John Ley, DDS, Editor

Bone Grafting

"Repair of the Perforated Sinus Membrane With a Resorbable Collagen Membrane: A Human Study," by P. Proussaefs, J. Lozada, J. Kim, M. Rohrer. Int J Oral Maxillofac Implants, 19:413–420, 2004.

This study examined the efficacy of using collagen membranes to repair perforated sinus membranes during sinus lift procedures. Twelve patients received bilateral sinus augmentations with a split-mouth design and the lateral wall approach. In each patient, 1 sinus membrane had been accidentally perforated, but the other was intact. The perforated sinus membrane was repaired with a resorbable collagen membrane. Both sides were grafted with the same materials. The grafts were either xenograft alone or combined with demineralized freeze-dried bone allograft. The grafted sinuses were then allowed to heal for 6 to 16 months before implant placement. At implant placement, a biopsy was taken with a trephine drill. The results indicated that all grafted sites healed without complication. The perforated sites (PS) generally demonstrated poorer bone quality (type 3 or 4) compared with the nonperforated sites (NPS) (mostly type 2 with a few type 3). In 2 PS, the bone did not allow adequate primary stability for implant placement, resulting in fewer implants placed than were planned. Radiographically, the PS were more radiolucent with areas of graft extending beyond the barriers of the grafted sites. At the second-stage surgery, the implant survival rate was 100% for the NPS and 69.56% for the PS. Histologic examination of the PS demonstrated large amounts of connective tissue formation. The NPS demonstrated new bone formation in tight contact with the grafted material. Histomorphometric analysis revealed that the NPS had 33.58% ± 7.45% bone formation. The PS had 14.17% ± 7.06% bone formation. These results suggest that perforating the sinus membrane during a sinus lift procedure negatively affects graft quality and implant survival.

"Smoking and Complications of Onlay Bone Grafts and Sinus Lift Operations," by L. Levin, R. Herzberg, E. Dolev, D. Schwartz-Arad. Int J Oral Maxillofac Implants, 19:369–373, 2004.

This study examined the effects of smoking on the incidence of complications after onlay bone graft (OBG) and sinus lift (SL) operations. The authors divided the data from 143 operations (64 OBG and 79 SL) into 3 groups: nonsmokers, mild smokers (up to 10 cigarettes per day), and heavy smokers (more than 10 cigarettes per day). In addition, the duration that a patient had been smoking (less or more than 10 years) was also noted. The complications from the OBG operations were categorized as either minor (hematoma, swelling, inflammation, temporary parasthesia) or major (graft exposure or mobility). The complications for the SL operations included perforation of the membrane and postoperative complications such as swelling, acute or chronic infection, and bleeding. Twelve of the 64 OBG operations were performed on smokers, and 30 of 79 SL operations were performed on smokers. The results indicated that in the OBG operations, complications occurred in 50% of smokers and in 23.1% of nonsmokers. One third of the smokers had major complications compared with 7.7% of the nonsmokers. Both of these differences were statistically significant. The duration of smoking did not have a significant effect. No significant difference was found in the incidence of complications in the SL operations. These results suggest that smoking plays a negative role in OBG but not in SL operations.

"Efficacy of Platelet-Rich Plasma in Alveolar Bone Grafting," by T. Oyama, S. Nishimoto, T. Tsugawa, F. Shimizu. J Oral Maxillofac Surg. 62:555–558, 2004.

This is a clinical study of the efficacy of using platelet-rich plasma (PRP) in combination with autogenous bone (obtained from the iliac crest) in the repair of alveolar cleft defects. Twelve patients were included in the study. Seven of the patients had the autogenous bone mixed with PRP before the alveolar cleft was grafted. The remaining 5 patients (controls) had the cleft grafted with autogenous bone mixed with fibrin glue. The radiographic size of the defect was mapped preoperatively and compared with the amount of regeneration of the defects with computerized tomograms obtained 5 to 6 months after grafting. The average volume of regenerated bone in the PRP groups was 80.19% ± 6.77%. The average volume in the control patients was 63.67% ± 13.94%, which was significantly less. These results suggest that PRP is beneficial when combined

with autogenous bone in the correction of alveolar clefts; however, the low numbers of patients in this study limits the study's relevance.

Root-Form Implants

"The Use of Short, Wide Implants in Posterior Areas With Reduced Bone Height: A Restrospective Investigation," by T. Griffin, W. Cheung. J Prosthet Dent, 92:139–144, 2004.

This retrospective study examined the efficacy of using short, wide-diameter (6 mm wide × 8 mm long), hydroxyapatite (HA), screw-shaped root-form implants. A total of 168 implants were consecutively placed into the first and second molar regions of the maxilla and mandible in 167 patients. The implants were placed in a 2-stage procedure. In some maxillary cases where the bone height was 6 to 8 mm, an osteotome-aided sinus lift was performed to lift the sinus floor. In the mandible, these situations were treated by leaving the implant 1 to 2 mm supracrestally, and the crest was grafted with autogenous bone harvested during the osteotomy preparation. The implants were restored with an occlusal scheme that avoided working and nonworking contacts. Implant success was assessed with clinical and radiographic parameters from previously published guidelines. The implants and restorations (single-tooth restorations and fixed partial dentures) were followed 6 months after loading and every 2 years afterward. The mean follow-up period was 34.9 ± 13.4 months postloading with the final restoration. All implants were deemed to be successful according to the pre-established criteria. This study suggests that short, wide-diameter, HA, screw-shaped root-form implants can be used successfully.

Subperiosteal Implants

"A Descriptive 18-Year Retrospective Review of Subperiosteal Implants for Patients With Severely Atrophied Edentulous Mandibles," by D. Moore, P. Hansen. J Prosthet Dent. 92:145–150, 2004.

This retrospective study examined the success of 40 tripodal mandibular subperiosteal implants placed in 40 patients in the years between 1982 and 2000 at the University of Missouri–Kansas City School of Dentistry. The majority of the frameworks (38 of 40) were made by the traditional bone-impression method of model fabrication. The remaining 2 frameworks were fabricated on bone models obtained by computerized tomography and stereolithography. All the implants were made at 1 dental lab of surgical-grade vitallium. In all cases the implants were restored with an o-ring–retained mandibular overdenture. The implants were examined radiographically and clinically for stability, movement, inflammation, and exposure of the framework. In addition, patients were asked if the implants had met their expectations. Of the 40 patients, 39 were available for evaluation in this study. The results indicated that none of the implants were mobile. Radiographic examination revealed no bone loss or movement of the implants. One patient, who developed diabetes, had inflammation around the permucosal struts. Subjectively, the patients were satisfied and would elect to have the procedure done again. These results demonstrate the long-term efficacy of the sometimes-maligned modern mandibular subperiosteal implant.

Implant Prosthodontics

"A Comparison of the Porcelain Fracture Resistance of Screw-Retained and Cement-Retained Implant-Supported Metal-Ceramic Crowns," by E. Torrado, C. Ercoli, M. Mardini, et al. J Prosthet Dent. 91:532–537, 2004.

This in vitro study examined the porcelain fracture resistance of cement- and screw-retained implant-supported porcelain fused to metal crowns. Four groups of 10 copings were fabricated on an implant abutment. Group 1 (screw retained) had a buccolingual width of 5 mm and a screw access hole in the center of the occlusal surface. Group 2 (screw retained) were identical to Group 1 with the exception that the screw access hole was offset 1 mm toward the buccal cusp. Group 3 (cement retained) had a buccolingual width of 5 mm. Group 4 (cement retained) had a reduced buccolingual width of 4 mm. All copings had porcelain placed in a standard fashion to thickness of 1.2 mm. Afterward, the crowns were attached to a 3.75- × 10-mm implant fixed into a stainless-steel base. The crowns were then tested in a custom testing apparatus for fracture resistance to a vertical load. The results indicated that the 2 screw-retained groups required a significantly lower force before porcelain failure compared with the cement-retained groups. No difference was between groups 1 and 2 and groups 3 and 4. These results suggest that screw-retained implant-supported crowns will have a greater rate of porcelain fracture compared with their cement-retained counterparts. Reduction of the occlusal

buccolingual width did not affect porcelain fracture resistance in cement-retained crowns.

BASIC SCIENCE AND RESEARCH

"The Effect of Alendronate on Resorption of the Alveolar Bone Following Tooth Extraction," by H. Altundal, O. Guvener. Int J Oral Maxillofac Surg. 33:286–293, 2004.

This study examined the efficacy of a bisphosphonate drug, alendronate, on preventing alveolar bone loss after tooth extraction in an animal model. Bisphosphonates are a class of drugs that aid in the prevention of bone loss in patients with conditions such as osteoporosis. In this study, 60 male rats were placed into 3 groups: baseline group, saline-treated group, and alendronate-treated group. The saline- and alendronate-treated groups were further categorized into 14-day follow-up and 28-day follow-up groups. All the rats had their mandibular first molars extracted under general anesthesia. The rats in the baseline group were killed immediately after extraction. The 2 alendronate-treated groups were administered 0.25 mm/kg alendronate daily for 14 or 28 days before sacrifice. The saline-treated groups were administered saline daily for 14 or 28 days before sacrifice. Before sacrifice, levels of urinary calcium, creatinine, serum calcium, alkaline phosphatase, and phosphate were obtained. All mandibles were removed and examined for bone levels and osteoclast and osteoblast activity. The results indicated that the alendronate-treated groups had significantly lower levels of urinary calcium, creatinine, serum calcium, and alkaline phosphatase at both 14 and 28 days compared with the saline-treated groups. Histologically, the alendronate-treated group had significantly less osteolclastic activity at 14 and 28 days. Significantly thicker buccal alveolar bone was in the alendronate-treated groups at 14 and 28 days. The lingual bone was found to be significantly thicker at 28 days (but not at 14 days) in the alendronate-treated group. These results demonstrated that alendronate suppressed alveolar bone resorption after tooth extraction in the rat model.

SPECIAL REPORT

"Osteonecrosis of the Jaws Associated With the Use of Bisphosphonates: A Review of 63 Cases," by S. Ruggiero, B. Mehrotra, T. Rosenberg, S. Engroff. J Oral Maxilofac Surg. 62:527–534, 2004.

This retrospective paper examined the correlation between bisphosphonate use and osteomyelitis of the jaw. Bisphosphonates are a class of drugs that aid in the prevention of bone loss in patients with conditions such as osteoporosis. In addition, they have been used to reduce the symptoms and complications in patients with metastatic bone tumors. The authors had noted an increasing number of patients who were referred for the treatment of refractory osteomyelitis. The authors reported on 63 such cases between February 2001 and November 2003. Up to that point, usually 1 or 2 cases presented per year. All the patients had been taking bisphosphonates by either oral or intravenous routes for at least 1 year. None of the patients had received radiation therapy to the affected jaws. The majority of the patients (56 of 63) were undergoing chemotherapy for various malignancies. The other 7 patients had no history of malignancy or chemotherapy and had been prescribed bisphosphonates for osteoporosis. The typical presentation was a nonhealing extraction socket or exposed jawbone progressing to sequestrum formation, localized swelling, and purulent discharge. The majority of the patients had a recent tooth extraction or another dentoalveolar procedure. Fourteen percent had no history of a recent dentoalveolar procedure and had spontaneous exposure and necrosis of the alveolar bone. The lesions presented in both the maxilla and the mandible. Radiographically, the lesions showed regions of mottled bone consistent with sequestrum formation. Histologic examination revealed necrotic bone with bacterial debris and granulation tissue. Culture revealed normal oral flora. Conservative treatment of these lesions usually proved inadequate, with the majority of patients requiring resections of the involved bone (either partial or complete). The authors postulated that bisphosphonates, because of their antiosteoclastic effect, affect normal bone remodeling and healing. Also, bisphosphonates have been demonstrated to decrease the blood circulation in bones. The authors discuss the possible deleterious effects on osseointegration that could occur in patients undergoing long-term bisphosphonate therapy, and they recommend clinicians be aware of these potential complications in any patients who are using bisphosphonates chronically. Early intervention may prevent the incidence of the more destructive advanced lesions.