

Clinical Perspectives

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Case Presentations By:

John Lupovici, DDS (USA)

Harold Baumgarten, DMD (USA)

José Luis Calvo Guirado, DDS, PhD, MS (SPAIN)

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Introducing The RegenerOss™ Family Of Products For Guided Bone Regeneration

Guided Bone Regeneration

Guided Bone Regeneration (GBR) is a predictable and well documented surgical approach for the treatment of deficient alveolar ridges prior to, or in conjunction with, endosseous implant placement to promote osseous regeneration.¹

Patients with advanced periodontitis or missing teeth often present with less than optimal clinical conditions. Advancements in regenerative materials provide clinicians with a variety of choices for successfully performing GBR procedures.²⁻⁴ Regenerative procedures may be performed in combination with implant therapy to replace lost hard and soft tissues. Simultaneous implant placement and regeneration may reduce the number of surgical visits and the waiting time to reach the restorative stage.⁵

To meet the demand of clinicians performing regenerative procedures in combination with implant therapy, advanced technology in bone grafting materials and barrier membranes has improved the success of these procedures.

Introducing RegenerOss Bone Grafting Products

In response to clinician's growing interest in GBR in conjunction with implant therapy, BIOMET **3i** has introduced three new materials, which provide a scaffold for building bone to transform a variety of challenging site defects into optimal outcomes. The new RegenerOss Portfolio includes:

RegenerOss Allograft Putty:

A Demineralized Bone Matrix (DBM) in a lecithin carrier (for graft containment) that offers both verified osseointegrativity and osseointegrativity for the promotion of bone growth. This graft material is ideally suited for small defects around implants or in defects that are self space maintaining.

Endobon® Xenograft Granules:

An osseointegrative bovine-derived mineralized grafting material with more than 10 years of clinical use in oral maxillofacial and orthopedic procedures. The mineralized nature of Endobon Xenograft Granules provides an osseointegrative scaffold that is ideally suited for regeneration of defects when effective space maintenance is required.

RegenerOss Allograft:

Aseptically processed human tissue from the University of Miami Tissue Bank (UMTB) that provides a safe alternative to autogenous or synthetic grafting materials. Clinicians may choose from a wide range of configurations that are potentially osseointegrative and/or osseointegrative, thus making this graft material ideally suited for ridge augmentation and periimplant defects when an allograft is desired.

The *Clinical Case Presentations* to follow demonstrate the use of RegenerOss Products in various clinical situations such as: tooth extraction with GBR and delayed implant placement—with and without membrane exposure; and sinus lift and grafting with simultaneous implant placement into an edentulous site.

Each of these case presentations are representations of the individual clinician's experience in clinical practice and may not be indicative of other cases due to varying patient subsets and clinical scenarios.



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Regeneration Of A Facial Defect Following Tooth Extraction In the Aesthetic Zone: A Case Presentation

Clinical Treatment By John Lupovici, DDS (USA)†



INITIAL PATIENT PRESENTATION

A 62-year-old female patient presented with hopeless dentition in the maxillary anterior region secondary to advanced periodontal involvement (Figure 1). Radiographic examination revealed advanced localized horizontal and vertical involvement (Figure 2). The patient's chief complaint was progressive migration of the maxillary anterior dentition. Due to

advanced and severe loss of supporting alveolus and high aesthetic requirements of treating the maxillary anterior region, the treatment plan included a staged approach to tooth extraction and regeneration to provide an optimal restorative result, followed by implant placement in five months.

DIAGNOSIS

- Hopeless dentition maxillary anterior region, teeth Nos. 7, 8, 9 and 10 due to advanced periodontitis
- Inadequate horizontal and vertical bone to support immediate implant placement in an optimal prosthetic position without guided bone regeneration
- Adequate interincisal clearance with the opposing dentition

TREATMENT PLAN

- Fabrication of diagnostic casts, wax patterns and a surgical guide
- Removal of splinted restorations (teeth Nos. 8 and 9) and extraction of maxillary central and lateral incisors (teeth Nos. 7, 8, 9 and 10) with simultaneous guided bone augmentation
- Immediate placement of a provisional partial denture (teeth Nos. 7-10)
- Placement of two NanoTite™ Certain® Implants (4mm diameter) in five months
- Osseointegration and soft tissue maturation period
- Implant level impression four months post implant placement and placement of a provisional fixed partial denture
- Placement of a definitive prosthesis

REGENERATIVE THERAPY

Following acceptance of the treatment plan by the patient, diagnostic casts, wax patterns and a surgical guide were fabricated. On the day of surgery, the patient received local anesthesia by infiltration. The splinted crowns supported by teeth Nos. 8 and 9 were removed, followed by extraction of teeth Nos. 7-10 using atraumatic techniques to maintain the residual supporting alveolus. The socket walls were debrided of all granulomatous tissue using hand and rotary instruments and the integrity of the socket walls was evaluated. The residual sockets revealed large horizontal and vertical osseous defects with thin apical-facial plates in the area of tooth sites Nos. 7-10.



Fig. 1



Fig. 2



Fig. 3

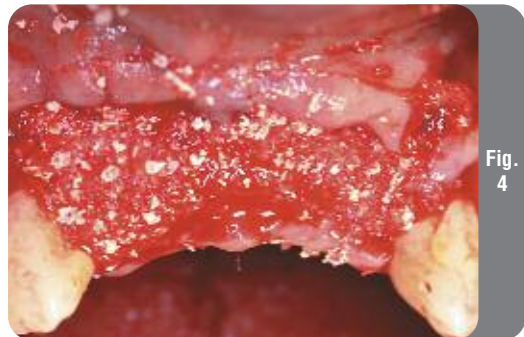


Fig. 4



Fig. 5

A full thickness mucoperiosteal flap was elevated facially from cuspid to cuspid to expose the defect (Figure 3). The large facial defect was carefully debrided and grafted with RegenerOss™ Allograft Putty in conjunction with Endobon® Xenograft Granules, a RegenerOss Product (Figure 4). This combination of materials was chosen to optimize the strengths of the individual graft materials. The RegenerOss Allograft Putty was selected for its verified osteoinductive properties as well as for its superior handling in heme filled sites. Endobon Xenograft Granules were selected due to well-documented osteoconductive properties and a long resorption profile.

An OsseoGuard™ Resorbable Collagen Membrane was trimmed and hydrated with sterile saline for 10 minutes, then intimately positioned over the graft and under the facial soft tissue flap. Membrane stability was verified. It adapted well to the surgical site and was easily draped over the grafted site, then tucked under the flaps without the need for tacking or suturing (Figure 5). An OsseoGuard Membrane was chosen in this case due to its superior handling characteristics and longer resorption profile (six months). Extensive periosteal releasing incisions were performed on the facial soft tissue flap to yield tension-free closure (Figure 6). An immediate provisional partial denture was tried-in and adjusted and the patient was dismissed with post-operative medications and instructions.

IMPLANT PLACEMENT

Five months post extraction and grafting, the patient returned for evaluation and implant placement. Healing was uneventful. Primary closure of the membrane was maintained throughout the healing duration. The provisional partial denture was removed revealing excellent soft tissue dimension and ridge width (Figure 7). Full thickness mucoperiosteal flaps were raised displaying remnants of the OsseoGuard Membrane and the regenerated osseous ridge to support future implant placement (Figures 8 and 9). A 9mm x 2mm hard tissue core was sampled with a 2mm trephine from the newly regenerated site.

Histology: The core was sent for histologic evaluation, which revealed vital bone cells in conjunction with evidence of the incorporation of the Endobon Xenograft Granules (Figure 10). No foreign body reaction was noted.

The surgical guide was placed onto the occlusal surfaces of the adjacent dentition delineating the ideal implant position, including the apical/coronal position to yield a proper emergence profile. Preparation of the osteotomies in tooth sites Nos. 7 and 10 began with a 2mm diameter Twist Drill placed through the predetermined locations in the surgical guide. Implant position was verified with Direction Indicators (Figure 11). At the time of surgery, the bone density was determined to be Type II to Type III (according to the Lekholm & Zarb Index) therefore the subsequent and final drill was a 2.75mm diameter Twist Drill used to the full predetermined depth. Two NanoTite™ Certain® Implants (4mm diameter x 13mm length) were placed into the prepared osteotomies. Cover screws were placed (Figure 12) and the soft tissue flaps were secured with mattress sutures to ensure tension free closure. The provisional restoration was relined and replaced and the patient was dismissed with post-operative medications and instructions.



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11

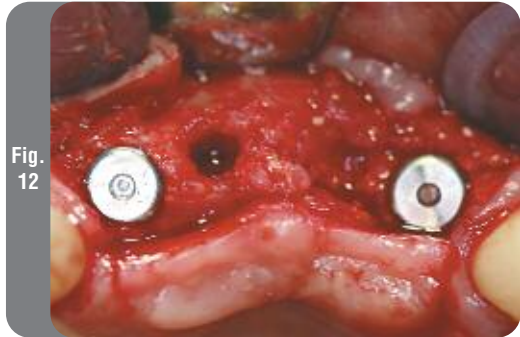


Fig. 12



Fig. 13



Fig. 14



Fig. 15

Four months post implant placement into the regenerated site, the patient returned for second stage implant uncovering. A full thickness incision bisecting to the palatal was made to apically reposition the keratinized soft tissue at the time of implant exposure. EP® Healing Abutments were placed and the soft tissue flaps were secured with interrupted sutures. A verification radiograph was taken (Figure 13). The provisional restoration was relieved and relined over the healing abutments. The patient was dismissed with instructions for oral hygiene.

RESTORATIVE TREATMENT

Six weeks post implant uncovering, the healing abutments were removed and Certain® Pick-up Implant Impression Copings were placed into the internal interfaces of the implants with audible and tactile clicks to confirm seating. A periapical verification radiograph was taken. An impression was made of the impression copings with high-viscosity polyvinylsiloxane impression material. An alginate impression was made of the opposing arch and sent to the dental laboratory along with the implant impression, occlusal record and shade selection. PreFormance® Posts consistent with the size of the teeth being replaced were chosen for use as interim abutments due to the composition—PEEK (polyetheretherketone) to promote the development of excellent soft tissue contours during healing. A provisional fixed partial denture was fabricated to allow for final soft tissue maturation and for prosthetic confirmation of phonetics and aesthetics (Figures 14 and 15). The patient will be seen by the restorative dentist for seating of the definitive abutments and restoration.

CLINICAL OVERVIEW

This clinical case presentation demonstrates a staged approach to tooth extraction and GBR, followed by implant placement in four months, due to the severity of the osseous defect. Following tooth extraction, the osseous defect was grafted with RegenerOss™ Allograft Putty in conjunction with Endobon® Xenograft Granules. The graft was covered with an OsseoGuard™ Resorbable Collagen Membrane, which was chosen in this case due to its numerous advantages, specifically for its delayed resorptive profile, which is pivotal in the regeneration of lost alveolus. Excellent ridge width and soft tissue dimension was obtained, which provided for implant placement in the aesthetic zone with optimal results. Histologic evaluation of the regenerated bone revealed vital bone cells in conjunction with evidence of the incorporation of the Endobon Xenograft Granules. This clinical case presentation is an excellent representation of utilization of the individual strengths of regenerative materials and techniques to obtain a successful clinical and biological result.

Restorative Colleague: Walter Homayoon, DDS Bohemia, New York

Laboratory Colleague: Steven Pigliacelli, CDT, Marotta Dental Studio, Farmingdale, NY

†Dr. Lupovici is a Diplomate of the American Academy of Periodontology. He has extensively lectured nationally and internationally on regeneration and implant dentistry. He is a former Clinical Assistant Professor in the Department of Periodontics and Implant Dentistry at New York University College of Dentistry. He maintains a private practice focused on implant dentistry and regenerative therapies in New York City and Long Island, New York.

Simultaneous Extractions And Guided Bone Regeneration Of The Posterior Maxilla: A Case Presentation

Clinical Treatment By Harold Baumgarten, DMD (USA)††



INITIAL PATIENT PRESENTATION

A 46-year-old female patient presented with pain in the maxillary left second premolar, tooth No. 13. Clinical and radiographic examinations revealed advanced caries into the pulp chamber of tooth No. 13 (Figures 1 and 2). The patient had been taking antibiotics (Erythromycin) for three days and the pain had begun to abate. The maxillary left first premolar, tooth No. 12, received previous endodontic treatment and exhibited substantial bone loss and caries to the gingival margin. The maxillary left first molar, tooth No. 14, received previous endodontic treatment. Also, the provisional restoration with inadequate clinical crown length required replacement. The treatment plan accepted by the patient included immediate extraction of teeth Nos. 12 and 13, with socket preservation for future implant placement.

DIAGNOSIS

- Advanced caries, teeth Nos. 12 and 13
- Acute periapical abscess with pain, tooth No. 13
- Moderate periodontitis, tooth No. 12
- Inadequate restoration of tooth No. 14 and inadequate clinical crown length

TREATMENT PLAN

- Fabrication of immediate transitional partial denture
- Extraction of teeth Nos. 12 and 13 due to advanced caries
- Clinical crown lengthening, tooth No. 14
- Socket preservation for future implant placement in tooth sites Nos. 12 and 13
- Implant placement in a single stage protocol
- Placement of single-unit implant supported PFM crowns, teeth Nos. 12 and 13; PFM crown, tooth No. 14

SURGICAL TREATMENT

The patient was anesthetized with 2% xylocaine (1:100,000 epinephrine). Full thickness buccal and palatal mucoperiosteal flaps were elevated from the distal aspect of tooth No. 11 to tooth No. 15 to expose the alveolar bone. A clinical crown lengthening procedure was done on the distal aspect of tooth No. 14. Teeth Nos. 12 and 13 were extracted with periostomes and the sockets were carefully debrided with hand and rotary



Fig. 1



Fig. 2

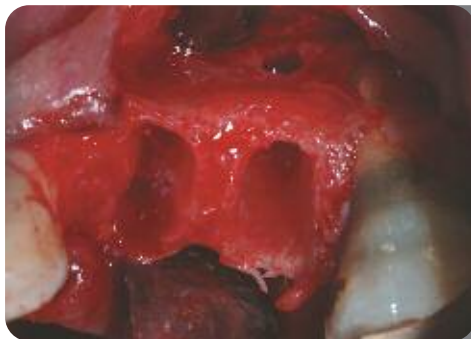


Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10

instruments. A fenestration defect was noted in the buccal socket wall of tooth No. 13 in the apical aspect (Figure 3).

RegenerOss™ Allograft Putty was placed to completely fill both extraction sites (Figure 4). The putty nature (lecithin carrier) of the material allows it to be molded and retained in the defect. An OsseoGuard™ Resorbable Collagen Membrane was trimmed and hydrated with sterile saline, then placed over the graft. The membrane was tucked under the buccal and palatal flaps and draped over the graft (Figure 5). The soft tissue flaps were secured with Vicryl® 4-0 interrupted sutures (Ethicon, Inc., a Johnson & Johnson Co.) (Figure 6). Due to the socket openings, primary closure of the soft tissue flaps was not obtained over the center most aspect of the extraction sites.

Note: The composition of the resorbable collagen material is such that it permits soft tissue healing and coverage.

The transitional partial denture was inserted and equilibrated. The intaglio surface of the partial denture was relieved to ensure the absence of pressure over the grafted site. The patient was dismissed with post-operative medications and instructions (Acetaminophen with codeine, antibiotics and chlorhexidine gluconate oral rinse).

IMPLANT PLACEMENT

Five months post extractions and grafting, the patient was seen for evaluation. Healing appeared uneventful, both clinically and radiographically (Figures 7 and 8). The patient was anesthetized and full thickness mucoperiosteal buccal and palatal flaps were elevated. The ridge width and fill of the extraction sockets appeared adequate for implant placement (Figure 9). Preparation of the osteotomies began with an ACT® Pointed Starter Drill to pierce the cortical bone. Preparation of the osteotomies continued with use of a 2mm diameter Twist Drill, Pilot Drill and 3mm diameter Twist Drill—to the full predetermined depth for the implants chosen. Two NanoTite™ Certain® Implants (4mm diameter x 13mm length in site No. 12 and a 4mm diameter x 11.5mm length in site No. 13) were placed (Figure 10). Osstell™ Smartpegs™ (Osstell Mentor, Integration Diagnostics, AB, Göteborg, Sweden) were placed into each implant and hand tightened. Both implants achieved ISQ (Implant Stability Quotient) values of 75. This reading indicated a very high level of primary stability of the implants. EP® Healing Abutments were placed into the implants. The soft tissue flaps were repositioned around the healing abutments and secured with interrupted sutures (Figure 11).

PROVISIONALIZATION

Two months post implant placement, the patient was seen for evaluation (Figure 12). Excellent soft tissue healing around the titanium healing abutments was noted. The healing abutments were removed and Certain Twist Lock™ Transfer Impression Copings consistent with the size of the implants were placed into the internal interface of the implants with an audible and tactile

click to ensure complete seating. A verification radiograph was taken (Figure 13). An implant level impression was made with polyvinylsiloxane material. An alginate impression was made of the opposing arch and sent to the dental laboratory along with the implant impression, occlusal record and shade selection. GingiHue® Posts were selected and were prepared in the dental laboratory for adequate interocclusal clearance, parallelism and margin placement .5mm below the gingival margin. These were then seated into the internal interface of the implants and secured with abutment screws tightened to 20Ncm with a torque driver. Autopolymerizing acrylic resin was placed into a prefabricated provisional restoration and inserted onto the GingiHue Posts and onto the prepared tooth No. 14. The initial set occurred intraorally and final polymerization occurred extraorally. The provisional restoration had occlusal contacts in centric occlusion. It was contoured, polished and placed onto the GingiHue Posts and tooth prep, then temporarily cemented (Figure 14). A post insertion radiograph was taken (Figure 15). The patient was given oral hygiene instructions and was discharged with the fixed provisional restoration in place. The patient will be seen at a later date for placement of individual PFM crowns for teeth Nos. 12, 13 and 14.

CLINICAL OVERVIEW

This clinical case presentation demonstrates a staged approach to tooth extraction and guided bone regeneration, followed by implant placement in five months. Following tooth extraction, the buccal fenestration and the extraction sockets were grafted with RegenerOss™ Allograft Putty. The putty nature of the material allowed it to be molded and retained in the defect. The graft was covered for protection during regeneration with an OsseoGuard™ Resorbable Collagen Membrane, which was chosen in this case due to its material composition and longer resorption profile (six months). Due to the socket openings, primary closure of the soft tissue flaps was not obtained over the center most aspect of the extraction sites, however, due to the nature of the resorbable collagen material, exposure of the membrane did not prevent soft tissue healing and coverage. Excellent fill of the defect and maintenance of ridge width was obtained, which provided adequate bone dimension for implant placement.

Laboratory Colleague: Alfred Nelson, CDT, Amsterdam Dental Laboratory, Philadelphia, PA.

††Dr. Baumgarten received a DMD degree and Certificates in Periodontics and Periodontal Prosthesis (Fixed Prosthodontics) from the University of Pennsylvania in Philadelphia, PA. He is a member of the Academy of Osseointegration, American Academy of Periodontology and American Dental Association. He is a Fellow in the Greater New York Academy of Prosthodontics and is a Clinical Professor in the Department of Periodontics at the University of Pennsylvania. Dr. Baumgarten maintains a private practice in Philadelphia, PA with emphasis on implant dentistry and implant prosthodontics.



Fig. 11



Fig. 12



Fig. 13



Fig. 14



Fig. 15

Simultaneous Sinus Lift, Grafting And Implant Placement In The Posterior Maxilla: A Case Presentation

Clinical Treatment By
 José Luis Calvo Guirado, DDS, PhD, MS (SPAIN)†††



INITIAL PATIENT PRESENTATION

A 56-year-old female patient presented to the dental clinic missing the maxillary right first molar, tooth No. 3. The tooth was extracted three years prior due to fracture. Clinical and radiographic examination of the edentulous space revealed *adequate* soft tissue dimension and *inadequate* bone height (7mm) under the maxillary sinus for implant placement without the need for grafting (Figures 1 and 2). The patient's chief complaint was "I have bite problems due to the missing tooth." The patient desired a fixed restoration for the missing tooth, which would not compromise the adjacent natural teeth. The treatment plan accepted by the patient included a simultaneous sinus lift and bone graft with immediate implant placement.

DIAGNOSIS

- Missing tooth No. 3 due to previous fracture
- Adequate soft tissue dimension
- Inadequate bone height (7mm) under the maxillary sinus for implant placement without the need for grafting
- Adequate interocclusal space with the opposing dentition

TREATMENT PLAN

- Simultaneous sinus lift, grafting and placement of a NanoTite™ PREVAIL® Implant (5/6/5) in tooth site No. 3
- Osseointegration and soft tissue maturation period
- Second stage implant surgery five months post implant placement
- Implant impression two months post second stage surgery
- Placement of a definitive abutment and PFM crown, tooth site No. 3

SURGICAL TREATMENT

The patient was anesthetized with 2% xylocaine (1:100,000 epinephrine). Full thickness buccal and palatal mucoperiosteal flaps were elevated over the edentulous site, tooth No. 3, to expose the alveolar bone (Figure 3). Using copious irrigation,



Fig. 1



Fig. 2



Fig. 3



Fig. 4

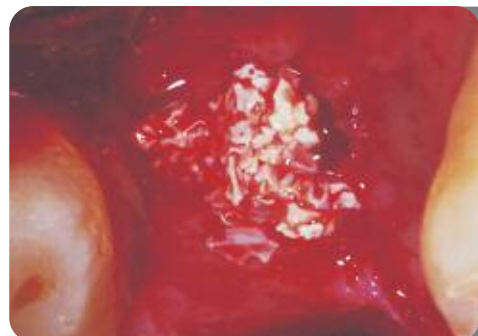


Fig. 5

preparation of the implant osteotomy began with use of an ACT® Pointed Starter Drill to pierce the cortical bone and position the implant in the ideal location of the edentulous site. A 2mm diameter Twist Drill was advanced to the floor of the sinus. A Direction Indicator was placed and a periapical radiograph was taken to confirm the location of the sinus floor (Figure 4). A sinus elevation was performed with osteotomes. Endobon® Xenograft Granules were used in combination with the osteotomes to elevate the sinus floor and graft the site (Figures 5 and 6).

An internally interfaced NanoTite™ PREVAIL® Implant (5/6/5 diameter x 11.5mm length) was placed without irrigation into the prepared osteotomy (Figures 7 and 8). An Osstell™ Smartpeg™ (Osstell Mentor, Integration Diagnostics, AB, Göteborg, Sweden) was placed into the internal interface of the implant and hand-tightened (Figure 9). The implant achieved an ISQ (Implant Stability Quotient) value of 62. The Smartpeg was removed and an implant cover screw was placed (Figure 10). Silk sutures were selected to close the soft tissue flaps with horizontal mattress sutures (Figure 11). A post-insertion periapical radiograph was taken revealing elevation of the sinus membrane and containment of the graft (Figure 12). The patient was dismissed with post-operative medications and instructions.

Five months post sinus elevation, grafting and implant placement, the patient returned for evaluation. Healing appeared uneventful both clinically and radiographically. A periapical radiograph was taken to confirm osseointegration of the implant and containment of the grafted bone in the sinus. The height of bone achieved following the sinus elevation and graft, was measured digitally revealing 12mm of height above the original sinus floor and 13mm of bone height to the top of the cover screw of the implant (Figure 13).

The patient was anesthetized. Buccal and palatal mucoperiosteal flaps were elevated to expose the cover screw on the implant. The cover screw was removed with a large hex driver and an Osstell Smartpeg was placed into the implant and hand-tightened. An ISQ value of 68 was achieved. The Smartpeg was removed and an EP® Healing Abutment was selected consistent with the size of the implant restorative seating surface (5mm). The healing abutment was placed with a large hex driver and tightened with 20Ncm of torque. The soft tissue flaps were repositioned around the healing abutment and secured with interrupted sutures. A verification radiograph was taken. The patient was given oral hygiene instructions and discharged.

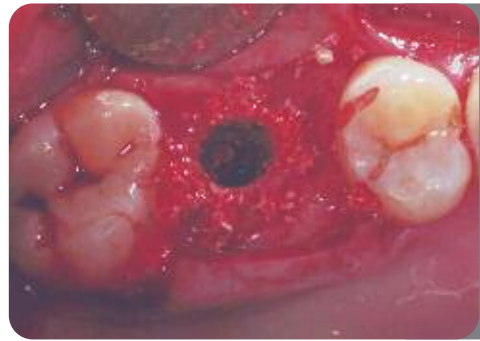


Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14



Fig. 15

RESTORATIVE TREATMENT

Two months post second stage surgery and healing abutment connection, the patient returned for evaluation. Excellent soft tissue healing was noted. The healing abutment was removed and a Certain® Pick Up Impression Coping was seated into the internal interface of the implant with an audible and tactile click to confirm seating. A periapical verification radiograph was taken. An implant level impression was made of the coping with high-viscosity polyvinylsiloxane impression material. An alginate impression was made of the opposing arch and sent to the dental laboratory along with the implant impression, occlusal record and shade selection for fabrication of the definitive abutment and a PFM crown. A GingiHue® Post was selected consistent with the size of the implant and prepared in the dental laboratory for adequate interocclusal clearance, parallelism and margin placement. The modified abutment and PFM crown were sent to the dental office.

The patient returned to the dental clinic for abutment seating and placement of the definitive restoration. The healing abutment was removed. The modified GingiHue Post was seated and secured with a Gold-Tite® Retaining Screw tightened to 20Ncm of torque. A verification radiograph was taken. The restoration was tried in, adjusted interproximally and contoured for optimal occlusal contacts in centric and eccentric positions, then cemented (Figure 14). A post insertion radiograph was taken (Figure 15) and the patient was dismissed with oral hygiene instructions.

CLINICAL OVERVIEW

This clinical case presentation illustrates simultaneous sinus lift and grafting with osteotomes followed by immediate implant placement into an edentulous space. Endobon® Xenograft Granules were chosen in this case for grafting in the sinus due to the mineralized nature of the graft material, which provides a scaffold for effective space maintenance in the sinus. Excellent gain in bone height under the sinus was noted radiographically. A two-stage surgical procedure was performed with implant exposure five months post implant placement into the grafted sinus.

†††Dr. Calvo Guirado is a Senior Professor in General Dentistry, Senior Lecturer in Implant Dentistry and Chairman of the Implant Master Course. He serves as Faculty of Medicine and Dentistry, University of Murcia, in Murcia, Spain.

**RegenerOss™ Portfolio—
A Variety Of Options For Building Bone**
Ordering Information*



RegenerOss Allograft Putty		
Catalog #	Description	Volume
ROAP05	Demineralized Bone Matrix in a lecithin carrier	0.5cc
ROAP10	Demineralized Bone Matrix in a lecithin carrier	1.0cc
ROAP20	Demineralized Bone Matrix in a lecithin carrier	2.0cc
Endobon® Xenograft Granules		
Catalog #	Volume	Particle Size
ROX05	0.5ml	500–1000µm
ROX10	1.0ml	500–1000µm
ROX20	2.0ml	500–1000µm
RegenerOss Allograft		
Catalog #	Description	Weight
0338	Demineralized Cortical 200-300µm	1/2g
1453	Demineralized Cortical 300-500µm	1/2g
0394	Demineralized Cortical 500-800µm	1/2g
1451	Demineralized Cancellous 200-300µm	1/2g
1452	Demineralized Cancellous 300-500µm	1/2g
0400	Demineralized Cancellous 500-800µm	1/2g
0605	Mineralized Cortical 200-300µm	1/2g
1450	Mineralized Cortical 300-500µm	1/2g
0393	Mineralized Cortical 500-800µm	1/2g
0344	Mineralized Cancellous 200-300µm	1/2g
1449	Mineralized Cancellous 300-500µm	1/2g
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*Some RegenerOss Products are not available in all markets. For more information contact your local BIOMET 3i Representative.

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Global Headquarters
4555 Riverside Drive
Palm Beach Gardens, FL 33410
1-800-342-5454
Outside The U.S.: +1-561-776-6700
Fax: +1-561-776-1272
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RegenerOss Allograft Putty is manufactured by Interpore Cross International.
RegenerOss Allograft is processed by the University Of Miami Tissue Bank.

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Fax: +61-2-9888-9900

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Fax: +43-(0)6235-200-45-9

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Phone: +32-2-5410290
Fax: +32-2-5410291

BRAZIL
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CANADA
Phone: +514-956-9843
Fax: +514-956-9844

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Fax: +33-1-41054340

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Fax: +49-721-255177-73

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Fax: +44-1628-820182

MEXICO
Phone: +52-55-5679-1619
Fax: +52-55-5684-8098

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Phone: +31-(0)78-629-2800
Fax: +31-(0)78-629-2801

NEW ZEALAND
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Fax: +64-508-133-331

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Fax: +46-40-17-6099

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Phone: +351-21-000-1647
Fax: +351-21-000-1675

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Phone: +34-93-470-59-50
Fax: +34-93-372-11-25

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TURKEY
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Phone: +44-800-652-1233
Fax: +44-1628-820182

DISTRIBUTORS

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Phone: +541-1482-71001
Fax: +541-1482-67373

CHILE
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Fax: +56-2-2330176

CHINA
Atek Inc.
Phone: +86-21-6329-1265
Fax: +86-21-6329-1620

COLOMBIA
3i Colombia
Phone: +571-612-9362
Fax: +571-620-6412

COSTA RICA
Implantec S.A.
Phone: +506-234-9043
Fax: +506-224-7620

EL SALVADOR
Dentimer SA de CV
Phone: +503-263-6350
Fax: +503-263-6676

GREECE
Impladent Dental Implants, LLC
Phone: +30-2310-501-651
Fax: +30-2310-522-417

ISRAEL
H.A. Systems
Phone: +972-3-6138777
Fax: +972-3-6138778

HONG KONG
Ositek Inc., Ltd.
Phone: +852-8121-6601
Fax: +852-3747-3754

ITALY
Biomax, srl.
Phone: +39-0444-913410
Fax: +39-0444-913695

JAPAN
Implant Innovations Japan
Phone: +81-66-868-3012
Fax: +81-66-868-2444

KOREA
Jungsan 3i Corp.
Phone: +82-2-516-1808
Fax: +82-2-514-9434

LEBANON
3i MENA s.a.l.
Middle East And North Africa
Phone: +961-1-694000
Fax: +961-1-694222

PARAGUAY
Andres H. Arce y Cia SRL
Phone: +595-21-208185
Fax: +595-21-496291

POLAND
Dental Depot
Phone: +48-71-341-3091
Fax: +48-71-343-6560

RUSSIA
Com-Dental
Phone: +7-495-797-6686
Fax: +7-499-242-9567

SINGAPORE
Asia Implant Support & Services
Phone: +65-6223-2229
Fax: +65-6220-3538

SOUTH AFRICA
Selective Surgical CC
Phone: +27-11-991-7007
Fax: +27-11-672-1391

TAIWAN
Kuo Hwa Dental Suppliers Co., Ltd.
Phone: +886-2-2226-1770
Fax: +886-2-2226-8747

THAILAND
3i (Thailand) Co., LTD.
Phone: +662-252-6685
Fax: +662-252-6686

UKRAINE
Com-Dental
Phone: +38-067-7007667
Fax: +38-044-5017117

URUGUAY
Pro3implant S.R.L.
Phone: +598-2-4034163
Fax: +598-2-4034163