (control side) and a 1:1 mixture of autogenous bone and cortico-cancellous porcine bone particles (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) in the controlateral sinus (test side). The bony sinus windows were covered by a resorbable collagen membrane (Evolution, OsteoBiol®, Tecnoss®).

5 months after surgery, all patients received at least 2 implants on each side of the maxilla and bone biopsy specimens (2 from each side) were taken at the time of implant placement.

The histologic evaluation of the test sites at 5 months showed the presence of some residual cortico-cancellous bone particles and that the incompletely resorbed bone graft was well integrated and in complete continuity with the new bone tissue formation. No significant differences in bone percentages were observed in the bone biopsies from test and control sites.

CONCLUSIONS

In the present study, cortico-cancellous pig bone particles at 5 months became partially resorbed and surrounded by new woven bone. On the basis of the findings from this study, the Authors concluded that the cortico-cancellous pig bone particles have the capacity to support bone augmentation and can be successfully used in a 1:1 mixture with autogenous bone harvested from the iliac crest in case of severe maxillary atrophies (class V Cawood).

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A clinical study of the outcomes and complications associated with maxillary sinus augmentation

ABSTRACT

The sinus lift procedure is performed in order to increase the bone volume in the lateral maxilla and allow the use of dental implants. The dental implants can either be placed simultaneously when there is sufficient bone height, or be placed in a second moment, after an augmentation procedure.

The aim of this study was to evaluate the rate of complications in maxillary sinus floor augmentation surgery and the impact of complications on subsequent implant treatment in a patient population with severe maxillary atrophy scheduled for treatment under general anaesthesia.

70 patients (124 sinuses) with severe maxillary atrophy were included in the study for the maxillary sinus augmentation treatment under general anaesthesia. In 93 sinuses, the treatment was performed with autogenous bone alone. The donor sites for bone harvesting included the mandibular symphysis or the antero-upper border of the iliac crest. The remaining 31 sinuses were augmented with a 1:1 mixture of autogenous bone and cortico-cancellous pig bone particles (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy). The particles had granulometry between 250 and 1000 µm. The bony sinus windows were covered with a resorbable collagen membrane. Finally, the mucoperiosteal flap was replaced and sutured using vertical interrupted mattress sutures.

CONCLUSIONS

In evaluating the intraoperative complications, the Authors found that the use of an onlay bone graft in conjunction with sinus augmentation appeared to significantly increase the rate of infective complications. Anyway, this study showed no significant correlations between the occurrence of complications and the type of filling material adopted in the maxillary sinus augmentation. Furthermore, it was observed that new bone formation took place within 6 months of the sinus lift operation.

In particular, the Authors concluded that “no radiographic discrepancies in the amount of bone regenerated were observed between sinuses where only autogenous bone was used and those where a 1:1 mixture of autogenous bone and cortico-cancellous pig bone particles was used”.

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

LATERAL ACCESS SINUS LIFT

007

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ORIGINAL ARTICLE
The International Journal of Oral & Maxillofacial Implants
2006 Jan-Feb; 21(1):81-5

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LATERAL ACCESS SINUS LIFT

009

Histologic and ultrastructural analysis of regenerated bone in maxillary sinus augmentation using a porcine bone-derived biomaterial

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ORIGINAL ARTICLE
Journal of Periodontology
2006 Dec;77(12):1984-90

ABSTRACT

In case of an insufficient bone volume in the posterior maxilla, maxillary sinus floor augmentation procedures are used. Even if several different materials have been proposed for sinus augmentation procedures, it is still not clear which graft materials are clinically most suitable for bone regeneration. Autogenous bone is considered to be the gold standard, but its main disadvantages, especially those related to the patient's discomfort, produced a quest for a bone substitute that could be used in bone regeneration techniques and induce a predictable and rapid healing of the tissues at the interface with dental implants.

The aim of the present study was to report the results of light microscopy (LM) and transmission electron microscopy (TEM) in specimens retrieved 5 months after sinus floor augmentations using a porcine bone-derived biomaterial in the form of granules (Apatos, OsteoBiol®, Tecnoss®, Coazze, Italy). 10 patients were included in this study. After maxillary sinus augmentation using this biomaterial, 10 specimens were retrieved after 5 months and processed to be observed under light microscopy (LM) and transmission electron microscopy (TEM). At the same time, implants have been placed, planning second-stage surgery after 5 months.

After 5 months, the clinical observation revealed that all implants were stable and the x-rays showed the presence of bone around and above the implants placed in the augmented maxillary areas. The light microscopy observation showed that most of the particles were surrounded by newly formed bone and that mainly compact bone was present at the interface. Moreover, the bone biomaterial interface showed a close contact between the porcine bone particles and the surrounding bone that had mainly features of mature bone with numerous osteocytes. Newly formed bone area was 36±2,8%, marrow spaces were 38±1,6%, while residual graft material was 31±1,6%. Under TEM, all phases of bone formation (osteoid matrix, woven, and lamellar bone) were observed in proximity with the biomaterial particles.

CONCLUSIONS

The findings of this study show that this cortical porcine bone-derived biomaterial is biocompatible and can be used for maxillary sinus augmentation procedures, promoting bone formation without in-terfering with the normal reparative bone processes and implant osseointegration.

Based on these results, the Authors concluded that "these findings could increase the scientific knowledge of the clinician for understanding the biologic interactions occurring in proximity of a porcine bone substitute, showing that bone in contact with it presents all the phases of bone formation and shows features similar to the pre-existing osseous tissue, thus indicating the biocompatible properties of this graft".

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Osteotomy and membrane elevation during the maxillary sinus augmentation procedure. A comparative study: piezoelectric device vs. conventional rotative instruments

ABSTRACT

Sinus lift is generally considered to be a safe surgical procedure for the maxillary sinus floor augmentation with a low prevalence of complications. Anyway, in case of a sinus membrane perforation, it is no more possible to guarantee the graft stability and its vascularization, jeopardizing the maturation and mineralization of the bone graft. Moreover, the presence of a large sinus membrane perforation allows migration of the graft to the respiratory mucosa and its bacterial contamination.

The aim of this randomized-controlled clinical trial was to compare two treatment procedures for the surgical access (osteotomy and sinus membrane elevation) to the maxillary sinus by means of piezoelectric device and conventional instruments during the maxillary sinus floor augmentation procedures.

A total of 13 patients (10 females and 3 males) who required a bilateral maxillary sinus floor elevation for implant-prosthetic rehabilitation were selected. A within-patient control study was carried out. The osteotomy for sinus access was performed on one side of the maxilla using the piezosurgery (test sites) and on the other side using conventional rotary diamond burs (control sites).

Once the sinus membranes were elevated to obtain the requested volume for bone grafting, all the maxillary sinuses were grafted using 100% cortico-cancellous pig bone particles (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy). The bony sinus windows were covered with a reabsorbable collagen membrane (Evolution, OsteoBiol®, Tecnoss®).

CONCLUSIONS

All patients had an uneventful healing and no signs or symptoms of maxillary sinus disease were observed after the augmentation surgical procedures.

With reference to the comparison between the two surgical procedures, none of the differences observed between the two groups reached a level of significance.

Within the limits of the present study, the Authors concluded that “piezosurgery and conventional instruments did not show any differences in the clinical parameters investigated for the maxillary sinus floor elevation”.

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

LATERAL ACCESS SINUS LIFT

014

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ORIGINAL ARTICLE
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LATERAL ACCESS SINUS LIFT

023

Removal, after 7 years, of an implant displaced into the maxillary sinus. A clinical and histologic case report

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ORIGINAL ARTICLE
Journal of Osseointegration
2009

ABSTRACT

Even if the placement of endosseous implants in the posterior maxilla has become a standard procedure, different complications can occur and among these there is the implant displacement inside the maxillary sinus, that may cause local infection around the implant; it is the most common effect and consequently may lead to an extensive resorption of the surrounding bone. The main cause of implant displacement is the inadequate bone height in the posterior maxilla.

In this article the Authors reported a case of an implant migrated inside the maxillary sinus at the time of abutment connection and removed 7 years later. After the removal of the implant, a bone Lamina (OsteoBiol®, Tecnoss®, Coazze, Italy) was used to close the lateral window of the sinus. The mucoperiosteal flap was then replaced and sutured with multiple horizontal mattress sutures.

The removed implant underwent histological examination, while post-surgical visits were scheduled at monthly intervals to check the healing process. 7 months after the implant removal from the maxillary sinus a CAT scan image revealed normal mucosal thickness and no opacification of the left maxillary sinus.

CONCLUSIONS

In case of the displacement of an implant into the sinus, the implant must be removed and so it is important to accurately evaluate the specific characteristics of the patient and receptor site in order to establish the best treatment of the specific clinical case that can include the use of a graft material to fill the residual cavity.

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Maxillary sinus augmentation using prehydrated cortico cancellous porcine bone: hystomorphometric evaluation after 6 months

ABSTRACT

Bone substitutes, such as allografts, xenografts and allografts have been proposed for the augmentation procedures in case of insufficient alveolar bone height that can prevent the placement of standard dental implants in the posterior part of edentulous maxilla. Recently, a xenogenic bone substitute consisting of sterilized cortical pig bone in the form of particles with high porosity and diameter ranging from 600 to 1,000 µm has been proposed.

The aim of this study was to evaluate histologic results of a prehydrated cortico-cancellous porcine bone used in maxillary sinus augmentation. 24 patients with a residual bone height requiring a maxillary sinus augmentation procedure to place dental implants were included in this study. After the sinus membranes elevation in order to obtain the necessary volume for bone grafting, all the maxillary sinuses were grafted using 100% cortico-cancellous porcine bone particles (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy). The bony sinus windows were covered with a reabsorbable collagen membrane (Evolution, OsteoBiol®, Tecnoss®). The mucoperiosteal flaps were sutured using vertical-interrupted mattress sutures.

From the biopsies harvested 6 months after the augmentation procedures, it was possible to determine that mean percentage of new formed bone was 43,9±18,6% (range 7,5-100%), whereas the mean percentage of residual graft material was 14,2±13,6% (range 0-41,9%). The new bone/residual graft material ratio in the maxillary sinuses was 3,1. The mean soft tissues percentage was 41,8±22,7% (range 0-92,5%). The histological evaluation showed that the residual graft particles were surrounded by newly formed bone which presented features of mature bone, with well-organized lamellae and numerous small osteocytic lacunae.

CONCLUSIONS

Even if more studies on collagenated cortico-cancellous porcine bone are recommended by the Authors, the histological and histomorphometrical findings supported the idea that porcine bone has excellent osteoconductive properties and can be used successfully for sinus augmentation. In particular, after 6 months, it was evident a high percentage of reabsorption of the porcine bone.

Moreover, the presence of multinucleated cells in resorption lacunae along the surface of porcine bone particles and the presence of bone metabolizing units within granules indicated that a remodelling/resorption processes were taking place. In the Authors' opinion, the clinical success observed with porcine bone could be dependent on the surface topography of this biomaterial.

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

LATERAL ACCESS SINUS LIFT

032

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ORIGINAL ARTICLE
Clinical Implant Dentistry and Related Research 2012 Jun;14(3):373-9. Epub 2010 May 11

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LATERAL ACCESS SINUS LIFT

034

Porcine bone used in sinus augmentation procedures: a 5-year retrospective clinical evaluation

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ORIGINAL ARTICLE
Journal of Oral and Maxillofacial Surgery
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ABSTRACT

Inadequate bone height in the lateral part of the maxilla is a contraindication for implant surgery and the rehabilitation of the edentulous posterior maxilla with dental implants often represents a clinical challenge.

The aim of this study was to evaluate from a clinical point of view the maxillary sinus augmentation using porcine bone. This study included 121 healthy patients (71 women and 50 men), all candidates for augmentation in the posterior maxilla. After the elevation of the sinus membrane, the maxillary sinus was filled with sterilized porcine cortico-cancellous mixed bone particles (Apatos, OsteoBiol®, Tecnoss®, Coazze, Italy). In 20 cases a perforation of the sinus membrane occurred, but without clinical complications and all the membrane perforations were successfully repaired with a collagen membrane (Evolution, OsteoBiol®, Tecnoss®) and showed uneventful healing.

After a 4- to 6-month healing period, sandblasted and acid-etched implants were inserted. All grafted sinuses healed well without major complications and did not show occurrence of symptoms indicating possible maxillary sinusitis and the cumulative survival implant rate was 92% after a mean loading time of 5 years.

CONCLUSIONS

The results of this study show that porcine bone can be used with success in sinus floor augmentation procedures, and rougher-surfaced implants are probably preferable. These findings are in accordance with other studies that showed that porcine bone has good biocompatibility and osteoconductive properties, with osteoblastic seams forming bone directly on the biomaterial surface and with no histologic signs of adverse reactions.

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A collagenated porcine bone substitute for augmentation at Neoss implant sites: a prospective 1-year multicenter case series study with histology

ABSTRACT

It is well known that the presence of localized defects and/or small amounts of bone below the maxillary sinus can compromise implant placement. In such situation, in order to achieve predictable results, it is necessary to perform specific bone augmentation techniques. Different bone substitutes and barrier membranes are commonly used for the augmentation of localized defects and of the maxillary sinus floor and the aim of this study was to evaluate from a clinical and histological point of view a porcine bone (PB) substitute used for augmentation of the alveolar crest or the maxillary sinus floor prior to or in conjunction with implant placement. The biomaterials used were two types of collagenated bone of porcine origin (Gen-Os or mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy), two types of collagen gel (Gel 40 or Gel 0, OsteoBiol®, Tecnoss®), and two types of membranes (Evolution Fine or Lamina Soft X-fine, OsteoBiol®, Tecnoss®). 19 patients were treated, with a total of 34 implants (Neoss Ltd., Harrogate, UK) placed. Implants were followed with implant stability measurements at placement and abutment connection, and with intraoral radiographs at abutment connection and after at least 1 year of loading. A biopsy for histology and morphometry was taken at the first re-entry operation. The results show that all but one procedure resulted in successful augmentation, with an overall procedure success rate of 94,7% and 90% for maxillary sinus floor augmentations. The histological examination showed the formation of new bone at the PB surface, forming bridges between particles and between particles and preexisting bone. The presence of scalloped resorption lacunae and new osteons inside the particles indicated ongoing resorption/remodeling of the particles.

CONCLUSIONS

The clinical cases presented in this study showed that collagenated PB could effectively be used for bone augmentation of various defects in all the 19 patients. The study included different defects and treatment strategies because the Authors decide to evaluate the use of the PB in consecutive patients with different needs as usually dealt with in everyday practice. This study showed good clinical results when using a PB substitute and barrier membranes for augmentation of the alveolar crest and maxillary sinus and the histology revealed osteoconductive properties of the material and also indicated osteoclastic resorption.

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

LATERAL ACCESS SINUS LIFT

038

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041

Maxillary sinus augmentation in humans using cortical porcine bone: a histological and histomorphometrical evaluation after 4 and 6 months

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ORIGINAL ARTICLE
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ABSTRACT

Bone substitutes, such as allografts, xenografts, and alloplasts, have been proposed in several augmentation procedures as an alternative to autogenous bone. Although autogenous bone is considered as the gold standard, its use has several disadvantages: a limited availability, a tendency to partially resorb, the need for an additional surgery, and the increased morbidity.

Among the bone substitutes available on the market, Apatos (OsteoBiol®, Tecnoss®, Coazze, Italy) is a xenogeneic bone substitute consisting of sterilized cortical porcine bone in form of particles with a high porosity and with a diameter ranging from 600 to 1000 µm. This biomaterial is similar to human bone, and it has been reported, in humans, to be osteoconductive, well integrated in the host site and incompletely resorbed after 5 months, and with no signs of adverse reactions in a rabbit study. All sinuses have been augmented with porcine cortical bone particles (Apatos) mixed with sterile saline solution and blood. A resorbable membrane (Evolution, OsteoBiol®, Tecnoss®) was positioned while closing the packed sinus window.

The aim of the present study was to perform histologic and histomorphometric evaluation of 77 specimens retrieved 4 or 6 months after sinus augmentation using cortical porcine bone augmentation material. The specimens were processed to be observed under light microscopy. Histomorphometric measurements after 6 months showed: 31,4±2,6% newly formed bone, 34,3±3,1% marrow spaces, 37,6±2,2% residual graft.

The results of the evaluations confirmed the good biocompatibility and high osteoconductivity of this porcine biomaterial. Most of the grafted biomaterial particles were surrounded by newly formed bone, and no gaps or connective, fibrous tissues were found at the biomaterial-bone interface. There were no sign of inflammatory or other adverse reactions in the bone formed.

CONCLUSIONS

The present results show that cortical porcine bone is a biocompatible, osteoconductive biomaterial than can promote the formation of new bone, even in maxillary sinus augmentation procedures, without interfering with bone regeneration.

As this was a histological and histomorphometrical study only, in their conclusions the Authors anticipated that the long-term outcomes - that will be reported in a separate manuscript - were satisfactory in comparison to other studies using other graft materials.

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

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Comparative histological results of different biomaterials used in sinus augmentation procedures: a human study at 6 months

ABSTRACT

As demonstrated by several studies, sinus augmentation is a predictable treatment for atrophy of the posterior maxilla and different bone substitutes have been used in sinus floor augmentation. However, only few studies compared the performances of the different kinds of grafts and so a current issue is the definition of the best filling material for the sinus cavity. Therefore, the aim in this study was to perform a histological and histomorphometric evaluation, in humans, of specimens retrieved from sinuses augmented with phycogene HA (Algipore®, DENTSPLY-Friadent, Mannheim, Germany), macroporous biphasic calcium phosphate (MBCP®) (Leone, Firenze, Italy), calcium carbonate (Biocoral®, Leader-Novaxa, Milan, Italy), collagenized porcine cortico-cancellous bone (Apatos Cortical, OsteoBiol®, Tecnoss®, Coazze, Italy) ABB (Bio-Oss®, Geistlich, Wohlhusen, Switzerland). A total of 30 sinus augmentation procedures were performed and in every case, 100% biomaterial was used. 15 patients were scheduled for bone reconstruction procedures including sinus augmentation and implant insertion. For the examination, a total of 60 bone cores, 2 for each augmented sinus, 12 for every biomaterial, were retrieved. At low power magnification, it was possible to observe that many grafted particles were bridged by newly formed bone and in some portions of the specimens, graft particles appeared to be lined by newly formed bone, without gaps in the bone-particle interface and with no sign of inflammatory cells and multinucleated giant cells. In the porcine bone group, few peripheral osteocytic lacunae, present in the biomaterial, appeared to be filled with osteocytes; around some particles, osteoblasts could be seen, while actively depositing unmineralized osteoid matrix.

CONCLUSIONS

In this preliminary 6-year report of an ongoing study, the results indicate Based on the findings, the Authors concluded that “the results of the present study have shown that all these biomaterials can be used with success in maxillary sinus augmentation procedures showing good biocompatibility and osteoconductive properties, with osteoblastic seams forming bone directly on the biomaterial surface and with no histological signs of adverse reactions”.

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

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046

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LATERAL ACCESS SINUS LIFT

048

A 6-month histological analysis on maxillary sinus augmentation with and without use of collagen membranes over the osteotomy window: randomized clinical trial

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ORIGINAL ARTICLE
Clinical Oral Implants Research
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ABSTRACT

When in the posterior edentulous maxilla the bone volume is insufficient for implant placement, it is necessary to perform a bone augmentation procedure, including the elevation of the sinus membrane from the floor of the maxillary sinus in order to allow the placement of a bone graft. As there are some doubts about the need for using a barrier concurrently with a graft in sinus augmentation procedures, in this randomized clinical trial histological and histomorphometrical analysis were used to assess the effectiveness of the use of membrane in lateral sinus augmentation procedures, investigating the effect of a resorbable collagen membrane over the osteotomy window on maxillary sinus augmentation healing. After the informed consent was signed, all patients enrolled for this study underwent at least one session of oral hygiene before the sinus elevation procedure. Maxillary sinuses were allocated to either a control (membrane) or test (no membrane) group, using a computerized random allocation process. All the patients were treated with the same surgical technique consisting of sinus floor augmentation via a lateral approach. After the elevation of the sinus membrane, the sinuses were grafted with a mixture of autogenous bone harvested from the lateral bone wall and collagenated cortico-cancellous porcine bone (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) and the sinuses in the control group were covered with a reabsorbable collagen membrane (Evolution, OsteoBiol®, Tecnoss®) and the mucoperiosteal flaps were sutured with reabsorbable sutures.
After 6 months and immediately prior to the implant placement, one bone biopsy was harvested from the lateral window and the bone samples were processed and forwarded to the Institute of Biomedicine, the Sahlgrenska Academy Gothenburg University, Sweden for histological examination.

CONCLUSIONS

On the basis of the results of the histological and histomorphometrical analysis, the Authors concluded that compared with sites which were not covered, the use of the membrane may slightly increase the amount of vital bone over a period of 6 months and the use of a membrane seems to reduce the proliferation of the connective tissue and the graft re-absorption rate. Anyway, further studies are needed to explore the advantages of the use of membrane for the sinus augmentation procedure and its influence on the amount and quality of regenerated bone.

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Ultrastructural study by backscattered electron imaging and elemental microanalysis of bone-to-biomaterial interface and mineral degradation of porcine xenografts used in maxillary sinus floor elevation

ABSTRACT

Adequate alveolar ridges are fundamental to successful rehabilitation with dental implants and different techniques for reconstructing atrophied ridges are available. Bone substitute grafts represent a relevant possibility, provided that the biomaterial for bone substitution is biologically safe and safety depends on the quality of its reproducibility, its biocompatibility, and an absence of toxicity. The aim of this study was to carry out a retrospective investigation of a bone substitute material (BSM) in retrieved bone biopsies from maxillary sinus augmentation in 15 human subjects. The Authors investigated mp3® (OsteoBiol®, Tecnoss®, Coazze, Italy), an antigen-free bone consisting 90% porcine granules of dimensions between 600-1000 µm mixed with 10% pure Type-I porcine collagen, used as a bone substitute for sinus augmentation. The investigation was performed by means of an ultrastructural study of the bone-to-biomaterial interface using scanning electron microscopy backscattered electron imaging (SEM-BSE), as well as analysis of the mineral degradation of residual bone substitute graft material using microanalytical system based on energy-dispersive X-ray spectrometry (EDX). In the 15 partially edentulous patients (6 women and 9 men), of ages ranging from 37 to 60 years, the sinus membrane was elevated with curettes of different shapes and after membrane elevation, all sinus cavities were grafted with a BSM. After BSM grafting, an absorbable collagen porcine membrane (Evolution, OsteoBiol®, Tecnoss®) was placed over the window to minimize soft tissue invasion.
9 months after sinus lifting, bone cores were harvested from the maxillary sinus. The specimens were processed for observation under a SEM-BSE analysis, then chemical analysis and elemental mapping of the mineral composition were generated using a EDX. Scanning electron microscopy revealed that newly formed bone had become closely attached to the xenograft. Elemental analysis (above all, a high Ca/P ratio) showed that there was a gradual diffusion of Ca^{+} ions from the biomaterial to the newly forming bone at the interface.

CONCLUSIONS

From a clinical point of view, after a 9-month follow-up period of these 15 patients the success rate was 100%. No perforation of the sinus membrane or other clinical complications such as sinusitis or pain resulted from surgery. The increased volumes produced by the xenograft procedures were stable by the end of the healing period and all planned implants could be placed in the augmented sites. The analysis demonstrated that the biomaterial proved to be biocompatible, bioreabsorbable and osteoconductive when used as a bone substitute for maxillary sinus elevation.

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

LATERAL ACCESS SINUS LIFT

051

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LATERAL ACCESS SINUS LIFT

058

Use of piezosurgery during maxillary sinus elevation: clinical results of 40 consecutive cases

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ORIGINAL ARTICLE
International Journal of Periodontics & Restorative Dentistry
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ABSTRACT

Preservation of the sinus membrane is essential for a successful sinus grafting procedure and its integrity is crucial to stabilize grafting materials during the healing period. As perforation occurs most frequently during the rotary osteotomy stage when using a round diamond handpiece, the use of the piezoelectric techniques were suggested in order to obtain a greater precision and safety in bone surgery. The aim of this study was to evaluate the performance of piezoelectric devices during sinus elevation to determine the percentage of sinus membrane perforation and the time required to perform the antrostomy and elevation of the membrane. A total of 40 sinuses were included and the elevation procedures were performed by means of a piezosurgery device. The space obtained with the sinus elevation was filled with graft material: either autologous bone or a mixture of 50% autologous bone and 50% deantigenated collagenated bone substitute of porcine origin (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) was used as a filling material. The total amount of graft material at each site varied according to the extent of maxillary bone resorption and the sinus anatomy. During the sinus elevation procedure, seven perforations occurred, and in those cases, the bony sinus windows were covered with a resorbable membrane (Evolution, OsteoBiol®, Tecnoss®).

CONCLUSIONS

Postoperative healing was uneventful and free of complications in all patients. After 2 months, at radiographic analysis, an adequate amount of radiopaque material with greater density than the bone was present, and no signs of maxillary sinus infection were observed. Sinus membrane perforation occurred in 7 of 40 cases, representing 17,5% of procedures. These results are similar to those reported by several authors who also found very low perforation percentages using piezoelectric devices. The perforations were repaired using a collagen membrane in direct contact with the sinus membrane.
Based on the results of this study, the Authors affirm that "sinus augmentation can be successfully performed by means of a piezoelectric device, which was demonstrated to be an attractive alternative to simplify sinus elevation procedures and offer promising results in terms of complications such as sinus membrane perforations".

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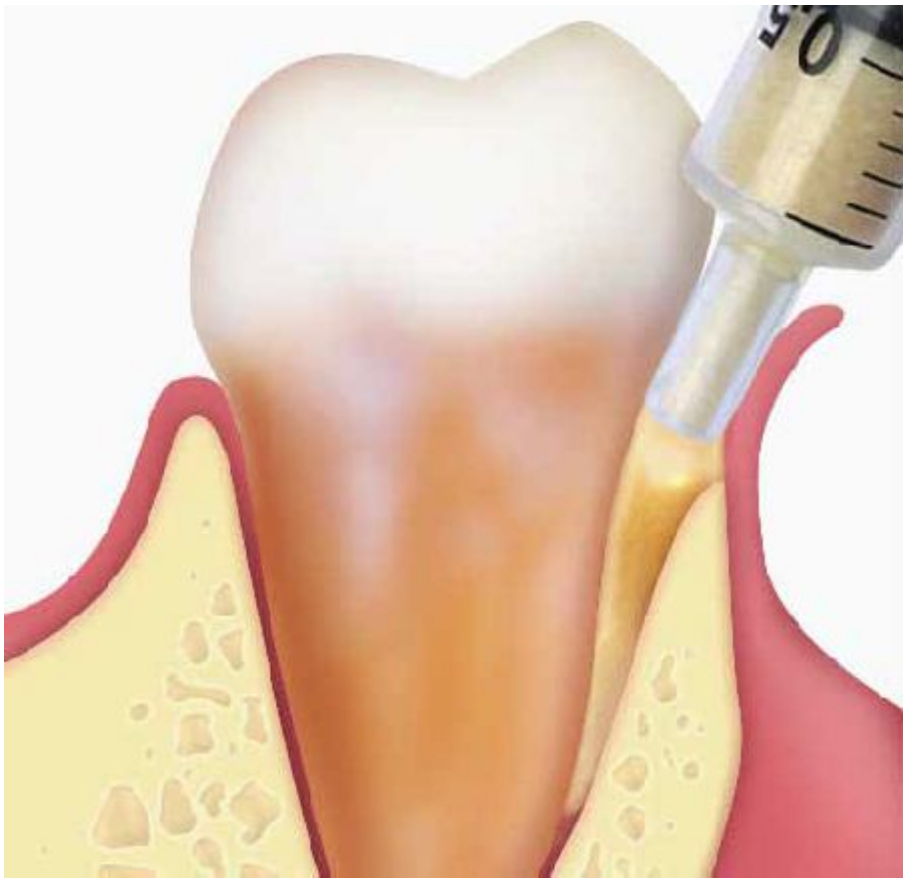
Periodontal regeneration



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REGENERATION SCIENCE

INSPIRED BY NATURE

PERIODONTAL REGENERATION

013

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ORIGINAL ARTICLE
Cosmetic Dentistry
2008, 3: 16-20

Soft tissue response to Platelet Rich Fibrin: clinical evidences

ABSTRACT

The correct management of the extraction site is mandatory for aesthetic reasons and in order to avoid bone resorption following extraction. Often, it is necessary to graft a filler material into the extraction site to maintain the residual bone volume. However, the management of soft tissue over the graft could require flap traction and discharging incisions, which reduce microvascularisation at the margins. In this article, the Author analized the characteristics of PRF, investigating the possibility to use it in combination with filling materials, with the advantage of an effective support for the cellular migration and revascularisation of the grafted site. Actually, it has been suggested to use PRF as a guided tissue regeneration membrane, to cover and protect the bone graft material (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy) and the operative site. The application of a PRF membrane allows the surgical site to be protected from external contaminations and offer a matrix for faster healing of the wound edges. As suggested by the Author, the use of a PRF membrane in the treatment of infrabony defects could be an advantage for an excellent healing. Mixed with graft materials, PRF is able to attract mesenchymal cells and new blood vessels, accelerating the healing times.

CONCLUSIONS

The use of PRF is a valid support in guided tissue regeneration because of its potential for accelerating the processes of tissue healing and this makes the treated site less sensitive to outside contaminations and positively influences the aesthetic result and the patient's postoperative comfort. At deeper levels, PRF increases the cohesion between the grafted biomaterial particles and facilitates the diffusion of growth factors locally at the graft site.

The Author underlines that "the high concentration of plasmatic cytokines and fibrin exert an osteogenic effect on bone progenitor cells and the concentration of leukocytes contained in the PRF appears to guarantee an immune action that facilitates the success of large grafts".

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Healing of gingival recessions using a collagen membrane with a demineralized xenograft: a randomized controlled clinical trial

ABSTRACT

Gingival recessions commonly associated with compromised esthetics, root hypersensitivity, higher incidence of root caries, and compromised plaque control and their treatment is performed via so-called mucogingival therapy. In order to promote the root coverage, it is possible to adopt the principles of guided tissue regeneration (GTR). As a variety of non-resorbable and absorbable barrier membranes has been used with clinical outcomes similar to those achieved by traditional procedures, the aim of this study was to compare the efficacy of two surgical techniques: coronally advanced flap (CAF) alone or in combination with the use of an absorbable membrane plus a demineralized xenograft (GTRF) for the treatment of gingival recession in a prospective randomized controlled clinical trial.

16 nonsmokers with 20 Miller Class I or Class II buccal gingival recessions at canines or premolars were included in the study. 10 defects were randomly assigned by coin toss to be treated by a CAF only (control sites), and the remaining 10 defects were treated by the GTRF method (test sites). The barrier device used was a collagen membrane (Evolution, OsteoBiol®, Tecnoss®, Coazze, Italy) and the bone substitute used was a demineralized xenograft (Gel 40, OsteoBiol®, Tecnoss®).

The results following both procedures appeared equivalent, providing good root coverage, gain in clinical attachment levels, healthy nonbleeding sulcus and increases in keratinized tissue.

CONCLUSIONS

Even if both treatments resulted in a significant reduction in recession and gain in clinical attachment level, the Authors found that the increase in keratinized tissue from baseline to 6 months was slightly greater for the GTRF group than for the CAF group and the test group experienced a statistically significant increase in gingival thickness (+0,71±0,21 mm) from baseline to the 6-month evaluation. Consequently, the Authors concluded that “both procedures offer a predictable, simple, and convenient means of root coverage in Miller Class I and II recession defects, but the GTRF-supported procedure resulted in more keratinized tissue and a signifi cant increase in gingival thickness than the CAF-only approach”.

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

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ORIGINAL ARTICLE
The International Journal of Periodontics & Restorative Dentistry
2009 Feb;29(1):59-67

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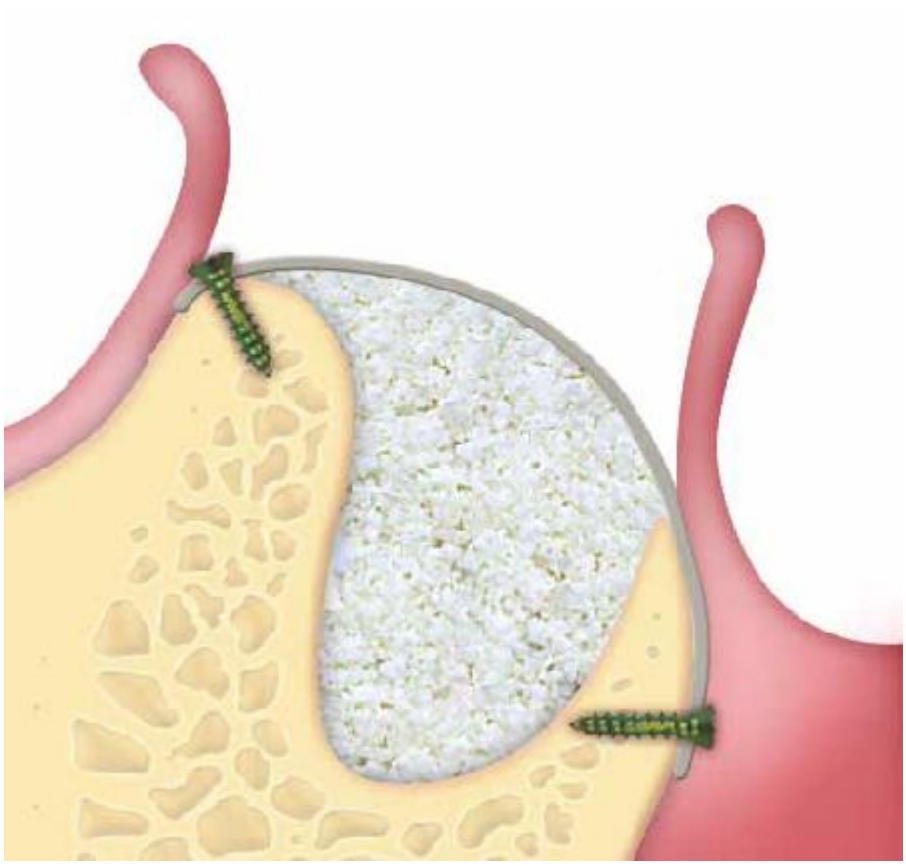

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HORIZONTAL AUGMENTATION

002

Rehabilitation of atrophic alveolar crests with cylindrical sandblasted and acid etched implants: a pilot study

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ABSTRACT

One of the fundamental element for a long lasting, aesthetic implant supported prosthetic restoration is the adequate quantity of the residual alveolar bone, in order to receive and surround the fixture, assuring a good stability of the implant that will support the prosthetic rehabilitation. Thanks to bone grafts, aimed to increase the alveolar crest volume both vertically and horizontally, nowadays it is possible to use osseointegrated implants even when a proper bone volume is missing. As the studies performed on bone physiology suggest that the integration of a bone graft in the receiving site takes place in a shorter period than the one supposed in the past, this pilot study aimed to evaluate the effectiveness of this kind of treatment. In this article a case report is presented: a 33-year old patient, missing both upper central incisors due to a trauma, was treated with a bone autograft harvested from the chin to correct the alveolar ridge defect. After the bone block harvesting, the block was fractured and adapted and fixed in the receiving site with synthesis screws. The remaining gaps were filled with heterologous bone fragments (Gen-Os, OsteoBiol®, Tecnoss®, Coazze, Italy). Then, the site was covered with a membrane and closed with sutures.

CONCLUSIONS

The healing occurred without complications and after 2 months the CT-Dentascan showed that bone tissue was enough for the placement of two implants. At the 1 year follow-up, the patient did not show implant mobility, nor peri-implant soft tissue infections. The x-ray examination revealed that the marginal bone level was preserved, without any signs of radiolucency.

ORIGINAL ARTICLE
European Journal of Implant Prosthodontics, 2005;(3)1:133-44

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Maxillary alveolar ridge reconstruction with nonvascularized autogenous block bone: clinical results

ABSTRACT

Implant treatment of severely resorbed maxillas is considered a demanding procedure, characterized by a higher failure rate compared with the implant treatment of patients with adequate bone volume.

In this study, 56 patients (18 men, 38 women) aged 27 to 63 years, requiring a treatment for maxillary atrophy, were selected and scheduled for onlay bone graft and titanium implants in a 2-stage procedure, with the purpose to evaluate the clinical success of bone reconstruction of the severely atrophic maxilla using autogenous bone harvested from the antero-superior edge of iliac wing. Moreover, the Authors analyzed the clinical success and the marginal bone level of dental implants placed 4 to 5 months after bone grafting and before prosthetic rehabilitation.

A total of 129 onlay bone grafts were used to augment the 56 severely resorbed maxillas. The cortico-cancellous blocks harvested from the iliac wing were adapted to the atrophic maxilla and attached to the residual ridge with self-tapping screws (Cizeta, Milano, Italy). An additional mixture of cortico-cancellous porcine bone particle and collagen (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) was placed at the periphery of the block grafts.

The augmentation procedure allowed the insertion of implants in the grafted area 4 to 5 months after surgery. The clinical and radiographic observations showed a satisfactory success rate rate (96,8%) of the block and a very low rate of resorption after bone graft and implant placement.

CONCLUSIONS

The use of iliac bone grafts, harvested from the antero-superior edge of iliac wing, for the reconstruction of severely atrophic maxillas, combined with the supplementary use of a mixture of cortico-cancellous porcine bone particle and collagen, showed to be a reliable treatment procedure.

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

HORIZONTAL AUGMENTATION

011

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ORIGINAL ARTICLE
Journal of Oral and Maxillofacial Surgery
2007 Oct;65(10):2039-46

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HORIZONTAL AUGMENTATION

012

Ridge splitting technique in atrophic anterior maxilla with immediate implants, bone regeneration and immediate temporisation: a case report

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ORIGINAL ARTICLE
Journal of the Irish Dental Association
2007 winter; 53(4); 187-90

ABSTRACT

Although, due to their high success rates, nowadays dental implants have become the standard treatment in order to restore both totally and partially edentulous patients, the successful placement of endosseous implants needs a primary stability that often cannot be reached in narrow alveolar ridges. Actually, an inadequate alveolar ridge width is a major limitation for the successful placement of an implant because, for most of the standard implant designs, a minimum ridge width of 6 mm is normally necessary.
In this article, the Authors describe a method to widen an atrophic ridge by splitting longitudinally the alveolar bone and filling the resultant space with collagenated porcine bone. To demonstrate this technique, they present a case report of a 22-year-old female patient with a significantly reabsorbed anterior maxilla. To treat this patient, Osseotite implants (4 mm wide x 13 mm long) were inserted within the split ridge and a mixture of autogenous tuberous and collagenated porcine bone was grafted between the fixtures. As advantages for the patients, this technique enables the achievement of less surgical traumas and a reduction of the treatment time.
The biomaterial used in this study was an antigen-free cortico-cancellous heterologous bone paste (Putty, OsteoBiol®, Tecnoss®, Coazze, Italy) composed by 80% granulated mix and 20% pure collagen.

CONCLUSIONS

As demonstrated in this case report, the use of immediate tapered implants, bone augmentation and immediate provisionalisation allows the treatment of thinner ridges, a better control during instrumentation, less trauma to the bone, and less risk of fracturing or perforating the expanding plate of bone. The alveolar ridge of the patient, wide only 2,5 mm, showed a net gain of more than 3 mm, enabling the placement of 4 mm wide implants. The collagenated porcine bone maintained the separation between the two cortical plates and led to the new bone formation between implants after 4 months.
With the particular technique here described, the Authors propose the use of collagenated porcine bone to fill in the bone defect, since it reabsorbs in a relatively short time, allowing a new bone to form around the implants. Moreover, such material acts as a scaffold that both prevents the collapse of the cortical plates and stimulates the bone healing process.

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

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Calculation of bone graft volume using 3D reconstruction system

HORIZONTAL AUGMENTATION

054

ABSTRACT

As the prior knowledge of bone quantity, volume and position can facilitate surgical procedures and reduce treatment morbidity in cases of autologous bone grafts, as well as facilitating treatment planning in cases of xenografts, the aim of this study was to evaluate the use of "bioreplicas" for determining precisely the amount of biomaterial required for bone regeneration procedure. A comparative study was made with a total sample size of 20 cases, 10 in the control group (without biomodels) and 10 in the test group. The 20 cases all required bone graft implants as a response to moderate alveolar atrophy; 10 of these were treated by conventional means (filling in the defect with progressive material increments until completely restored) and the other 10 made use of biomodels. "Bioreplicas" were generated from helical CAT scans with 0,5 mm slices, without 3D reconstruction or image filters. Bone defects in premolar and molar areas were treated with titanium mesh and xenografts. The bone replacement material was mp3® (OsteoBiol®, Tecnoss®, Coazze, Italy) a mixture of cortical and spongy bone of porcine origin in form of radiopaque hydroxyapatite granules and with a granulometry of 600-1000 µm and containing collagen. Objects of the evalution were the time needed to carry out procedures with and without the use of "bioreplicas", discrepancies between the grafts performed with and without "bioreplicas" and bone defects, and postoperative complications.

CONCLUSIONS

No significant differences were recorded for measurements of width and length of bone defect between patient bone and the biological models and so it was concluded that the use of "bioreplicas" obtained by rapid prototyping is effective in treatment planning.
In the case of xenografts, the fact that "bioreplicas" can be sterilized makes them useful for producing graft inserts of the correct size and shape.

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ORIGINAL ARTICLE
Medicina Oral, Patología Oral y Cirugía Bucal 2011 Mar 1;16(2):e260-4

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

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HORIZONTAL AUGMENTATION

052

Resonance frequency analysis of implants inserted with a simultaneous grafting procedure: a 5-year follow-up study in man

ABSTRACT

It is well known that primary stability is a key factor for the long-term success of an implant-supported rehabilitation. Primary stability is determined by bone quality and quantity, implant geometry, and placement technique and it is strictly related to the level of primary bone contact. Different ways of measuring implant stability are available and in this study the Authors examined the resonance frequency analysis (RFA), representing a clinical, noninvasive quantitative assessment of the stability of an implant and its osseointegration level. In order to do this, 16 patients in need of maxillary and mandibular rehabilitation were selected. They received a total of 36 implants inserted using a single-stage procedure at the same time as reconstructive surgery and were distributed as follows: 19 implants were inserted in 10 patients treated with autologous bone (group A) and 17 implants were placed in 6 patients treated with a combination of 50% autologous bone (bone chips) and 50% deantigenated collagenated bone substitute of porcine origin (OsteoBiol® Gen-Os and Putty, Tecnoss®, Coazze, Italy) (group B). The implant stability quotient (ISQ) values were measured during 5 years of follow up. The RFA values were recorded with the ISQ scale by means of a transducer attached to the implant via a screw and a frequency response analyzer (Osstell device).

CONCLUSIONS

At surgical re-entry in the 22 sites augmented in the maxilla and 14 in the mandible it was observed that the space under the titanium grid was filled completely by newly formed bone. Consequently, the Authors affirm that "within the limitations of the present study, the results showed that implant stability increased over time and its changes were correlated with anatomical location and different types of grafts only in the early healing period. RFA measurements indicate predictable and stable long-term results for implants inserted in sites reconstructed with autogenous bone and with porcine bone substitute in addition to autologous bone".

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Giovanna Iezzi[3]
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ORIGINAL ARTICLE
International Journal of Periodontics and Restorative Dentistry
2012 Oct;32(5):581-9

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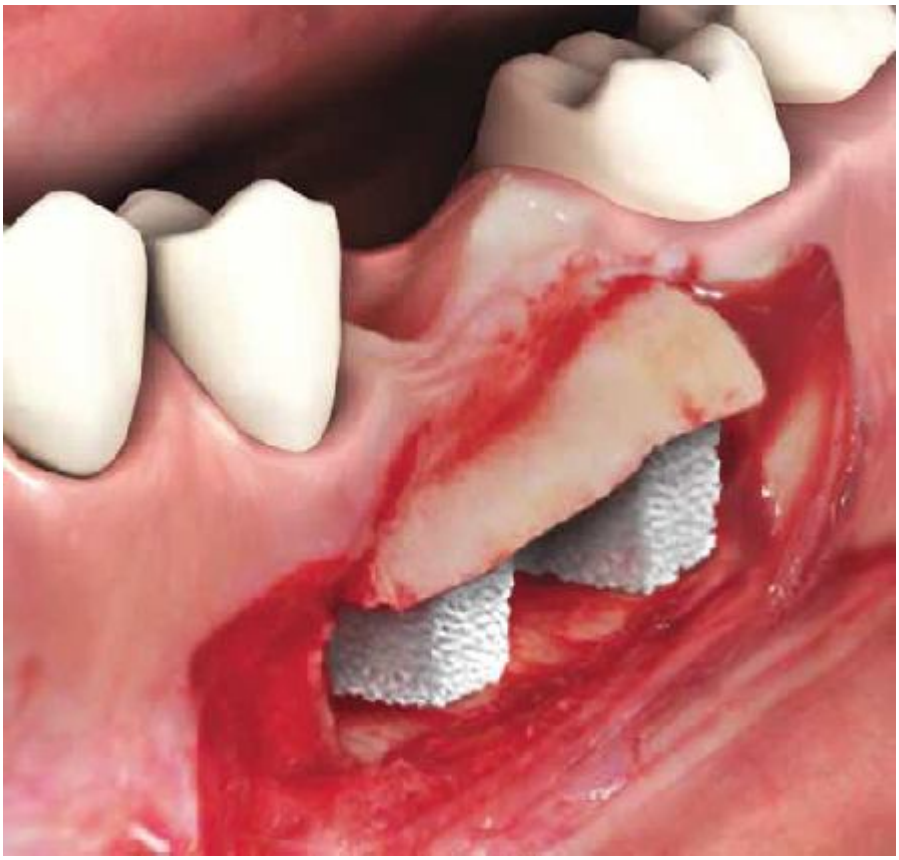
Vertical augmentation



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VERTICAL AUGMENTATION

037

Vertical ridge augmentation of atrophic posterior mandible using an inlay technique with a xenograft without miniscrews and miniplates: case series

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ORIGINAL ARTICLE
Clinical Oral Implants Research
2011 Oct; 22(10):1125-30. Epub 2011 Jan 20

ABSTRACT

Even if the rehabilitation of partially or totally edentulous posterior mandible with implant supported prosthesis has become a common practice, local conditions of the edentulous ridges may be unfavorable for implant placement and a vertical and horizontal augmentation may be necessary. In case of an horizontal osteotomy with the interposition of bone in the form of a ''sandwich'' to augment the alveolar ridge, it has been reported that the use of miniscrews and miniplates increase the risk of fracture of the osteotomy segments. The purpose of this study was to use an inlay technique, without the use of miniscrews and miniplates for stabilization of the transported bone fragments. 9 consecutive patients (6 men and 3 women) aged between 26 and 51 years were enrolled in this study. A horizontal osteotomy was performed 2-3 mm above the mandibular canal, and two oblique cuts were made using a piezosurgery device. As the patients refused the harvesting of autogenous bone, an inlay procedure was proposed using blocks of collagenated cancellous equine bone (Sp-Block, OsteoBiol®, Tecnoss®, Coazze, Italy) without miniscrews and miniplates. The blocks were inserted mesially and distally between the cranial osteotomized segment and the mandibular basal bone. The residual space was filled with particles of cortico-cancellous porcine bone (Gen-Os, OsteoBiol®, Tecnoss®). A resorbable collagen membrane (Evolution, OsteoBiol®, Tecnoss®) was applied above the buccal surface of the surgical site.

4 months after surgery, the Authors proceeded with the implants insertion. The postoperative course was uneventful in 7 of the 9 patients. No dehiscence of the mucosa was observed at the marginal ridge of the mobilized fragment. Newly formed bone was present near the osteotomized segments, and was observed to be in close contact with the particles of biomaterials. No gaps or connective tissue were present at the bone-biomaterial interface. Histomorphometrical results showed: 44 ±2,1% newly formed bone, 18 ±0,8% marrow spaces, 33 ±2,4% residual grafted material.

CONCLUSIONS

From the results of this study, it possible to suggest that the equine collagenated block can be considered as a good material for bone regeneration in inlay grafting procedures in atrophic posterior mandibles. As noted by the Authors, “the rigidity of the equine collagenated block allowed to eliminate the use of miniscrews and miniplates and simplified the technique. Besides, the rigidity of the block allowed maintenance of the space”.

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PAG 66

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

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Posterior atrophic jaws rehabilitated with prostheses supported by 6 mm-long, 4 mm-wide implants or by longer implants in augmented bone. Preliminary results from a pilot randomised controlled trial

ABSTRACT

The aim of this study was to evaluate whether 6 mm-long by 4 mm-wide dental implants could be an alternative to longer implants placed in bone augmented with bone substitutes in posterior atrophic jaws. In order to do this, 20 patients with bilateral atrophic mandibles and 20 patients with bilateral atrophic maxillae, having 5 to 7 mm of bone height above the mandibular canal or below the maxillary sinus, were randomised according to a split-mouth design to receive one to three 6 mm-long and 4 mm-wide implants or at least 10-mm long implants in augmented bone. The augmentation procedure consisted of an interpositional block of collagenated cancellous equine bone (Sp-Block, OsteoBiol®, Tecnoss®, Coazze, Italy) in mandibles or a mix of 100% cancellous and cortical porcine-derived collagenated bone having a particle size of 250 to 1000 µm (Gen-Os, OsteoBiol®, Tecnoss®) in maxillary sinuses. Both sides were to be treated during the same surgical session (one side to be augmented and the other to receive short implants). Outcome measures were prosthesis and implant failures, any complication, time needed to fully recover mental nerve function (only for mandibular implants) and patient preference. There were no statistically significant differences in graft, implant or prosthesis failures, though significantly more intra- and postoperative complications occurred at grafted sites. All 20 patients treated with mandibular implants and 15 patients treated with maxillary implants preferred short implants, whereas 5 patients treated with maxillary implants described both procedures as equally acceptable. These differences were statistically significant.

CONCLUSIONS

Based on the short-term data (5 months after loading) it is possible to suggest that short implants may be as effective, if not more effective, than longer implants placed in augmented posterior jaws. It should be noted that the long-term prognosis is yet unknown and the sample size of the present and other published RCTs are still relatively small to be drawing definitive conclusions. In the Authors' opinion, "5- to 10-year post-loading data are necessary before making reliable recommendations".

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

VERTICAL AUGMENTATION

055

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ORIGINAL ARTICLE
European Journal of Oral Implantology 2012;5(1):19-33

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PAG 67

VER

VERTICAL AUGMENTATION

056

Vertical ridge augmentation of the atrophic posterior mandible with a 2-stage inlay technique: a case report

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ORIGINAL ARTICLE
Implant Dentistry, 2012 Jun;21(3):190-5

ABSTRACT

In case of atrophic posterior mandible, the application of the inlay technique showed to be able to achieve good augmentation results. Instead of using autogenous bone, some authors have suggested to use inorganic bovine bone blocks for inlay bone grafting in atrophic posterior mandibles, obtaining histological and clinical outcomes comparable to those achieved using autogenous bone.
In this article, the use of a 2-stage inlay technique in atrophic posterior mandible with more than 10-mm thickness and less than 5-mm height above the inferior alveolar nerve is described. The Authors preformed an inlay procedure using a cancellous equine bone block (Sp-Block, OsteoBiol®, Tecnoss®, Coazze, Italy) in order to allow the subsequent implant placement for prosthetic rehabilitation of the affected region. The first surgical procedure was a basic corticotomy of the buccal and lingual bone. One month later, a complete inlay procedure was performed. The cancellous equine bone block graft material was shaped and placed between the cranial osteotomized segment and the mandibular basal bone and a resorbable collagen membrane (Evolution, OsteoBiol®, Tecnoss®) was applied to the buccal surface of the surgical site.

CONCLUSIONS

After the inlay technique application, computed tomography and conventional radiography showed a mean vertical bone gain of 11,5 mm. This 2-stage inlay technique avoids the use of chisels to complete bone osteotomy and reduces postsurgical nerve disturbances in atrophic posterior mandibles.
The Authors concluded that “a randomized controlled clinical trial is necessary to compare outcomes using this modification of the inlay technique with those obtained using the original procedure.”

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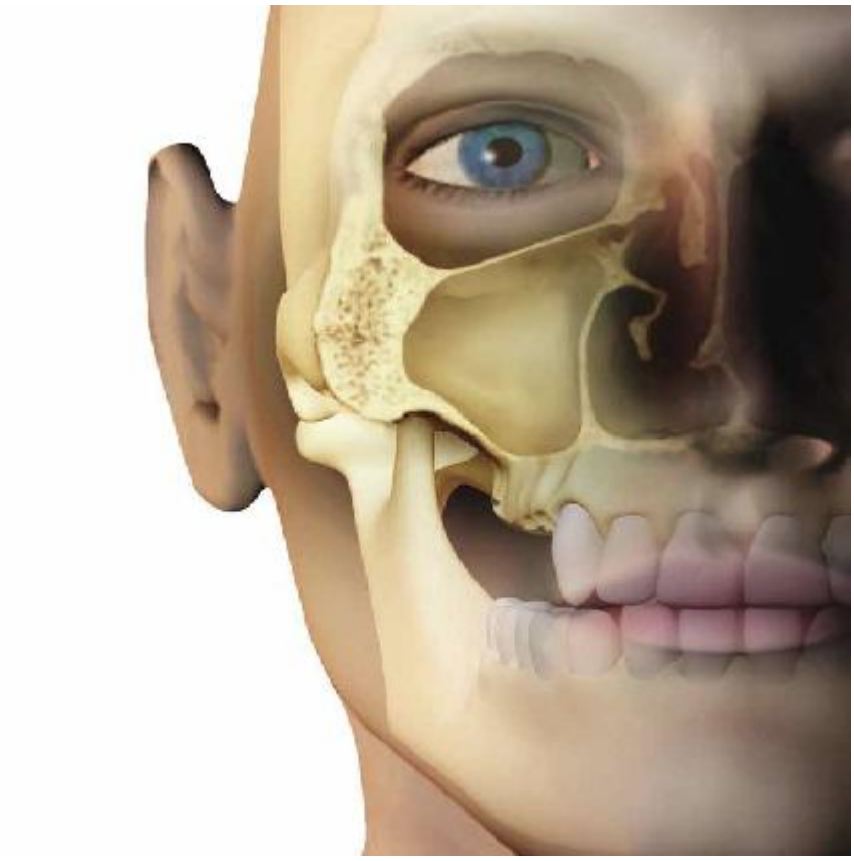
Maxillofacial



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MAXILLOFACIAL

005

Orbital floor restoration

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ORIGINAL ARTICLE
Journal of Craniofacial Surgery
2005 Nov; 16(6):968-72

ABSTRACT

In case of traumas involving the middle-third of the face, the fractures of the orbital floor must be solved by means of a reconstructive surgery, in order to restore the continuity of the orbital floor, to provide support of orbital contents and prevent soft tissues' fibrosis. In this kind of reconstructive surgery, the material for reconstruction plays an important role.

Over the years, different materials have been tested and autogenous grafts have been used as the material of choice. Recently, alloplastic materials have gained popularity because of their availability and ease of use. The purpose of this study was to review materials used in orbital floor reconstructive surgery at the Department of Maxillo-Facial Surgery of University of Rome ''La Sapienza'', with emphasis on their biocompatibility, their shaping features, and mechanical properties. From January 1995 to December 2003 379 patients with a diagnosis of orbital floor fracture, either pure or combined with other facial fractures were treated with these products.

CONCLUSIONS

In order to reconstruct the fractured orbital floor, autologous, allogenic and alloplastic materials are used and an argument of controversy among the surgeons is the choice of the most suitable material.

Based on the scientific evidence, the Authors suggest that the ideal implant should have the following features: it must be biocompatible and easily applicable; it should provide a good structural support; it should be stable and slightly resorbable. Surgical timing, material's availability and, obviously, costs are critical elements of choice.

Taking all these properties into consideration, alloplastic materials present several advantages due to their wide availability, the opportunity to use them in fractures of any dimension, their molding feature, the reduced surgical timing and the reasonable costs. In their study, among others materials, the Authors used swine bone cortex (Lamina, OsteoBiol®, Tecnoss®, Coazze, Italy), which proved to be a good material. Cortical swine bone allowed the restoration of the bone continuity in a satisfactory way. The main advantage of the swine bone cortex use is the possibility to restore even wide fractures that normally must be treated using a metal mesh support. Actually, the use of a metal mesh implies higher costs, a greater risk of infection and more serious lesions to the eyeball if further orbital trauma occurs. In the cases treated with swine bone cortex, the biocompatibility of the product proved to be good and no intolerance reaction neither any foreign-body reaction were observed.

The Authors concluded: "At present, swine bone cortex (Lamina, OsteoBiol®) implanted in 11 patients proved excellent results. Its main advantages, despite the modeling properties are not so good as other materials, are an optimal integration to the surrounding tissues and its use in rather wide fractures, thus allowing floor reconstruction without placement of metal mesh support".

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Hess area ratio and diplopia: evaluation of 30 patients undergoing surgical repair for orbital blow-out fracture

ABSTRACT

As diplopia is common occurrence after orbital blow-out fractures, the aim of this study was to determine if the Hess area ratio is effective in predicting postoperative diplopia in patients undergoing surgery for orbital blow-out fracture. In the study were included 30 consecutive cases affected by orbital fractures and diplopia undergoing surgical correction within 7 days after injury. Surgical approaches performed included transpalpebral, Lynch incision, combination of transpalpebral, Lynch incision, subciliary and transconjunctival. Two fractures of the medial wall were treated with endoscopy and in one case the reduction was performed through a previous cutaneous lesion. Orbital wall defects were repaired using bovine pericardium (Tutopatch), titanium mesh covered with bovine pericardium, and decalcified swine bone cortex (Soft Cortical Lamina, OsteoBiol®, Tecnoss®, Coazze, Italy).

To evaluate ocular motility disturbance, the involved ocular motility range was measured by use of a manual Hess screen test before and 4 months after surgery. The percentage of Hess area ratio was used to express the range of ocular motility in a numerical value.

CONCLUSIONS

The clinical cases of this study suggest that Hess area ratio is a useful procedure to convert Hess graphic representation in a numerical value so that Hess chart data can be compared among clinicians and used to predict surgical outcomes in patients undergoing surgery for orbital blow-out fractures.

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029

Orbital wall reconstruction with swine bone cortex

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ABSTRACT

Orbital fractures are common facial injuries and they can be isolated or associated with other orbital defects arising from maxillofacial fractures. The decision regarding surgical intervention in the management of medial orbital wall fractures is influenced by a variety of factors, including the presence and severity of restricted ocular motility, the degree of enophthalmos, the estimated fracture size, and the clinical judgment of the surgeon; however, untreated medial orbital wall fractures can result in secondary enophthalmos. Several kinds of materials have been proposed for the reconstruction of medial orbital wall defects: bone grafts harvested either from calvaria or the mandible, titanium meshes, and resorbable sheets. The use of these materials, alone as well as a combination of autologous bone grafts and alloplastic materials, has been widely reported.

The aim of this study was to describe the Authors' experience with collagenated swine bone cortex (Soft Cortical Lamina, OsteoBiol®, Tecnoss®, Coazze, Italy) for the reconstruction of the fractured medial orbital wall.

In the cases reported, it is underlined the handling advantages of the OsteoBiol® sheet, which can be easily shaped with scissors by the surgeon, before a tepid saline solution bath, assuring the necessary plasticity to adapt the material both to bone and soft tissues.

Postoperative clinical evaluation of the patient, Hess test, ophthalmologic examination and CT have been performed to assess the correct position of the Lamina with satisfactory results.

CONCLUSIONS

Based on their experience, the Authors believe that collagenated swine bone cortex is an excellent option to restore medial wall defects, thanks to its biocompatibility and adaptability. The Lamina does not provide injuries to the orbital soft tissues during its application, and it can be used to restore wide defects.

With reference to its handling properties, they affirm that "this heterologous implant, thanks to collagen and to superficial decalcification, takes on elastic texture, keeping the density of the bone tissue. In this way, the edges remain soft to prevent microtraumas to the soft tissue, and it can be safely inserted in the orbit, granting a very high resilience. In our department, the use of this material was initially reserved to reconstruct orbital floor fractures; however, the considerable advantages that this material offers made it possible to be used in other situations, such as for the restoration of medial orbital wall fractures".

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Zygomatic implant placement in conjunction with sinus bone grafting: the “extended sinus elevation technique.” A case-cohort study

ABSTRACT

In case of edentulous patients with an extremely atrophied maxilla, the implant-prosthetic rehabilitation represents a challenge for clinicians. As a matter of fact, the progressive bone resorption in the posterior region, the widening of the sinuses and the anterior alveolar bone resorption can dramatically reduce the possibility to perform a standard implant-prosthetic treatment. The introduction of the zygomatic implants made it possible for clinicians to perform immediate implant placement without bone augmentation for the treatment of such patients. However, although zygomatic implant insertion may have a number of advantages, existing clinical data have shown that the placement of zygomatic implants increases the risk of postoperative complications related to the sinus. The purpose of this cohort study was to introduce a modified surgical technique for the placement of zygomatic implants aiming to minimize the risk of biologic complications. The selected 10 patients, all with an extremely atrophied maxillae, were planned to be treated with one to four zygomatic implants in conjunction with sinus bone grafting. After the integrity of the sinus membrane was confirmed, the established sinus cavity was augmented with a bone graft material (mp3®, OsteoBiol®, Tecnoss®, Coazze, Italy) and the augmented area was covered with a resorbable barrier membrane (Soft Cortical Lamina, OsteoBiol®, Tecnoss®) to prevent soft tissue ingrowth into the sinus and to enable guided bone regeneration. Fixation pins (TitanPin, Geistlich) were used when collapse of the barrier membrane was expected and a second barrier membrane (Evolution, OsteoBiol®, Tecnoss®) was applied on top of the first membrane to allow optimal soft tissue integration. Implants were inserted after the bone grafting procedure. After 6 months after from the implant insertion, all patients received the definitive prostheses and underwent clinical and radiographic examinations. The overall 6-month implant survival rate was 90,9% for zygomatic implants and 100% for auxiliary implants placed in the anterior area and the clinical indicators, such as probing pocket depth, keratinized tissue and plaque and bleeding indices, were good in all patients. The radiographic examinations showed a substantial gain of radiographic bone around the zygomatic implants.

CONCLUSIONS

The findings of this cohort study demonstrate that the proposed “extended sinus elevation technique” to place zygomatic implants in conjunction with sinus bone grafting may decrease the risk of biologic complications, in contrast with traditional zygomatic implant placement, reducing sinus-related symptioms and complications, avoiding the exposure of implant threads in the maxillary antrum and improving biomechanical properties of the prosthesis.

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

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045

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