Composite bone graft for treatment of osseous defects after surgical removal of impacted third and second molars: case report and review of the literature

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The aim of this case report was to evaluate the clinical and radiographic measurements of mandibular first molar bone support after mandibular third and second molar extraction and immediate augmentation of the extraction site with a combined autogenous bone graft with Bio-Oss materials. A pyramidal full-thickness mucoperiosteal flap with 1 distal releasing incision was used for removal of impacted third and second molars. During the procedure, autogenous bone graft was collected with a bone trap and then combined with Bio-Oss materials. The osseous defects distal to first molar and extraction site was filled with the composite bone graft and covered with Bio-Gide membrane. After 1 year, there was a successful defect regression and gain of bone and clinical attachment level. Moreover, there was a reduction of probing pocket depth and gingival inflammation. From the results of this study, it can be concluded that grafting of osseous defects and extraction site with autogenous bone graft combined with Bio-Oss materials will predictably result in a decreased risk of developing a periodontal defect on the distal aspect of mandibular first molar.
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Managing impacted teeth in adults is considered a risk for persistent or new periodontal defects on the distal aspect of the mandibular second molars after the extraction of mandibular third molars. Clinical investigations, however, have shown that surgical removal of impacted mandibular third molars may result in intrabony defects at the distal aspect of the second molar.[1-6] In a retrospective study comprising 215 patients, Kugelberg et al. (1985)[5] found that 2 years after surgery, 43.3% of the cases exhibited probing pocket depths >7 mm and 32.1% showed intrabony defects >4 mm. Osborne et al.[7] showed little benefit achieved by root planing the distal aspect of second molars after extraction of an adjacent impacted third molar. Their results showed only minimal reduction of probing pocket depth or induction of reattachment of gingival tissues to the second molar at or near the cementoenamel junction. Similarly, little or no benefit was found with different flap designs used in these situations.[8-10] Consequently, traditional treatment at the time of extraction of impacted third molars often results in the development of an osseous defect at the distal aspect of the second molar, which may require surgical treatment later.

A number of augmentation procedures are performed today to stimulate regeneration or to enhance attachment of supporting structures in periodontal defect sites. Augmentation of the osseous defect with bone grafts has become one of the most common surgical techniques in recent years. However, the morbidity and limited availability associated with autografts, and the potential for disease transmission, immunogenic response, and variable quality associated with allograft, have led to a wide variety of alternative materials. Various bone-grafting materials are currently used in alveolar bone grafting procedures, with different degrees of success. These materials include autogenous bone (harvested from the patient's iliac crest, rib, mandible, or maxillary tuberosity), allogenic bone, bone graft substitutes (e.g., tricalcium phosphate, bioactive glass, anorganic bovine minerals, and porous hydroxyapatite), and a combination of these materials.

Autogenous bone is considered to be ideal because of its osteoconductive and osteoinductive properties and because it contains a source of osteoprogenitor cells. It is still considered to be the criterion standard with which other grafting materials are compared. But the

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search for a bone graft substitute continues, because of some of the disadvantages associated with the use of autogenous bone grafts, namely, donor site morbidity, need for a second surgical site, possible hospitalization, need for a general anesthetic, and a limited amount of graft available depending on the donor site chosen.

One of the alternative materials often used to restore osseous defects is Bio-Oss, a resorbable anorganic bovine hydroxapatite. Bio-Oss is a safe effective bone graft material from specially processed bovine sources. Under the electron microscope, Bio-Oss looks very similar to human bone. Because of its similarity to human bone, Bio-Oss is highly successful in helping new bone to form. However, recent research has shown the material to be unpredictable in the amount of bone formation and not to be totally resorbable.[11,12]

For the purposes of the present study, the primary research question was: Among older patients having mandibular third and second molars extracted, does intervention of combined autogenous bone graft with Bio-Oss materials at the time of extraction result in a decreased risk of developing a periodontal defect on the distal aspect of mandibular first molars? The aim of this case report was to evaluate the clinical and radiographic measurements of mandibular first molar bone support before mandibular third and second molar extraction compared with 12 months after extraction and immediate reconstruction of extraction sites with autogenous bone graft combined with Bio-Oss materials.

CASE REPORT

A 42-year-old male patient was referred to the Periodontics and Oral and Maxillofacial Surgery Divisions, College of Dentistry, University of Dammam, Saudi Arabia, with impacted mandibular third and second molars (teeth #31 and #32) associated with osseous defect distal to tooth #30 (mandibular right first molar). There was history of pain during eating and when the mouth was closed. The patient's medical status was noncontributory, he was a nonsmoker, and he mentioned that he had no trauma to the related area. Additionally, he had not received antibiotic, antimicrobial, or nonsteroidal antiinflammatory drug therapy for the preceding 3 months.

The following clinical parameters were assessed at the baseline and 3, 6, 9, and 12 months after surgery with the use of the same periodontal probe (PCP-NUC 15 Probe; Hu-Friedy, Chicago, IL, USA): gingival index (GI),[13] pocket probing depth (PPD), and clinical attachment level (CAL).[14] Radiographic measures also were evaluated presurgically and at 3, 6, 9, and 12 months after surgery. In addition, before and after the augmentation procedure, bone sounding measurements were taken with a calibrated Williams periodontal probe to the nearest millimeter: vertical height of the defect (VDH) measured from the most apical extent of the defect to a fixed point on the tooth surface (because the coronal aspect of gingival margin may have changed after surgery). After local anesthesia, these measurements were taken again after 3, 6, 9, and 12 months.

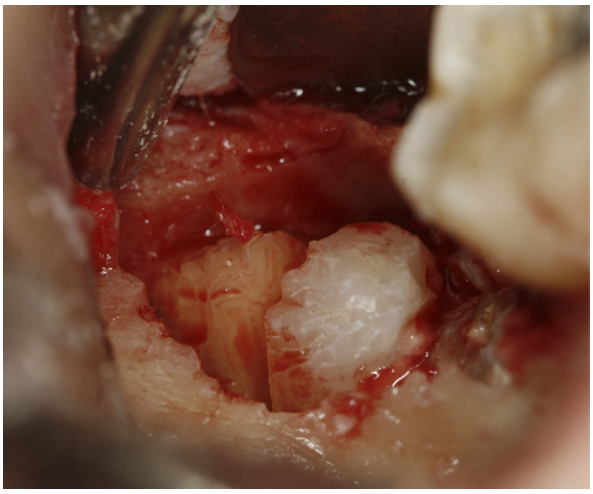

Fig. 1. Mandibular second and third molars in place before surgical removal.

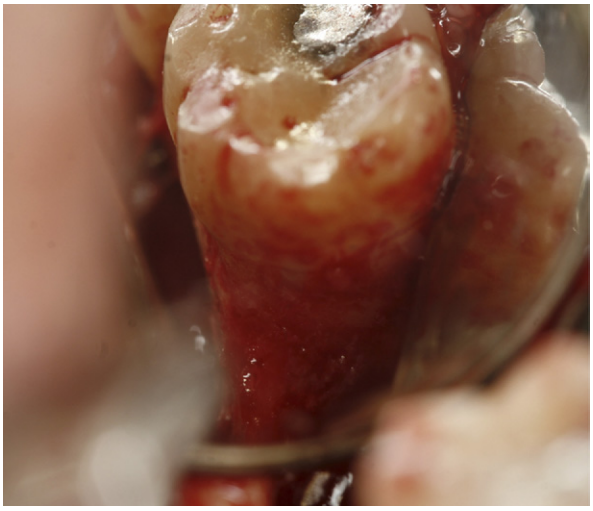

Fig. 2. Mandibular second and third molars extraction site before placement of composite graft, showing periodontal osseous defect distal to the mandibular first molar.

The patient was prepared for surgery with an initial phase of therapy, including oral hygiene instructions, scaling, and root planing. Approximately 4 weeks after initial therapy, he was reevaluated to assess clinical parameters and plaque control. He was required to achieve a good oral hygiene (<20% O'Leary plaque index) before progressing to the surgical phase of therapy.

Ethics

Written informed consent was obtained from the patient before surgical procedure, and the protocol was reviewed and approved by the Ethical Committee of the College of Dentistry, University of Dammam, Saudi Arabia.

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