New coating for implants could prevent premature failure

A team of MIT chemical engineers has developed a new coating for implants that could help them better adhere to the patient’s bone, preventing premature failure.

The coating, which induces the body’s own cells to produce bone that fixes the implant in place, could also be used to help heal fractures and to improve dental implants, according to Hammond and lead author Nisarg Shah, a graduate student in Hammond’s lab.

Artificial hips consist of a metal ball on a stem, connecting the pelvis and femur. The ball rotates within a plastic cup attached to the inside of the hip socket. Similarly, artificial knees consist of plates and a stem that enable movement of the femur and tibia. To secure the implant, surgeons use bone cement, a polymer that resembles glass when hardened. In some cases, this cement ends up cracking and the implant detaches from the bone, causing chronic pain and loss of mobility for the patient.

“Typically, in such a case, the implant is removed and replaced, which causes tremendous secondary tissue loss in the patient that wouldn’t have happened if the implant hadn’t failed,” Shah says. “Our idea is to prevent failure by coating these implants with materials that can induce native bone that is generated within the body. That bone grows into the implant and helps fix it in place.”

The new coating consists of a very thin film, ranging from 100 nanometers to one micron, composed of layers of materials that help promote rapid bone growth. One of the materials, hydroxyapatite, is a natural component of bone, made of calcium and phosphorous. This material attracts mesenchymal stem cells from the bone marrow and provides an interface for the formation of new bone. The other layer releases a growth factor that stimulates mesenchymal stem cells to transform into bone-producing cells called osteoblasts.

Once the osteoblasts form, they start producing new bone to fill in the spaces surrounding the implant, securing it to the existing bone and eliminating the need for bone cement. Having healthy tissue in that space creates a stronger bond and greatly reduces the risk of bacterial infection around the implant.

“When bone cement is used, dead space is created between the existing bone and implant stem, where there are no blood vessels. If bacteria colonise this space they would keep proliferating, as the immune system is unable to reach and destroy them. Such a coating would be helpful in preventing that from occurring,” Shah says.

It takes at least two or three weeks for the bone to fill in and completely stabilise the implant, but a patient would still be able to walk and do physical therapy during this time, according to the researchers.

The MIT team can control the thickness of its film and the amount of growth factor released by using a method called layer-by-layer assembly, in which the desired components are laid down one layer at a time until the desired thickness and drug composition are achieved.

The researchers are now performing animal studies that have shown promising results: The coatings lead to rapid bone formation, locking the implants in place.

Dental implant firm files for bankruptcy

According to reports, Voxellogix Corp, a seven-year-old US teeth-replacement company, has filed for bankruptcy protection in San Antonio.

President of the corporation and dental specialist, Dr Stephen Schmidt, who replaces missing and damaged teeth, said the company had been “hurt” by the down economy in the last few years. As a result it “lacked the financial resources it needed to grow”.

The company was part of the emerging field of digital dentistry that uses three dimensional models and other computer-designed aids to improve teeth replacement. While full replacement costs at Voxellogix started at about $40,000, the company said its treatment can result in lower costs compared to conventional dental methods.

The report stated that Voxellogix filed for bankruptcy protection Tuesday under Chapter 11 of the bankruptcy code, meaning it can seek reorganisation. Schmidt said he was uncertain, however, if it would return to business.

Nobel Biocare Catalog 2012 available online

Nobel Biocare has released its new Product Catalogue 2012 with up-to-date content, illustrations and detailed product information.

The new Nobel Biocare Product Catalog 2012 is an informative and fundamental reference point for navigating through Nobel Biocare’s comprehensive assortment of products and solutions. The updated catalogue allows for accurate and efficient ordering of all Nobel Biocare’s implants, prefabricated and individualized prosthetics, and components for guided surgery.

Highlights of the new product catalogue include: Recently launched products such as NobelClinician Software for digital diagnostics and treatment planning now also for Mac, NobelActive 5.0 for safe implant placement in areas with limited space, and NobelReplace Conical Connection and NobelReplace Platform Shift designed to optimize aesthetic outcome through enhanced soft tissue preservation while maintaining the benefits of the well-proven tapered implant body.
A 59-year-old male patient was looking for a new fixed restoration for his maxilla. His case history showed no general disease. The patient had been fitted with telescopic model casting prostheses in the maxilla and mandible.

Owing to the periodontally insufficient anterior residual teeth in the maxilla (teeth #12, 11, 21 and 22), the prosthesis could no longer be supported. After losing the residual teeth, the patient wanted a fixed implant-based restoration of the maxilla.

The residual teeth of the mandible showed the following findings. Tooth #48 was impacted and displaced. Tooth #45 showed mobility (Grade 3) and was periodontally insufficient.

The anterior residual teeth #53 to 45 presented with increased probing depths on the canine teeth and increased mobility (Grade 2).

The treatment strategy for the maxilla included, as a first step, a conservative periodontal therapy of the anterior or residual teeth for strategic preservation and fixation of the existing prosthesis until implant insertion.

Afterwards, the residual teeth were removed and a bilateral sinus floor augmenta-
tion was performed in a two-stage procedure. Following 3-D planning, eight endosseous implants were inserted with the CAMLOG Guide System in a flapless procedure, and the prosthetic restoration was realised using a telescopic bridge.

In the mandible, tooth #45 was removed and the other teeth were treated with conservative periodontal therapy. The mandibular posterior teeth were replaced and realigned. Teeth #43 to 33 received re-veneering of the removable denture.

In order to ensure accurate transferability, the fixation must be performed under radiological control in the identical position as the one for the implantation.

The planned minimally invasive flapless procedure for implant insertion requires a unique fixation for the preparation of radiological materials. The fixation is facilitated by temporary implants in a suitable position.

In order to ensure accurate transferability, the fixation must be performed under radiological control in the identical position as the one for the implantation.

The scan template is fabricated...
Discover Atlantis™ crown abutment

Atlantis™ crown abutment is an efficient, effective and aesthetic alternative to traditional cast abutments for single-tooth, screw-retained restorations.

Like Atlantis™ patient-specific CAD/CAM abutments for cement-retained restorations, the Atlantis crown abutment is uniquely designed from the final tooth shape for more natural aesthetic results and available for all major implant systems. It is also precision-milled from a solid blank of biocompatible zirconia, which eliminates the need to cast with precious metals.

To guide all drills by the sleeve geometry from the start, the drilling sequence is performed in succession from the nine to the 11mm drill and finally to the 13mm drill (maximum implant length). The CAMLOG Guide offers a sleeve system. As opposed to multi-sleeve systems, a single sleeve inserted into the surgical template is adequate for guidance during all drilling sequences and implantation procedures. The implants can be inserted through the sleeves.

Experience the freedom of unlimited possibilities. Experience Atlantis™.

The thickness of the mucous membrane can be measured by fitting the radio-opaque tooth along the plaster surface.

The accuracy and simplicity with which the implants can be inserted in prosthetically correct or anatomically difficult situations is increased significantly by virtual 3D implant planning using CBCT or CT in combination with the guided implant bed preparation and implant insertion. Implant therapy is thus facilitated.

The drilling sequence in the CAMLOG Guide System is different from other systems. While in a conventional drilling sequence, the pilot drill is advanced to the final implant length, the drilling sequence guided by the CAMLOG Guide first starts with the shorter pilot drill (length six mm).

What’s more, because porcelain is applied directly to the Atlantis crown abutment, it can be easily retrieved, if needed, and the time and cost of preparing a separate coping is recaptured.

Atlantis crown abutment is available in five shades, including a new translucent zirconia in white. It can be placed in all positions in the mouth and is covered by a comprehensive warranty.

For more on the benefits of Atlantis™ screw- and cement-retained solutions, visit www.astratechdental.co.uk.

Conclusion

The original goal of the prosthetic reconstruction was a fixed bridge restoration. Owing to the hygienic and functional training phase with the long-term temporary appliance, the patient opted for a removable bridge.

The accuracy and simplicity with which the implants can be inserted in prosthetically correct or anatomically difficult situations is increased significantly by virtual 3D implant planning using CBCT or CT in combination with the guided implant bed preparation and implant insertion. Implant therapy is thus facilitated.

The drilling sequence in the CAMLOG Guide System is different from other systems. While in a conventional drilling sequence, the pilot drill is advanced to the final implant length, the drilling sequence guided by the CAMLOG Guide first starts with the shorter pilot drill (length six mm).

To guide all drills by the sleeve geometry from the start, the drilling sequence is performed in succession from the nine to the 11mm drill and finally to the 15mm drill (maximum implant length).

The CAMLOG Guide offers a sleeve system. As opposed to multi-sleeve systems, a single sleeve inserted into the surgical template is adequate for guidance during all drilling sequences and implantation procedures. The implants can be inserted through the sleeves.

Editorial note: The case was first published in C Mairoana & M Beretta (eds.), Manual of Oral Implantology (Edizioni Italia Press, 2010) and is reprinted here with kind permission.

A complete list of references is available from the publisher.
About the author

Dr Claudio Cacaci

is a specialist in oral surgery and implant dentistry. He studied at the Dental School in Munich and worked in the Department of Maxillofacial Surgery and the Department of Oral Surgery and Implant Dentistry in Munich. In 1997, he founded a private dental clinic with Dr Jan Hajtó in Munich. In 1998, he established the Private Training Centre for Implant Dentistry (F.I.O.I.) in Munich. He is the founder of the Munich Study Group for Implant Dentistry and a member of various national and international study groups and dental associations.

Dr Cacaci is author of the book Check-list – Implantology and contributing author of the book Manual of Oral Implantology. Since 2009, he has worked in a group practice specialising in implantology and periodontology in Munich.
Champions® Implant System

(R)Evolution in Implantology and Prosthodontics:
MIMI® Method (Minimally Invasive Method of Implantation)

Dr. Armin Nedjat said, “I have developed the Champions® implant system, a reliable and innovative implant system that can be routinely used in the day-to-day work of dental offices. More than 2,800 dental offices and clinics are ‘Champions’, and they performed more than 50,000 implantations last year. Do you want to be a new ‘Champion’ too?”

Advantages
- Suitable for MIMI® – Win-Win situation for patients and dentists
- Patient friendly
- More efficient procedure for the dentist
- Champions® implants: a wide range of innovative implants and accessories, which can be used for many indications
- High quality at affordable prices
- Excellent primary stability
- Optimal immediate loading
- Excellent prosthetic restorations
- Innovative solution and successful treatment
- Made in Germany with great precision and of the highest quality materials
- Free MIMI® marketing
- Free forum for all Champions® customers
- Champions® surface – rated one of the best

Champions® implants: a wide range of innovative implants and accessories, which can be used for many indications

Easy, Successful and Affordable
Made in Germany

www.champions-implants.com

Including: MIMI® Method (Minimally Invasive Method of Implantation)

Suitable for MIMI®

One-Piece Implants

Champions® Square-Shaped Implants
Ø 3.0 · 3.5 · 4.0 · 4.5 · 5.5
Thread lengths: 6 · 8 · 10 · 12 · 14 · 16 mm

Innovative solution and successful treatment

Two-Piece Implants

Free loan of the surgical kit
Inner cone with integrated “Hexadapter”
Micro-close connection < 0.6 µm
Price VAT included:
Healing Cap (with implant) 0 €
Customizable and glueable titanium abutment 23 €
Implant Analog Set 23 €
Impression Coping 10 €

Medilas Opal diode laser 980
by Dornier MedTech

Courses about the minimally invasive implantation method (MIMI®) and the Champions® implant system

Continuing education in Mallorca

The course starts on Wednesday at 2:00 PM and ends on Saturday afternoon
June 13 – June 16, 2012

Course content
- Theory: Presentation of the Champions® implant system and the MIMI® method
- Practice: Live surgeries with one-piece and two-piece Champions® implants

The course includes
- 5 nights in a double-room, breakfast included, transfer to the dental office, day rate, lunch, coffee break, 2 dinners, course script, A3 Certificate, incl. for accompanying person.

Course fee € 3,200 (VAT excluded)
Course participants: minimum 3, maximum 10

Please arrange your flight schedule. For transfers, please give us your flight arrival time.

The courses will be presented in a friendly and relaxed atmosphere, and dentists will be able to incorporate Implantology as an additional treatment in their dental office.

The courses will be taught by Dr. Armin Nedjat, an experienced Dental Implantology specialist. He has placed and restored more than 20,000 implants.
Keep it safe and simple

Dr Armin Nedjet examines the principles of Champions

For almost two decades, MIMI®, the Minimally Invasive Method of Implantation, has been known as a beneficial, patient-friendly and periosteum-protecting surgery surgical method. (Don’t confuse the MIMI® method with Mini implants, which are made from titanium, grade five, and have an implant diameter that is smaller than 2.9mm). The Champions® implant system, which is inserted according to MIMI®, has been very successful in recent years. However, this implant system can also be inserted according to the classical implantation method, and if necessary, augmentations can be performed. The implants themselves are made from titanium, grade four, by a well-known German manufacturer. The surface of the Champions® are made from the best material on the market, according to several studies in Germany, for example at the university clinic in Cologne, and the United States.

The principle of Champions® is KISS “keep it safe & simple!” and last year, more than 50,000 Champions® implants were inserted in German dental clinics/offices. The Champions® implants have proven to be reliable and beneficial. Their price-performance ratio and innovative features (such as the cementable “Prep-Caps” and the two-piece Champions® Evolution® implants), as well as the efficient surgical and prosthetic procedures they employ, are unbeatable.

Primary stability at a torque of 40Ncm can be achieved with a one-piece 3.5mm-diameter “Classic” Champions® implant (slightly conical end), with the 3.0mm-diameter “New Art” Champions® or with 3.5mm-diameter two-piece Champions® Evolution® implants.

Implants with a larger diameter (approx 4.5mm or 5.5mm) should only be used if primary stability of the 3.0mm-diameter condensers or of the mentioned implants cannot be achieved at 30/40Ncm.

According to recent clinical studies, the old argument, “The more titanium in the bone, the better it is”, has been proven wrong. In fact, the peri-implant nutrition plays a major role. There are very few complications associated with the MIMI® treatment, which is very beneficial for patients: thanks to MIMI®, the periosteum, which nourishes the bone, is very well protected.

In some cases, you can extract teeth that cannot be periodontally preserved and insert implants in the same session. Patients with one-piece Champions® implants, for example for single front teeth, are provided with a fixed temporary restoration before the final prosthodontic restoration is fitted eight weeks after implantation. If there are more than four fixed teeth/implants, the final prosthodontic restoration can even be fitted within the first 14 days post-surgery. If complications associated with temporary restorations, the temporary restorations should not be removed in the second to eight weeks post-surgery.

When two-piece Champions® (R)Evolution® implants are inserted, the implants can be transferred to Secondary Osseointegration Stability independently from temporary restorations without any problems. Two-piece Champions® (R)Evolution® implants are indicated for smaller units (one- three teeth), and one-piece Champions® are indicated for larger units (four or more implants/teeth). Dental surgeons prefer to work with two-piece Champions® Evolution® implants since they can avoid many of the problems associated with temporary restorations. The whole treatment (without the need of special high-tech material) is easily affordable for most patients.

• Figs 1-3: Case Study

Tooth 34 and tooth 56 of the 50-year-old patient could not be preserved. After local anaesthesia, the teeth were gently extracted, and one-piece Champions® were inserted. You can see the bone “plateau” between the previous tooth roots in the bifurcation area. This type of immediate implantation has many advantages, just one surgery session is necessary, and in the long-term, there is no loss of soft or hard tissue.

• Figs 4-7

With the bone condensing conical triangular drills, we pre-
Laser-Lok 3.0 is the first 3mm implant that incorporates Laser-Lok technology to create a biologic seal and maintain crestal bone on the implant collar. Designed specifically for limited spaces in the aesthetic zone, the Laser-Lok 3.0 comes with a broad array of prosthetic options making it the perfect choice for high profile cases.

2. Implant strength & fatigue testing done in accordance with ISO standard 14801.

- Two-piece 3mm design offers restorative flexibility in narrow spaces
- Implant design is more than 20% stronger than competitor implant
- 3mm threadform shown to be effective when immediately loaded
- Laser-Lok microchannels create a physical connective tissue attachment (unlike Sharpey fibers)

Introducing the Laser-Lok® 3.0 implant

Following the immediate implantation, zircon Prep-Caps were cemented approximately one-two mm subgingivally. Combined with hyaluronic acid gel and malleable and resorbable collagen, Prep-Caps ensured optimal GTR.

Treat small spaces with confidence

For more information, contact BioHorizons
Customer Care: +44 (0)1344 752560 or visit us online at www.biohorizons.com
guessed that implants should always have an inter-implantary distance of two-three mm or of two-three mm to adjacent teeth, this has been proven wrong by hundreds of studies and long-term documented cases. When the implants have achieved primary stability, bone does not have to first grow on the titanium. Thanks to the MIM® technique, bone remains well-nourished. There-

Therefore, you only need an inter-implantary distance of one mm and a distance of 1mm to the adjacent teeth.

Patients need to be well informed about all aspects of implant treatment, including the benefits of one-piece implants for single tooth gaps. Temporary restorations and cements should be fitted to avoid lat-

eral shear forces and micro-

movements in the first two to eight weeks post-surgery, and patients should be aware of the importance of their compliance with their dentist’s instructions. The case described is an example of how successful and reliable immediate implantation can be if special techniques and materials, which protect the periosteum, are applied.

FREE NTI-tss Starter Kit worth £105 for bookings taken before 31st May

1.30pm - 5.30pm  Price per place £195 inc VAT

☐ 19th Sept - London BDA, Wimpole Street
☐ 12th Oct - Edinburgh Royal College of Physicians
☐ 16th Nov - Cardiff National Museum

To reserve your place and get a Free NTI-tss kit. Indicate the date you wish to attend, fill in your details below and return freepost to:

S4S (UK) Limited, Freepost RSAR-XSAZ-GGJE, 752a Chesterfield Road, Sheffield, S8 OSE

Delegatel Name_________________________GDC No.____________________________
Address_______________________________Postcode____________________________
Tel_________________Email____________

‘Patients need to be well informed about all aspects of implant treatment, including the benefits of one-piece implants for single tooth gaps’

About the author

Dr Armin Nedjat, dentist, Implantology specialist, Diplomate ICOI Champions-Implants GmbH Bornheimer Landstraße 8 D-55237 Flonheim, Germany Tel.: +49 (0) 67 34 / 91 40 80 Fax: +49 (0) 67 34 / 91 40 80 info@champions-implants.com www.champions-implants.com

S4S
the dental splint specialists

Seminar Offer

NTI-tss - Therapeutic Protocol for Pain Management

One of the most enthusiastic speakers on the subject of pain management. Dr Khaira delivers a course that will be beneficial to every Dental Practitioner. The NTI-tss splint and Therapeutic protocol is a cornerstone of Dr Khairas’ everyday dentistry.

This seminar covers:

• Parafunction & Bruxism
• Occlusion - when it matters and when it doesn’t
• Examination and muscle palpation
• Practical anatomy and physiology
• Pain management for Migraine & headaches with NTI-tss

Fig 13
Fig 14
Fig 15
Fig 16

FREE NTI-tss Starter Kit worth £105 and receive a BOOK NOW FREE NTI-tss Kit worth £105

NEW COURSE for 2012

For online or telephone bookings use Discount code DTR

booking hotline 0114 250 0176
www.s4sdental.com
Ridge preservation and GTR with a xenograft and resorbable collagen membrane

Prof Nart provides a case study

The most predictable way to maintain the width, height and position of the alveolar ridges is to perform ridge preservation at the time of tooth extraction. This procedure requires an intra-socket osseous graft and the use of a membrane and should reduce the morphological changes in alveolar bone (Lekovic et al. 1998; Wang et al. 2004). In a six-month animal study, Araújo and Lindhe demonstrated that the placement of a biomaterial in an extraction socket may modify the remodelling and ridge resorption that occurs following tooth extraction. They observed that there was an average of 55 per cent of ridge resorption in natural healing and only 12 per cent in the grafted sites (Araújo & Lindhe 2009).

The materials and the surgical techniques in use today simplify ridge preservation before implant placement and enable clinicians to ensure the functional and aesthetic outcome of the implants and subsequent restorations more predictably. Various natural and synthetic bone graft materials are available for the clinician to use for ridge preservation. Bone grafts in general are divided into four major categories: autogenous, allografts, xeno grafts and alloplasts. Although the gold standard is the autogenous graft, studies have proven the reliability and functionality of using either an alloplastic xenograft, which avoids the creation of an additional surgical site for bone harvesting. In addition, there is rapid resorption of autogenous grafts, which is much slower with mineralised allografts or xenografts (Artzi et al. 2000; Vence et al. 2004; Imakou 2006).

The use of barrier membranes has become a standard of care in guided bone regeneration and for alveolar ridge preservation and/or augmentation. The membrane excludes fast growing cells – epithelial and connective tissue cells.
- while enabling mesenchymal progenitor cells to proliferate and to differentiate into osteoblasts. When this surgical technique was established initially, membranes made of expanded polytetrafluoroethylene (ePTFE) were used. Although clinical and experimental studies found excellent treatment results using ePTFE membranes, wound healing complications with infection sequelae arose following the exposure of membranes. Therefore, clinicians and researchers have advocated the use of bioabsorbable barrier membranes (Gerris et al. 1995).

There are two main materials used to manufacture bioabsorbable membranes: collagen derived from an animal source and synthetic materials. The ability of collagen to promote progenitor cell adhesion, chemotaxis, homeostasis and physiological degradation, along with its ease of manipulation and low immunogenicity, make it an ideal barrier material (Rothamel et al. 2004).

Successful regeneration is possible, provided that cell exclusion and space maintenance prevails for the time needed for repopulation of the site with progenitor cells. This period may vary between three to 12 months for bone regeneration in edentulous areas. The structural integrity of implanted bioabsorbable barrier membranes needs to be preserved for an adequate period to allow maturation of the newly formed tissue under the membrane-protected space.

The purpose of the present case report is to evaluate clinically and histologically a ridge preservation using a xenograft and resorbable collagen membrane following tooth extraction.

**Case study**

A 40-year-old female patient was selected for this case report. Other than localised periodontal disease around a right temporary mandibular second molar, she had no systemic disease. The patient was referred for extraction of this molar. The reason for the extraction was type III mobility and the radiological image.

**Surgical treatment**

Following administration of local anaesthesia (4 per cent articaine and 0.001 per cent epinephrine), the tooth was elevated and an atraumatic extraction was performed. A full-thickness mucoperiosteal flap was elevated to expose both the labial and the lingual aspects of the alveolar ridge. The extraction socket was then curedtted to remove all the soft tissue. A combined two- and three-walled bony defect of 6 and 5 mm and a fenestration of the buccal plate were observed (Figs 3 & 4).

A ridge preservation technique was performed using a xenograft material and a double layer of resorbable collagen membrane.
the first seven days and 10ml 0.20 per cent chlorhexidine gluconate rinses for 50 seconds twice a day (1-0-1) from the day of the operation until day 14 after surgery was prescribed. A toothbrush with extra soft bristles was recommended from the second week. The patient was advised to avoid chewing on the operated side, and refrain from consuming hot food and drinks for two weeks. A follow-up visit was scheduled for seven days post-treatment, and the sutures were removed after 14 days.

Surgical re-entry for implant placement (at six months follow-up) was observed with an optical microscope at 200 x and 400 x magnification.

Clinical and histological analysis (Figs 14 & 15)

Clinically, xenograft particles were well integrated into the alveolus, and the regenerated area was easily distinguishable from the original bone tissue. The new bone formed was firmly attached to the particles of xenograft. The histological analysis revealed no inflammatory response or fibrous encapsulation of particles of the graft material. All samples showed new bone formation with the newly formed bone strongly adherent to the bone graft particles.

Discussion

The aim of this case report is to evaluate guided bone regeneration after tooth extraction with xenograft material. The use of a bone substitute can avoid bone harvesting from a donor site, thus reducing patient discomfort post-operatively.

In a randomised clinical study, Barone et al. (2008) compared extraction-only treatment to ridge preservation with xenograft (cortico-cancellous porcine bone) and collagen membrane. Seven months after tooth extraction, a greater horizontal width reduction of the residual alveolar ridge (8.1mm versus 6.5mm) in the extraction-only group was observed. A reduction of vertical ridge height was also observed. These findings were in agreement with previous studies (Iasella et al. 2005). Deproteinised bovine bone has proven to be a highly biocompatible and osteo-conductive material that acts as a natural scaffold for bone formation, and has a low

Post-operative care

Clinical and histological analysis revealed no inflammatory response or fibrous encapsulation of particles of the graft material. All samples showed new bone forma-

Following local anaesthesia as described above, a crestal incision was done and a full-thickness flap was raised in preparation for implant placement (Fig 10). A bone biopsy specimen was harvested in the area previously regenerated using a bone trephine drill. Following the biopsy, the planned implant was placed (Figs 11–15). The specimen was fixed in a solution of 10 per cent neutral buffered formalin, then dehydrated in ethanol and embedded in methylmethacrylate resin. Finally, the section was stained with basic fuchsin and toluidine blue, and was observed with an optical microscope at 200 x and 400 x magnification.

The aim of this case report is to evaluate guided bone regeneration after tooth extraction with xenograft material. The use of a bone substitute can avoid bone harvesting from a donor site, thus reducing patient discomfort post-operatively.

The patient was given 600mg ibuprofen every eight hours for the first four days and 500mg amoxicillin every eight hours for the first four days and 500mg amoxicillin every eight hours for the first seven days and 10ml 0.20 per cent chlorhexidine gluconate rinses for 50 seconds twice a day (1-0-1) from the day of the operation until day 14 after surgery was prescribed. A toothbrush with extra soft bristles was recommended from the second week. The patient was advised to avoid chewing on the operated side, and refrain from consuming hot food and drinks for two weeks. A follow-up visit was scheduled for seven days post-treatment, and the sutures were removed after 14 days.

Surgical re-entry for implant placement (at six months follow-up) was observed with an optical microscope at 200 x and 400 x magnification.

Clinical and histological analysis (Figs 14 & 15)

Clinically, xenograft particles were well integrated into the alveolus, and the regenerated area was easily distinguishable from the original bone tissue. The new bone formed was firmly attached to the particles of xenograft. The histological analysis revealed no inflammatory response or fibrous encapsulation of particles of the graft material. All samples showed new bone forma-

Discussion

The use of a bone substitute can avoid bone harvesting from a donor site, thus reducing patient discomfort post-operatively.

In a randomised clinical study, Barone et al. (2008) compared extraction-only treatment to ridge preservation with xenograft (cortico-cancellous porcine bone) and collagen membrane. Seven months after tooth extraction, a greater horizontal width reduction of the residual alveolar ridge (8.1mm versus 6.5mm) in the extraction-only group was observed. A reduction of vertical ridge height was also observed. These findings were in agreement with previous studies (Iasella et al. 2005). Deproteinised bovine bone has proven to be a highly biocompatible and osteo-conductive material that acts as a natural scaffold for bone formation, and has a low
Often times, compromises have to be made when developing impression materials. Because normally the rheological properties of stability and good flow characteristics would stand in each other’s way. DMG’s Honigum overcomes these contradictions. Thanks to its unique rheological active matrix, Honigum yields highest ratings in both disciplines.

We are very pleased to see that even the noted test institute »The Dental Advisor« values that fact: Among 50 VPS Honigum received the best »clinical ratings«.

*  The Dental Advisor,  Vol. 23, No. 3, p  2-5

Table I_Histological and histo-morphometric evaluation of the xenograft as an alveolar bone graft material.

<table>
<thead>
<tr>
<th>Material</th>
<th>Membrane</th>
<th>New bone (%)</th>
<th>Residual particles (%)</th>
<th>Connective tissue (%)</th>
<th>Inflammatory response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artz, 2000</td>
<td>No</td>
<td>46.3</td>
<td>30.8</td>
<td>22.9</td>
<td>Minimum</td>
</tr>
<tr>
<td>Lavee, 2004</td>
<td>Collagen</td>
<td>26</td>
<td>16</td>
<td>–</td>
<td>25% shrink</td>
</tr>
<tr>
<td>Barone, 2003</td>
<td>Collagen</td>
<td>25</td>
<td>20</td>
<td>30</td>
<td>No</td>
</tr>
<tr>
<td>Cardaropoli, 2006</td>
<td>Collagen</td>
<td>25</td>
<td>20</td>
<td>30</td>
<td>No</td>
</tr>
<tr>
<td>Lui, 2009</td>
<td>6-8 Collagen</td>
<td>25-8</td>
<td>25-4</td>
<td>34-1</td>
<td>connective tissue</td>
</tr>
</tbody>
</table>

The rate of resorption (Carmagnola et al. 2005; Barone et al. 2008).

The absence of inflammatory signs around the xenograft particles suggests that this is a safe and biocompatible biomaterial (Barone et al. 2008). Many studies have demonstrated the absence or a minimal amount of inflammatory infiltrate (Cardaropoli & Cardaropoli 2008), but in a clinical and histological study evaluating ridge preservation with xenografts in humans, Vence et al. (2004) observed some histological inflammation, primarily polymorphonuclear neutrophils in the trabecular spaces, in three of 12 treated sockets, at four months. However, there was no clinical inflammation, and all sites had complete soft tissue closure by three weeks. The authors suggest that the inflammation may have been related to resorption of the graft particles.

Overcoming opposites.

The efficacy of a xenograft as an alveolar bone graft material may be the result of a combination of factors: its osteo-conductive capacity, the increase of mineral content in the grafted area necessary for bone formation and its density in order to provide stability to the graft and to persist for many months (Barone et al. 2008; Artzi et al. 2000).

The histological analysis revealed that in all samples there are residual particles of the xenograft, including studies at nine months (Artzi et al. 2000). According to studies, the volume of residual bone graft material may vary between 16 and 50 per cent. The volume of new bone formation varies between 25 and 46 per cent (Table I).

Histological and histo-morphometric studies have observed that the formation of new bone and the resorption of the xenograft particles is a slow and gradual process. In a nine-year study of a sinus elevation with a xenograft, Traini et al. (2007) observed an increase in bone formation over time, a decrease in the narrow spaces and a slow resorption of the biomaterial. Sartori et al. (2003) presented a case of a sinus augmentation with a xenograft and histo-morphometric evaluation after ten years; he observed that the absorption of the xenograft is slow but constant. He saw a resorption of 5.6 per cent per year for the first two years and a significant decrease in the next eight years, with an average rate of resorption of 0.58 per cent per month.

According to several studies, once the xenograft is in contact with mineralised bone, it acts similarly to the host bone, providing a biologic support for dental implants (Haas et al. 1998). The success of implants placed in regenerated areas of up to 40 per cent of xenograft residual particles seems to be similar to those placed in native bone (Carmagnola et al. 2005).

Conclusion

The ridge preservation technique limits hard-tissue resorption following tooth extraction. A xenograft with a resorbable collagen membrane has been proven to be a clinically successful means of restoring a bone defect. The histological examination confirmed the presence of newly formed vital bone almost completely surrounding xenograft particles throughout the biopsy samples.

About the author

Prof. José Nart
Chairman and Programme Director
Department of Periodontology
Universitat Internacional de Catalunya
C/ Josep Trueta s/n 08195 Sant Cugat del Vallés (Barcelona), Spain
Tel: +34 93 504 2030
E-mail: jose@nartperiodoncia.com