

Traditionally most xenograft used in oral regenerative procedures has been unsintered. Such material undergoes a multi-step process of annealing (up to 300 degrees Celcius), followed by treatment with organic solvents such as sodium hydroxide.²⁴ However, a second type of bovine-derived bone, used since 1989 as a bone-replacement material in the fields of orthopedic and skull surgery, has recently been introduced into the field of oral regeneration. This material uses a process known as sintering to remove all pathogenic components and organic components from the bovine bone. The bovine bone is heated to more than 1200 degrees Celcius, yielding a highly crystalline material containing small amounts of calcium oxide resulting from decomposition of the original carbon content. The sintered bovine bone incorporates its native macroporosities, as well as preserves its microposity of the original bone.

The following clinical case presentation illustrates the use of sintered xenograft particles in combination with a resorbable collagen membrane to regenerate an edentulous mandible.

The patient was a 72-year-old female who presented with an ill-fitting denture following long-standing mandibular edentulism. Clinical and radiographic examination revealed a narrow alveolar ridge with significant apical undercuts (Figs. 1 and 2). The patient required pre-operative ridge regeneration to accommodate a future implant-supported overdenture.

Sintered bovine bone particles were chosen as the graft material due to their biologic and physical properties. Biologic properties include the ability to function as an osteoconductive regenerative material. The physical characteristics of bovine bone offer the additional advantage of increased compressive resistance, due to the material's inherent native structure. Regenerative attempts with other graft materials may be compromised by their inability to contend with the compressive forces delivered by an overlying denture.

Following treatment-plan acceptance, the patient was anesthetized, and a full-thickness mucoperiosteal flap was reflected (Fig. 3). Upon identification of the mental foramina, distal releasing incisions were made. Measurement of the existing ridge indicated that the width was 2-3mm wide (Fig. 4).



Fig. 1

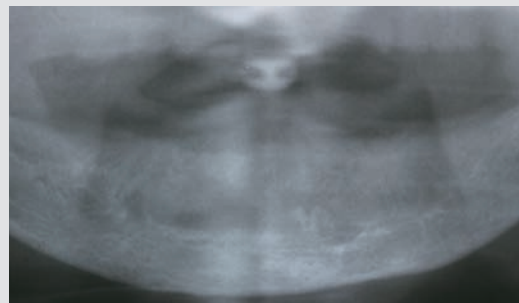


Fig. 2

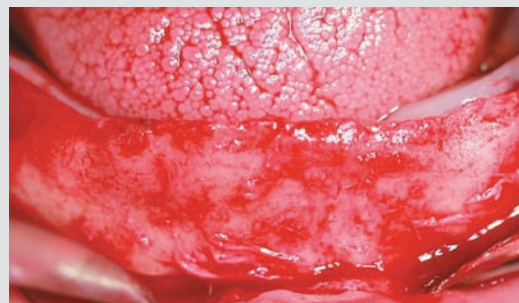


Fig. 3

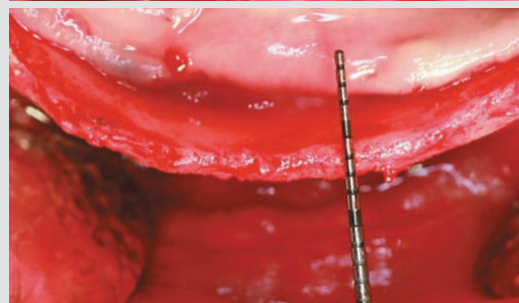


Fig. 4

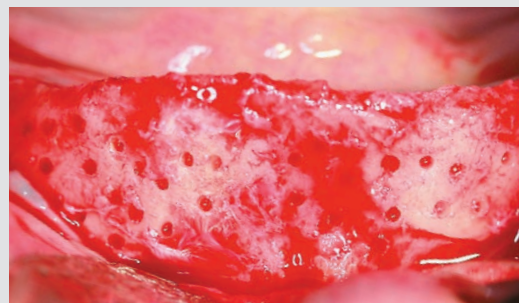


Fig. 5



Fig. 6

Fig. 7



Fig. 8



Fig. 9



Fig.10



Fig.11

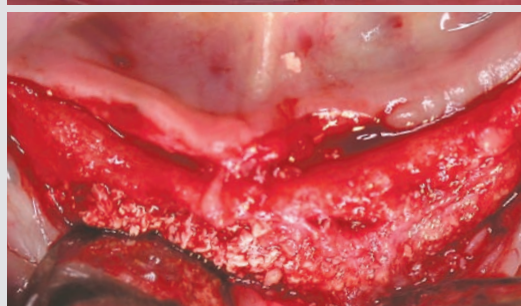


Fig.12



The residual periosteum was carefully debrided with hand instruments, and the ridge was decorticated using a high speed round carbide bur with copious irrigation (Fig. 5).

After hydration in sterile saline for five minutes, Endobon® Xenograft Granules (BIOMET 3i) were molded over the decorticated ridge. Excess graft material was applied to allow for the characteristic shrinkage associated with guided bone regeneration and the unavoidable compression by the denture (Figs. 6 and 7).

Graft containment was achieved by tucking cross-linked OsseoGuard® Resorbable Collagen Membranes (BIOMET 3i) under the facial flap and draping them over the graft (Fig. 8). Extensive periosteal releasing incisions of the buccal flap in conjunction with the initial lingual flap reflection to the floor of the mouth enabled passive primary closure. Continuous locking 4.0 Gore-Tex® Sutures (W.L. Gore & Associates, Flagstaff, Arizona, USA) secured the soft-tissue flaps (Fig. 9).

The intaglio surface of the existing denture was relieved and relined to reduce the potential compressive forces on the regenerated area, as well as to maintain primary closure. The patient was then released with analgesics and antibiotics.

Post-operative healing was uneventful, and primary closure of the regenerated site was maintained throughout the healing period. Six months later, the patient was seen for evaluation and placement of dental implants (Fig. 10). A crestal incision was made, and full-thickness periosteal flaps were reflected to reveal a sufficient gain in ridge width to support implant placement (Fig. 11).

Following the manufacturer's recommended protocol, osteotomies were performed in the two cuspid sites for placement of 4mm diameter NanoTite™ Certain® Implants (BIOMET 3i) (Fig. 12). Cover screws were placed into the internal interfaces of the implants and tightened by hand. A 2mm trephine core was harvested from the central incisor location, and histological evaluation revealed excellent incorporation of the Endobon Xenograft Granules. The soft-tissue flaps were closed with continuous locking sutures, and the intaglio surface of the existing denture was relieved and relined. The patient was then released with analgesics and antibiotics.

Three months later, after uneventful healing, a tissue punch was used to expose the implants. The cover screws were removed, and EP® Healing Abutments (BIOMET 3i) were placed. The denture was relieved over the healing abutments, and the patient was dismissed with oral hygiene instructions.

Following soft-tissue maturation at eight weeks, the patient was seen by the restorative clinician for impressions and fabrication of the definitive prosthesis. The mandibular overdenture will be retained by Locator® Abutments (BIOMET 3i) processed directly into the overdenture base.

Clinical Relevance

For many severely resorbed edentulous patients, being unable to wear a removable denture during healing may be a significant impediment to accepting treatment with dental implants. Treatment plans that acknowledge this psychological reality are likely to enjoy higher acceptance rates. Sintered bovine-derived bone particles used in combination with cross-linked, cell-occlusive membranes may enable clinicians to obtain successful regenerative outcomes in cases where compressive forces imposed by dentures might otherwise compromise the success of the augmentation or lead to questionable regenerative gain.

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