

John Ley, DDS, Editor

BONE GRAFTING

"Histologic evaluation of mineralized and demineralized freeze-dried bone allograft for ridge and sinus augmentations," by G. Cammack, M. Nevins, D. Clem, et al. *Int J Periodontics Restorative Dent*, 25:231–237, 2005.

This retrospective study compared the bone formation of mineralized freeze-dried bone allograft (FDBA) and demineralized freeze-dried bone allograft (DFDBA) when used for both ridge and sinus augmentation. A total of 93 patients had either ridge augmentation or sinus augmentation to facilitate implant placement. Core biopsy specimens were obtained with the use of a trephine drill 6 to 36 months after augmentation. A total of 21 sites were augmented with demineralized bone and 72 were augmented with mineralized bone. All samples were analyzed histologically and histomorphometrically. The results indicated that FDBA and DFDBA had 41.89% and 41.74% new bone formation, respectively. These differences were not statistically significant. In the ridge augmentation sites, the DFDBA samples had significantly less residual graft present compared with the FDBA samples. Interestingly, there was no correlation between graft age and the amount of bone formation. These results suggest that DFDBA and FDBA have similar bone-forming capabilities. A shortcoming of the study was the low number of sites grafted with DFDBA compared with FDBA.

"Clinical case reports of injectable tissue-engineered bone for

alveolar augmentation with simultaneous implant placement," by M. Ueda, Y. Yamada, R. Ozawa, Y. Okazaki. *Int J Periodontics Restorative Dent*, 25:129–137, 2005.

This study examined the efficacy of using tissue-engineered bone for alveolar bone augmentation. The tissue-engineered bone or "injectable bone" used in this study was composed of mesenchymal stem cells (MSCs), platelet-rich plasma (PRP), and β -tricalcium phosphate (TCP). The MSCs act as the morphogenesis factor in bone formation. The PRP acts as a source of growth factors, and the TCP acts as a biocompatible scaffold or carrier for the MSCs/PRP mixture. This study used this injectable bone in 6 edentulous patients. Three of the patients required sinus lift procedures, and 3 required alveolar ridge augmentation. The MSCs were obtained using aspirates from the patient's own iliac crest and prepared using a previously reported method. Combining the MSCs with the PRP and the TCP resulted in a graft that could be injected into sites as needed. The sinus lift procedures were combined with immediate implant placement. The ridge augmentation procedures were accomplished by first placing 15-mm root form implants into the residual ridge such that a significant portion of the implant was exposed. The exposed threads were covered by the injectable bone graft, and this was then covered by a titanium membrane and the tissues were closed in a tension-free manner. The implants were uncovered 4 to 6 months after placement. The results indicated that all the im-

plants were successful at the second-stage surgery and surrounded by hard bonelike material. Six months after prosthetic loading, the prostheses were removed and the implants demonstrated stability with bone resorption of 1.5 mm or less. Radiographic analysis demonstrated calcification of the graft with no delineation between the graft and the host bone. Two case reports were presented, illustrating the sinus and ridge grafting procedures. These results suggest that the tissue-engineered bone used in this study holds promise as an autogenous bone substitute. A shortcoming of the study was the lack of any controls and histologic analysis.

"Analysis of rat calvarial defects implanted with a platelet-rich plasma preparation: histologic and histomorphometric observations," by M. Pryor, G. Polimeni, K. T. Koo, et al. *J Clin Periodontol*, 32:966–972, 2005.

This study examined the bone-forming capabilities of platelet-rich plasma (PRP) in an animal model. Thirty rats had 6-mm round critical-sized defects created bilaterally in their calvaria. In 18 of the animals, one of the defects was grafted with an absorbable collagen sponge (ACS) and the other was grafted with ACS soaked in PRP. In the other 12 rats, one defect was grafted with ACS and the other was left alone. The animals were killed 4 and 8 weeks after surgery. The calvaria were subjected to histologic and histomorphometric analysis. The results indicated that the PRP had no significant influence on the histologic appearance of defect healing or the

amount of bone formation. The conclusion of the study was that PRP had limited potential to promote bone formation in this animal model.

“Does platelet-rich plasma promote remodeling of autogenous bone grafts used for augmentation of the maxillary sinus floor?”
by G. Raghoebar, J. Schortinghuis, R. Liem. *Clin Oral Implants Res*, 16:349–356, 2005.

This article evaluated the effect of platelet-rich plasma (PRP) on the healing of autogenous bone grafts placed into the maxillary sinus. Using a lateral wall approach, bilateral sinus grafts were performed using iliac crest bone in 5 consecutively treated patients. In one side PRP was added to the graft and applied to the soft tissues at wound closure. After at least 3 months of healing, bone biopsy specimens were obtained using trephine drills at 3 locations: canine, first premolar, and first molar. At this time, root form implants were placed (30 total). The core samples were subjected to analysis by microradiography, histology, and histomorphology. In addition, the patients' blood was analyzed for any increase in the level of transforming growth factor (TFG) immediately after grafting. The results indicated that PRP application had no influences on the serum levels of TFG. One non-PRP side experienced minor wound breakdown in the first week after surgery. This was managed with chlorhexidine rinses and healed in 2 weeks. At the time of prosthesis construction, one PRP side implant was noted to be mobile and was removed. All patients received implant overdentures and were functioning well at follow-up (20.2 ± 4.3

months). The microradiography and histologic analysis demonstrated no significant differences between the 2 sides. The conclusion of the study was that PRP had no influence on the healing of autogenous grafts in this patient population. Additional studies with more patients would be beneficial in the future.

IMPLANT PROSTHETICS

“Microbiological and clinical outcomes and patient satisfaction for two treatment options in the edentulous lower jaw after 10 years of function,” by M. Quirynen, G. Alsaadi, M. Pauwels, et al. *Clin Oral Implants Res*, 16:277–287, 2005.

This study compared clinical and microbiological parameters in 2 groups of edentulous patients receiving 2 different implant-supported prosthesis types in the mandible at least 10 years previously. Group 1 consisted of 25 patients who had implant overdentures supported by 2 root form implants. A bar, individual magnet, or ball-type abutments retained the prostheses. Group 2 consisted of 12 patients with full fixed prosthesis (FFP). Both groups received the same type of implants. The groups were compared for clinical parameters (plaque index, bleeding tendency, probing pocket depth, soft tissue recession, attachment level), radiologic bone levels, microbiologic composition of subgingival plaque, and patient satisfaction. The results were compared statistically. The results indicated that the clinical and radiologic parameters were similar for both groups. The bacterial content of the subgingival plaque was similar in both groups. The total amount of bacteria found was significantly less than that found

in an ongoing study of implant prostheses in partially edentulous patients. This demonstrated that natural teeth serve as a reservoir for bacteria to colonize implants. The composition of the bacteria demonstrated the presence of periodontal pathogens not commonly found in fully edentulous patients (*Porphyromonas gingivalis* and *Actinobacillus actinomycetemcomitans*). This finding is different from that found in other studies. The patient satisfaction questionnaires indicated that patients with the FFPs were more satisfied in chewing comfort and general satisfaction. Both groups displayed high levels of satisfaction. These results indicate that both treatment modalities provide successful long-term results.

ENDOSSEOUS IMPLANTS

“Immediate versus delayed loading of dental implants in the maxillae of minipigs: follow-up of stability and implant failures,” by E. Nkenke, B. Lehner, M. Fenner, et al. *Int J Oral Maxillofac Implants*, 20:39–47, 2005.

This study compared the stability of implants loaded at different times after placement in an animal model. Twelve minipigs had their maxillary premolars and first molars removed bilaterally in the maxilla. After 3 months of healing, 6 implants were placed bilaterally in 9 animals (3 died after tooth removal). One side had the implants placed into osteotomies prepared by drills, and the other had the implants placed into osteotomies prepared by osteotomes. Placement torque was measured at insertion of the implants. A minimum placement torque of 15Ncm was required. One implant that did not meet this requirement was replaced by

a wider diameter implant. Implants were loaded by provisional prostheses immediately after placement or at 1, 2, 3, 4, or 5 months after placement. Those implants not restored immediately were treated with a 2-stage surgical protocol. Implant stability was assessed at placement, uncover (if applicable), and 6 months after loading by resonance frequency analysis. For statistical analysis, implants loaded after 1, 2, and 3 months were pooled into one group, and implants loaded at 4 and 5 months were pooled into another group. The results demonstrated no differences in initial implant stability and in the technique used to prepare the osteotomy. Implant stability decreased 1 to 3 months after placement and increased after a healing period of 4 and 5 months. In implants placed using the osteotome technique, 6 of 12 immediately loaded implants, 18 of 24 implants loaded after 1 to 3 months of healing, and 1 of 18 implants loaded after 4 to 5 months of healing failed. In those implants placed into sites prepared by drills, 7 of 12 immediately loaded implants, 12 of 24 implants loaded after 1 to 3 months of healing, and 2 of 18 loaded after 4 to 5 months of healing failed. There was no difference between the failures at immediate loading and those

loaded at 1 to 3 months for either placement technique. There was no correlation between placement torque of the implants and later failure. This contradicts the advice by some that suggests immediate loading should occur only in implants with high placement torque values. This study also failed to show any advantage to the use of osteotomes for implant site preparation. The conclusion of the study was that early and immediate loading had comparable (high) failure rates. Implants left for 4 months or longer before loading had increased survival rates.

"Single preoperative dose versus long-term prophylactic antibiotic regimens in dental implant surgery," by A. Binahmed, A. Stoykewych, L. Peterson. Int J Oral Maxillofac Implants, 20:115-117, 2005.

This is a prospective study that compared 2 different regimens of antibiotic prophylaxis on implant success rates. The first group consisted of 125 patients in which a single preoperative antibiotic dose was given before implant placement. The second group consisted of 90 patients in which the preoperative dose was followed by 7 days of antibiotics after implant placement. Both

groups also received a 1-minute preoperative rinse of 0.12% chlorhexidine. The preoperative antibiotic was either 1 000 000 U of intravenous penicillin G or 600 mg of intravenous clindamycin (in penicillin-allergic individuals). In the second group, the postoperative regimen was either penicillin V, 300 mg 4 times daily, or clindamycin, 150 mg 3 times daily. In the first group, 445 implants were placed. Wound dehiscences occurred in 3 patients, and no sign of infection was apparent in any patient. At stage 2 surgery, all implants were osseointegrated and later restored. In the second group, 302 implants were placed. Three patients developed wound dehiscence and infection was noted in one patient, which was treated with a further course of antibiotics. At stage 2 surgery, all implants were noted to be integrated; however, one implant was removed before prosthetic construction because of mobility and bone loss. No significant difference occurred between these 2 groups. No analysis of crystal bone levels or any other objective criteria was listed in the article. The conclusion of the article was that a single preoperative dose of antibiotics was as effective as a preoperative dose followed by a week-long postoperative course of antibiotics.