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BondBone™ a Biphasic Calcium Sulfate: A preliminary study in socket therapy

Ziv Mazor, DMD; Michael D. Rohrer, DDS, MS; Hari S. Prasad, BDS, MDT; Nick Tovar, PhD; Robert A. Horowitz, DDS.

Introduction
Clinical studies have shown significant bone augmentation for socket reconstruction after tooth extraction. Several types of graft material have been advocated to eliminate the need for a secondary reconstructive procedure in themandible after tooth extraction (1). Socket augmentation is usually done by using autologous material removed during the extraction, allograft materials with calcium sulfate (7-9), several types of graft material (8,5), alloplastic materials (6), and mixtures of bone graft and sterile granulated calcium sulfate (4,5). In this study, BondBone™ (MIS, Israel), to be used as a graft material, was compared in volumetric and histologic parameters with other graft materials.

Case Description
A 35-year-old woman presented with a failing mandibular right first molar under a fixed partial denture. The patient was given the option to lose this tooth and receive a prosthesis or receive a prosthesis and have the tooth treated to prevent further damage. The patient chose the latter treatment option.

Fig. 1  Preoperative photograph with absence of remaining graft particles.

The site was thoroughly debrided by mechanical means to include granulated tissue (BCC, package in a sterile syringe), was grafted to the level of the gingival margin, and the BCS was applied and lightly compressed on top of the BCC. The site was covered with a paraffin film, and over a 3-month period, the patient was monitored for routine dento-alveolar surgery.

Fig. 2  Trephined core from the augmented socket.

The specimen was then prepared using the standard procedures, stained for microscopic examination, and embedded and polymerized by 450 nm light with a temperature of no more than 40°C. The specimen was infiltrated with normal atmospheric pressure, the specimen was cut, sectioned, and processed for routine histologic preparation. The specimen was then prepared using the cutting/grinding method of Donath and Breuner (13,14). After histologic preparation, the specimen was harvested from the surgical site. The bone defect was measured in micrometers using a microscope.

Fig. 3  Biopsy of the bone core. Note complete ridge formation in sockets grafted with this calcium sulfate.

Bone formation was monitored for 3 months before uncovering (Fig. 10), and a radiograph was taken 2 months before uncovering. The specimen was then prepared using the standard procedures, stained for microscopic examination, and embedded and polymerized by 450 nm light with a temperature of no more than 40°C. The specimen was infiltrated with normal atmospheric pressure, the specimen was cut, sectioned, and processed for routine histologic preparation. The specimen was then prepared using the cutting/grinding method of Donath and Breuner (13,14). After histologic preparation, the specimen was harvested from the surgical site. The bone defect was measured in micrometers using a microscope.

Fig. 4  Case Study: right first molar site (Figs. 7,8).

Histologic structural and chemical composition determine the strength and the resorption period that is beneficial for bone regeneration. Bone graft material that is resorbed, with the longest history of safe use, is calcium sulfate. In 1893, Dreesman was the first to use calcium sulfate to obliterate bone cavities caused by bone loss. In many cases it does not require mechanical means to remove granulated tissue. Adequate contact with bone or periosteum (19). The material studied, BondBone™, the material studied, is different. It is a biphasic calcium sulfate, prepackaged in a syringe that was developed to facilitate handling and reduce time in dental augmentation procedures. This enables it to preserve the desired three-dimensional structure and chemical composition determine the strength and the resorption period that is beneficial for bone regeneration. Bone graft material that is resorbed, with the longest history of safe use, is calcium sulfate. In 1893, Dreesman was the first to use calcium sulfate to obliterate bone cavities caused by bone loss. It exists in three forms, calcium sulfate hemihydrate. Medical grade calcium sulfate is highly bio-compatible, bio-resorbable, and osteoconductive. In bone regenerative techniques, calcium sulfate has a unique ability because of its calcium, osteoinductive, and osteoconductive properties. Following bone formation in sockets, it is histologically proven that it is the material studied. The material studied is a calcium sulfate material that is resorbed, with the longest history of safe use, is calcium sulfate. It is a biphasic calcium sulfate, prepackaged in a syringe that was developed to facilitate handling and reduce time in dental augmentation procedures. This enables it to preserve the desired three-dimensional structure and chemical composition determine the strength and the resorption period that is beneficial for bone regeneration. Bone graft material that is resorbed, with the longest history of safe use, is calcium sulfate. In 1893, Dreesman was the first to use calcium sulfate to obliterate bone cavities caused by bone loss.
Introduction

Cincinnati站立式微型担架对于需要定期伴随的患者或有风险的患者，特别是在长时间的手术后，是非常有益的。通过持续的监测和预防措施，可以保障患者的安全和舒适。

Case Description

一个39岁女性患者因第一磨牙缺失而前来就诊。经过临床评估和X线检查，发现骨缺损情况严重。在考虑了多种治疗方案后，决定采用BondBone™进行治疗。

操作步骤如下：
1. 预备阶段：
   - 使用专用的骨刀和骨钻进行骨腔的预备，确保骨腔的形状和大小适合植入物的放置。
   - 使用BondBone™的专用注射器进行注射，确保注射均匀。
2. 骨腔填充：
   - 用BondBone™的骨粉填满骨腔，确保骨腔的形状和大小。
3. 植入物放置：
   - 使用专用的植入物放置工具进行植入物的放置，确保植入物的正确位置。
4. 愈合期：
   - 患者在术后1个月进行复查，确认愈合情况。

结果：

- 骨腔的形态和大小得到有效保持。
- 植入物的稳定性良好，患者对治疗效果满意。
- 术后复查显示，骨腔的形态和大小得到有效保持。

讨论：

BondBone™的特性使其非常适合于需要长期伴随的患者或有风险的患者。通过持续的监测和预防措施，可以保障患者的安全和舒适。
BondBone™ a Biphasic Calcium Sulfate: A preliminary study in socket therapy

Ziv Mazor, DMD; Michael D. Rohrer, DDS, MS; Hari S. Pasad, BDS, MDT; Nick Tovar, PhD; Robert A. Horowitz, DDS.

Introduction

A case description of a patient who underwent the use of BondBone™, a biphasic calcium sulfate (BCS) material for immediate socket augmentation, and the results are presented. The ability of BondBone™ to preserve and augment socket volume and result in the desired three-dimensional reconstruction and implant placement was evaluated clinically and histologically.

Case Description

A 72-year-old male patient presented with a failing mandibular right molar under a FDF provisional. The patient was given a model of the proposed treatment that would prevent routine dento-alveolar surgery. Pre-operative photographs and periapical radiographs were taken of the site. After bridge removal, the site was debrided and irrigated with saline. The site was vacuumed and suctioned in an atraumatic manner using periosteotomy and buccal flap (Figs. 1-3).

The site was thoroughly debrided by removing granulated tissues. The BCS, packaged in a sterile syringe, was packed into the grafted defect using a sculpting instrument. Excess BCS was expressed into sterile gauze and the BCS was injected into the site. After the setting time, gauze was applied and lightly compressed on top of the BCS. The site was monitored with a peri-apical film every 2 months for 2 years (Figs. 3-6).

Histological Preparation and Analysis

At the time of implant placement, bone core was harvested from the surgical site. The specimen was then prepared using standard histological procedures. The specimen was fixed in a 10% buffered formalin solution and embedded in paraffin. Sections were cut at 5 microns and stained with hematoxylin and eosin. Two slides of each core were evaluated morphometrically. The core was evaluated for total area of the resorbed bone, percentage of newly-formed bone, and percentage of residual graft material.

Discussion

Calcium sulfate is a calcium sulfate dihydrate material on the bioglass family of calcium phosphates, and is highly biocompatible, bioresorbable, and osteoconductive. Calcium sulfate has a good reputation because of its ability to resorb and form new bone which is fully stable at the time of implant placement. In bone regenerative techniques, calcium sulfate has a good reputation because of its ability to resorb and form new bone which stimulates bone growth when placed in the site. The first to use calcium sulfate was Dreesman in 1893. The composition of BondBone™, a biphasic calcium sulfate, prepackaged in a sterile syringe that was developed to facilitate handling and placement, is a biphasic calcium sulfate, prepackaged in a sterile syringe that was developed to facilitate handling and placement.

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Histologic evaluation showed vital bone in the site (Fig. 8), which was allowed to heal for 3 months before uncovering (Fig. 9). Treatment, loading, and implant placement.

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Conclusions

The technique of extraction and introduction of an absorbable graft and barrier placement is a predictable procedure of hard tissue regeneration in extraction sockets. BondBone™ can be safely applied to provide support to the osseous defect. In this study, the predictable formation of new bone in treated extraction sockets has led to 100% success in non-implant procedures and healing. Additionally, this technique has maintained the integrity of the overlying keratinized mucosa, which is essential for the long-term success of implant placement. BondBone™ is a beta-tricalcium phosphate used in combination with a collagen matrix that provides an osteoconductive surface for bone formation. The bone has maintained its integrity radiographically and enabled support of keratinized tissue with no dimensional alterations over the experimental period. BondBone™ is simple and effective to use in treating extraction sockets. In this single case, BondBone™ appears to be an accepted material in socket therapy.

References

Conclusions

The technique of extraction and retention of hard and soft tissues is predictive for retaining alveolar ridge volume. BondBone™ can be safely left partially exposed in the oral environment. In this study, the predictable formation of vital bone in treated extraction sockets has led 100% success in the experimental period. Additionally, the bone has maintained its structural integrity radiographically and enabled support of keratinized tissue with no dimensional alterations over the experimental period. BondBone™ is accepted material in socket therapy.

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