Bioactive glass and connective tissue graft used to treat intrabony periodontal defects

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Different techniques and materials can be used to treat intrabony periodontal defects caused by periodontal diseases. This case report presents an intrabony periodontal defect with bioactive glass and connective tissue graft used as a barrier. Probing depth and clinical attachment gain were reduced at 6 and 12 months post-treatment.

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Periodontal therapy is intended to control periodontal tissue inflammation and to stimulate the regeneration of periodontium that has been damaged by periodontal disease. To promote this regeneration, the appropriate guidance of cells capable of synthesizing collagen, cementum, and bone to the damaged site is required. Intrabony periodontal defects can be complex and difficult to treat. Surgical techniques, including guided tissue regeneration (GTR), have been used to regenerate tissue in these areas. GTR involves placing a physical barrier (membrane) and allowing those cells that have regenerative capacity (periodontal ligament cells) to migrate to the area of the periodontal defect while blocking the approach of undesirable cells (such as epithelial and/or gingival conjunctive tissue cells). This technique has been used with predictable results for 2- and 3-wall intrabony defects, and Class II furcation defects.

Both absorbable and nonabsorbable membranes have been used as barriers, with no significant differences between the 2 in terms of the healing process. Nowadays, absorbable membranes are used more commonly, mainly because nonabsorbable membranes require a second surgical procedure for their removal. A connective tissue graft also could be used as a barrier for furcation defects and intrabony defects. Using connective tissue graft as a barrier during GTR makes it possible to restore the hard tissue while enhancing the soft tissue profile in the same procedure.

Several types of grafts and alloplastic materials have been used to treat periodontal defects. Bioactive glass (BG) has osteoconductive potential, and has demonstrated an osteostimulatory effect as well. BG has been used to treat intrabony periodontal defects, demonstrating a significant improvement in clinical parameters (such as vertical and horizontal tissue gain in mandibular Class II furcation defects), compared to open flap debridement (OFD).

This case report presents a patient with intrabony periodontal defects that were treated by using BG and connective tissue graft as a barrier.

Case report
A 72-year-old woman was referred to a periodontist with the chief complaint of pain and discomfort in tooth No. 30. Clinical examination revealed deep probing depth, with bleeding upon probing, and clinical loss of attachment levels (5 mm and 7 mm) in the medial side of the tooth (Fig. 1). Radiographic examination revealed vertical bone loss at the medial surface of the tooth (Fig. 2).

The patient underwent scaling and root planing, and received oral hygiene instructions. Two months later, the depth of the periodontal pockets and the amount of bone loss remained similar to what was observed at the initial periodontal
examination. To regenerate periodontal tissue in the area, a treatment plan was proposed that would combine BG with a connective tissue graft as a barrier.

After antiseptic and anesthesia, an intrasulcular incision from teeth No. 28-31 was made, followed by a full thickness flap reflection on both the vestibular and lingual sides (Fig. 3). At that point, all granulation tissue was removed with the aid of curettes. Root surfaces were scaled, planed, and decontaminated with tetracycline hydrochloride (Fig. 4). The intrabony periodontal defect was filled with Biogran (Biomet 3i, LLC) (Fig. 5). An autogenous connective tissue graft was collected from the palate and placed gently under the flap with a suture (Vycril 5-0, Ethicon, Inc.) (Fig. 6), according to a previously described technique. The connective tissue used as a membrane was positioned 2 mm above the mesiodistal and crown apex direction of the defect. Finally, the flap was coronally positioned and sutured with suspensory sutures (Fig. 7).

Postsurgery, the patient received pain control medication (an analgesic containing acetaminophen), antibiotic (amoxicillin 500 mg, 3 times a day for 7 days), and chemical plaque control (0.12% chlorhexidine gluconate rinse, twice a day for 14 days); in addition, the surgical sites were covered with periodontal dressing. After 10 days, the sutures and the periodontal dressing were removed and follow-up visits were scheduled for 1, 3, 6, and 12 months. At each visit, oral hygiene instructions were reinforced. The surgical site was examined to confirm that healing was uneventful.

At 6 and 12 months, a reduction in probing depth and a gain in clinical attachment could be observed. In addition, the tooth had a probing depth of 3 mm at 12 months, with a clinical attachment level of 5 mm, and no bleeding upon probing (Fig. 8). The 1-year radiographic examination showed great improvement compared to the initial exam, with almost complete closure of the intrabony defect (Fig. 9).

**Discussion**

This case report involved the successful treatment of an intrabony defect by using BG combined with connective tissue graft as a barrier, which restored the bone morphology.

Previous studies reported that BG was an improvement compared to OFD when treating intrabony defects and furcation defects, demonstrating gains in clinical attachment levels, reduction of bleeding and probing depth, less gingival recession, and higher bone fill. Conversely, a 2008 study by Pagliaro et al compared BG and surgical scaling for treating intrabony defects and reported no statistically significant differences among all clinical parameters evaluated.

A 2010 clinical and radiological study compared 45 sites utilizing BG, biphasic calcium phosphate, and a control group. Three and 6 months post-surgery, the authors reported not only a reduction in probing depth, but also a gain in attachment level. Other studies have reported that BG enhances periodontal tissue healing when probing depth reduction, osseous defect fill, and clinical attachment gain are used as clinical parameters.

In a 2005 study by Villaca et al, the authors performed a histomorphologic analysis of 2-wall intrabony defects in monkeys and demonstrated that BG had a “promising inhibition” of the apical...
migration of the junctional epithelium and greater cementum deposition on the radicular surface. Moreover, the authors reported that BG particles were used to stimulate new bone based on both their osteoconductive properties and their osteostimulatory capacity. Previous in vitro studies revealed some of the critical events that occur with the use of bioactive glass—such as the enhancement of osteoblast proliferation and selectively modulated cell signaling pathways—can stimulate the expression of the osteoblast phenotype. In addition, Granito et al found that 300-355 μm particles (like those used in the present case) offered better tissue responses compared to control, which led to bone regeneration and deposition in the damaged periodontium.

The connective tissue graft has been used successfully as a barrier in treating root recessions and furcation defects. An in vitro study compared absorbable and non-absorbable membranes, concluding that selecting a barrier is crucial when BG is used, as the barrier may affect cell proliferation during the process of periodontal/tissue regeneration.

Conclusion

This case report indicates that periodontal intrabony defects can be treated successfully with a combination of BG and a connective tissue graft.

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References


Manufacturers

Biotemp: 3i, LLC, Palm Beach Gardens, FL 800.342.5454, biotemp3i.com

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