John Ley, DDS, Editor

BONE GRAFTING

"Maxillary Sinus Augmentation With Bio-Oss Particles: A Light, Scanning and Transmission Electron Microscopy Study in Man," by G. Orsini, A. Traini, A. Scarano, et al. J Biomed Mater Res Part B: Appl Biomater, 74B:448–457, 2005.

This paper examined the efficacy of using Bio-Oss (Geistlich, Wolhussen, Switzerland) as a graft material to augment the maxillary sinus. Twelve patients were included in the study. Six patients received unilateral sinus lifts, and 6 received bilateral sinus lifts. In all cases, the sinuses were augmented using the traditional lateral wall approach. The Bio-Oss was premixed with sterile saline and packed into the sinus cavity. Any sinus membrane tears were repaired with a collagen membrane, and prior to soft-tissue closure the graft material was covered with a collagen membrane. Implants were placed after healing for a minimum of 6 months. At the time of implant placement, 18 bone cores were obtained with the use of a trephine drill from the crestal bone. After preparation, the bone cores were examined using light microscopy, scanning electron microscopy (SEM), and transmission electron microscopy (TEM). Light microscopy indicated that the Bio-Oss particles were mostly surrounded by newly formed compact bone. Some particles were surrounded with biologic fluids and marrow spaces. SEM analysis demonstrated a close association between the Bio-Oss and the surrounding bone. In some small areas, a space was noted between the particles and surrounding bone. The particles were surrounded by woven and lamellar bone. The TEM study demonstrated that the majority of the Bio-Oss particles were surrounded by newly deposited bone in all phases of healing with little inflammatory reaction. The particles of Bio-Oss demonstrated an electron dense layer (cement lines) on their perimeter with the surrounding bone. The study demonstrated that Bio-Oss particles allow bone healing within the grafted sinus.

"Influence of Platelet-rich Plasma Added to Xenogenic Grafts on Bone Mineral Density Associated With Dental Implants," by A. Sanchez, S. Eckert, P. Sheridan, A. Weaver. J Oral Maxillofac Impl, 20:526–532, 2005.

This study examined the efficacy of using platelet-rich plasma (PRP) in the repair of periimplant defects in a dog model. Nine dogs had their second, third, and fourth premolars and first molar extracted bilaterally. After 2 months of healing, implant osteotomies were performed in the edentulous areas, and prior to implant placement, standardized 3-walled defects were created at the mesial and distal of each osteotomy. After implant placement, the defects were treated in one of three ways: demineralized freeze-dried bone (DFDB) with PRP, DFDB alone, or no graft. The animals were killed in groups of three at 1, 2, and 3 months postsurgery. The analysis of the bone healing was accomplished by comparing bone mineral density (BMD) and bone mineral content (BMC) at the healed defect sites. The results indicated that BMD and BMC increased with increased healing times. At 3 months, the DFDB sites had significantly greater BMD than nongrafted sites. The addition of PRP made no significant difference. These results suggested that PRP had no effect on the bone healing in this animal model. The limited numbers employed was a shortcoming of the study.

ENDOSSEOUS IMPLANTS

"Interface Reaction at Dental Implants Inserted in Condensed Bone," by A. Buchter, J. Kleinheinz, H. Weismann, et al. Clin Oral Impl Res, 16:509–517, 2005.

This study examined the effect of using an osteotome technique to prepare an implant osteotomy on the bone-implant contact. Eight minipigs had 64 implants inserted into their tibia. Two treated groups were tested in each animal. Group A had the implant osteotomy prepared by a conventional drill technique. Group B had the implant osteotomy prepared by first drilling with a pilot drill and then expanding the osteotomy with the use of progressively larger osteotomes. The animals were killed at either 7 or 28 days postplacement. The results indicated that at 7 days there was no significant difference between the 2 groups. At 28 days, the bone to implant contact was significantly greater in Group A. The authors postulated that the ostoetome technique significantly decreased the blood supply and thus healing in the surrounding bone. In addition, compression by osteotomes caused microfractures in the bone. Because of the negative effect of the osteotome

technique on bone to implant contact, the authors stated that early loading procedures should be avoided when this technique is employed.

"Effect of Immobilized Bone Morphogenic Protein 2 Coating of Titanium Implants on Peri-implant Bone Formation," by H. Schliephake, A. Aref, Scharnweber, et al. Clin Oral Impl Res., 16:563–569, 2005.

This study examined the effect of adding bone morphogenic protein 2 (BMP2) to an implant surface. Ten dogs were used in the study. Three types of implant surfaces were studied on specially designed screw type root form implants: titanium implants with a smooth machined surface (group 1), implants with a collagen 1 coating (group 2), and implants with a collagen 1 and chondroitin sulphate (CS) coating to which BMP2 was applied (group 3). The CS was employed to aid in binding the BMPs to the implant surface. All mandibular premolars were extracted, and after 3 months of healing, implants were inserted. Half of the animals were killed after 1 month of healing, and the remaining animals were killed at 3 months. The bone surrounding the implants was analyzed for bone-to-implant contact (BIC) and volume density (BVD). After 1 month of healing, there was no significant difference in BIC between the 3 groups, but BVD was higher in the 2 coated groups. There was no significant difference between the 2 coated groups. At 3 months, there was significantly higher BIC and BVD in the 2 coated groups. There was no significant difference between the 2 coated groups. The conclusion of the paper was that collagen coating increased BIC and BVD at the peri-implant interface. The addition of BMP2 did not further enhance bone formation.

"Predisposing Conditions for Retrograde Peri-implantitis, and Treatment Suggestions," by M. Quirynen, R. Vogels, G. Alsaadi, et al. Clin Oral Impl Res. 16:599–608, 2005.

This is a retrospective study that examined the incidence and potential causes of retrograde peri-implant infections. All single-teeth implants (426 in the maxilla, and 113 in the mandible) placed at a single clinic were examined for the incidence of retrograde peri-implantitis. Several variables were then examined: patient factors (age, health), recipient site factors (local bone quality and quantity, cause of tooth loss), periodontal and endodontic status of surrounding teeth, implant factors (length, surface properties), and surgical factors (use of guided bone regeneration, dehiscence, and fenestration). All implants that had retrograde peri-implantitis were also followed for the efficacy of any method employed to treat the problem. A total of 426 implants were placed in the maxilla, and 113 were placed in the mandible. All implants were Branemark (Nobel Biocare, Gothenburg, Sweden) of a machined surface or TiUnite surface. Seven implants (1.6%) in the maxilla and 3 implants (2.7%) in the mandible suffered from retrograde peri-implantitis. The incidence of retrograde peri-implantitis was significantly higher in implants with a rough surface (TiUnite). The TiUnite implants had a lower overall failure rate compared with the machined surface implants. The incidence of retrograde infections was correlated with endodontic pathology present in the teeth extracted prior to implant placement or in teeth adjacent to the implant placed. There was no other correlation to the incidence of these retrograde infections. The apical lesions were treated with curettage of the defect and placement of a bone substitute. This treatment was more successful in the maxilla. The authors concluded that retrograde peri-implantitis is provoked by remnants of scar or granulomatous tissue in the host bone or endodontic pathology from adjacent teeth.