John Ley, DDS, Editor

REVIEWS

"Atraumatic teeth extraction in bisphosphonate-treated patients" by Regev E, Lustmann J, Nashev R. J Oral Maxillofac Surg. 2008;66:1157–1161.

This paper presents an alternate technique for extracting hopeless teeth in patients with a risk of osteonecrosis of the jaw (ONJ). Ten patients who had been taking bisphosphonates and had nonrestorable teeth (15 in total) were included in the study. The technique employed involved placing an orthodontic elastic band around the cervical portion of the tooth in order to place extrusion forces on the tooth, thus exfoliating the tooth. Teeth with multiple roots were sectioned into individual roots and bands were placed on each portion, for a total of 21 roots. The bands were changed on a weekly basis and as the teeth erupted beyond the plane of occlusion the teeth were adjusted. Six mandibular molars were treated endodontically prior to sectioning. The mean time for exfoliation was 5.8 weeks with a range of 2–14 weeks. No antibiotics were given during treatment and all sockets demonstrated full soft tissue coverage within 2 weeks after the tooth was removed. In up to 9 months of follow-up there was no evidence of ONJ. This technique may prove valuable for patients with a higher risk of ONJ. Conical roots were only deemed to be acceptable for this technique.

"Cell based bone tissue engineering in jaw defects" Meijer G, de Bruijn J, Koole Blitterswijk C. Biomaterials. 2008;29:3053–3061.

This paper reported on the use of tissue engineering to effect repair of ridge defects prior to dental implant placement. Six patients with various ridge defects were reported on in this study. The bone constructs were fabricated by first obtaining bone marrow from each patient's iliac crest. From these bone marrow aspirates, human mesenchymal stem cells (HMCSs) were cultured in the laboratory in order to expand the number of cells. The osteogenic capability of the cells was checked with use of alkaline phosphatase staining. The HMCSs were then seeded on hydroxyapatite particles (HA). Some of the cultured HA particles were implanted subcutaneously into 2 mice for each patient to confirm the osteogenic nature of the grafts. The remaining particles were used for augmentation in each patient. Two of the patients had the HA particles used for sinus augmentation and the other 4 were used for ridge augmentation. After 4 months of healing, the sites were opened and implants were placed in a two stage fashion. At the time of implant placement, biopsies were taken at the implant sites with a small diameter trephine drill. The bone was allowed to heal around the implants for 3 months in the mandible and 6 months in the maxilla prior to uncovery. The patients were then followed at 3 month intervals up to 15 months after graft implantation. The results indicated that the HMCSs were osteogenic with the alkaline phosphatase test. The cultured HA particles demonstrated new bone formation in each mouse transplanted. A total of 11 implants were placed in the 6 patients. One implant failed and all patients were restored with a fixed prosthesis. There was no significant bone loss over the observation period. The biopsies of the implanted graft material demonstrated bone formation in only 3 of the patients. Furthermore the tissues suggested that for the most part the majority of bone formation in the implanted graft material was by osteoconduction and not osteogenesis. These results suggest that the graft constructs made in this study did not act in a predictable manner resulting in osteogenic bone formation in only 1 of 6 patients.

"The mucosal barrier at implant abutments of different materials" Welander M, Abrahamsson I, Berglundh T. Clin Oral Impl Res. 2008;19:635–641.

This study compared the stability of the mucosal tissues adjacent to implant abutments of different materials. Six dogs had their maxillary and mandibular premolars extracted. After 3 months of healing, 4 implants were placed on one side of the mandible in one stage fashion, using healing abutments. After 1 month of healing, the healing abutments were removed with abutments made of Titanium (Ti), zirconium (ZrO_2) or cast gold alloy (AuPt). The abutments were left for 5 months during which time a plaque control routine was initiated. Three months after implant placement surgery, the same process was repeated on the other side of the mandible. Two months later the animals were killed and subjected to analysis. The results indicated that the dimensions of the epithelium and connective tissue remained stable between the 2 and 5 month healing period adjacent to the Ti and ZrO_2 abutments. The cast abutments displayed apical migration of tissues in most sites. Similar results were evident in bone levels where the cast abutments demonstrated bone loss. The composition of the connective tissue adjacent to the cast

abutments demonstrated less collagen and fibroblasts and greater leukocytes compared to the other abutments. The authors concluded healing adjacent to Ti and ZrO_2 abutments is different to cast gold alloy abutments.

"Orthotopic bone formation in titanium fiber mesh loaded with platelet rich plasma in segmental defects" Kroese-Deutman H, Vehof J, Spauwen P, et al. Int J Oral Maxillofac Surg. 2008;37:542–549.

This paper used a rabbit model to examine the effect of platelet-rich plasma (PRP) on the healing of segmental bone defects. Eighteen rabbits had a bilateral segmental defect created in the radius. The bone obtained was used as graft materials by grinding the bone in a bone mill. The rabbits were then split into 3 groups of 6. In group 1 the defects were grafted with a titanium mesh tubes with PRP and the bone chips. In group 2 the defects were grafted with titanium mesh and bone chips. In group 3 the area was just grafted with the titanium alone. PRP was prepared using a standardized process and platelet concentrations were confirmed prior to grafting. After 12 weeks the animals were killed and the grafted areas subjected to analysis. The results indicated that the PRP group had the highest bone formation. The two other groups had similar bone levels. The authors concluded that the PRP aided in bone formation. The titanium mesh was deemed to be a good scaffold material to effect bone formation.

"Lateral ridge augmentation using particulated or block bone substitutes biocoated with rhGDF-5 and rhBMP-2: an immunohistochemical study in dogs" Schwarz F, Rothamel D, Herten M, et al. Clin Oral Impl Res. 2008;19:642–652.

This study examined the effect of applying 2 different growth factors, growth differentiating factor 5 (rhGDF-5) and bone morphogenetic protein 2 (rhBMP-2), to xenografts used for lateral ridge augmentation in a dog model. Eight dogs were employed. In each quadrant the second, third, and fourth premolars and first and second molars were extracted. After this standardized box defects were created leaving the lingual plates intact. After 2 months of healing, the defects were grafted with one of the following: particulated graft (BOG) alone (BioOss, Gestlich, Wolhusen, Switzerland), block graft (BOB) (BioOss) alone, BOG and BOB coated with rhBMP-2 or rhGDF-5. The blocks were fixated with a bone screw. All sites were covered with a collagen membrane. The dogs were killed at 3 and 8 weeks post grafting. The results indicated that coating the BOG with rhBMP-2 resulted in significantly higher new bone fill and mineralization at 3 and 8 weeks compared to controls. The BOG coated with rhGDF-5 had higher levels compared to controls but these levels were not significant. BOB did not demonstrate significantly higher new bone or mineralization at 3 weeks but demonstrated significantly higher levels in both rhBMP-2 and rhGDF-5 coated grafts compared to controls at 8 weeks. The authors concluded that coating the graft material with rhBMP-2 and rhGDF-5 effect bone formation in a positive way. The block and particulate grafts demonstrated different responses to the two growth factors.