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CASE REPORT

Histomorphologic Evaluation of Bone Augmentation Using Ovis Xeno-P® (Newly Developed Deproteinized Inorganic Porcine Xenograft)

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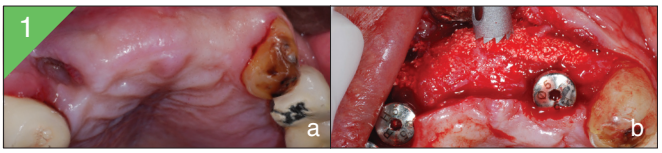

Figure 1a,b. a) Pre-operative clinical image of partially edentulous in maxillary anterior. b) Post-operative 2nd stage surgical image 5 months after GBR.

Background & Purpose

In implantology, various bone graft materials are used for the regeneration of bone. Based on their origin, these are classified as autogenous bone, allogenic, xenogenic and alloplastic bone substitutes. Each of these bone substitutes have specific chemical and structural features that lead to different angiogenetic, osteoinductive and osteoconductive properties. The characteristics of the xenogenic bone substitutes are the biocompatibility with the bone tissue, the osteoconductivity of the anorganic matrix and the long-term stability of the matrix in regenerated bone. Non-resorbable characteristic of xenogenic bone substitutes during bone regeneration leads to higher bone density of newly formed bone whereby the augmented volume can remain stable over the long term. For this reason, the first indication of the xenogenic bone graft is the volume maintenance. Ovis Xeno-P® is a new deproteinized, inorganic porcine xenogenic bone graft material. As a natural, non-antigenic, porous bone mineral matrix, the Ovis Xeno-P® is produced by the removal of all organic components from porcine cancellous bone. Due to its natural structure, Ovis Xeno-P® is physically comparable to the mineralized matrix of human bone. The anorganic bone matrix of Ovis Xeno-P® has macro and microscopic structures similar to human bone. The formation and ingrowth of new bone at the implantation site of Ovis Xeno-P® is favored due to its trabecular architecture, interconnecting macro and micropores and its natural consistency. The bone graft material's close resemblance to human bone enables effective bone regeneration. In the present study, bone augmentation procedures were done with Ovis Xeno-P®. Furthermore, we analyzed clinically and histologically.

Materials & Methods

Patient Information

59-year old male patient presented with partial edentulous in maxillary anterior region. Treatment plan was to extract #14 and do immediate implant placement. For #13 and #22, implant placement with GBR was planned (Fig.2&3)

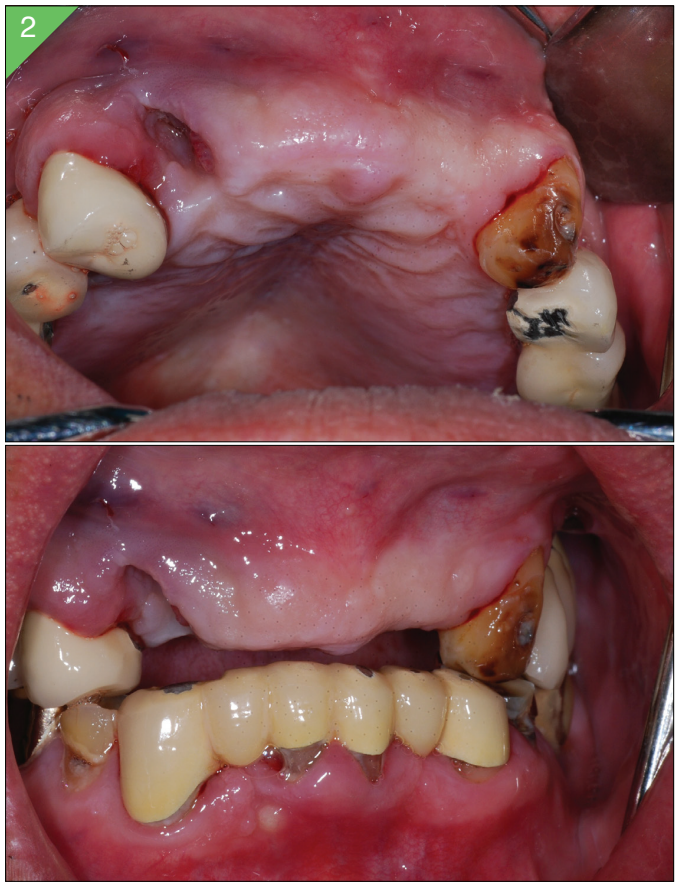

Figure 2. Pre-operative clinical images with partially edentulous in maxillary anterior region.

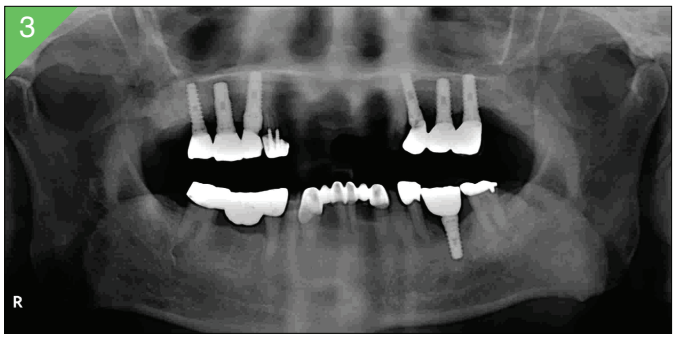

Figure 3. Pre-operative radiograph.

Treatment Procedure

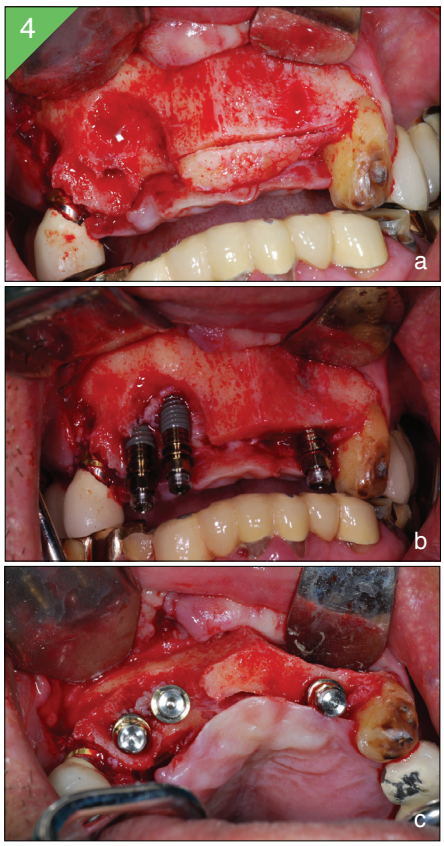

Figure 4a-c. a) Mucoperiosteal flap was elevated through crevicular and vertical incision after #14 extraction. b) Vertical reduction osteotomy was done in order to get occlusal space for restoration.
c) Three implants were placed at #14, #13, and #22.

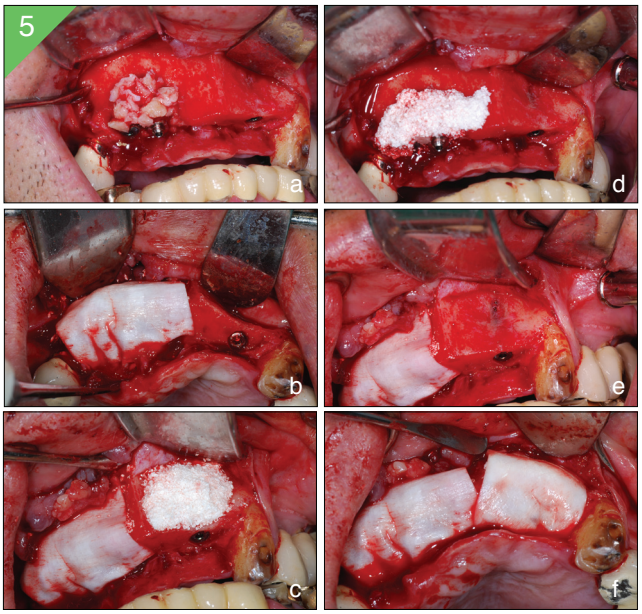

Figure 5a-f. a-e) Because of pre-existing buccal bone defect, coronal portion of #14, #13 implants were exposed. In addition, apical portion of #22 was exposed due to apical concavity. Autogenous bone harvested from the vertical reduction osteotomy was grafted around the exposed fixture.
f) For long-term stability in augmented region, deproteinized inorganic porcine bone (Ovis Xeno-P®, DENTIS™, Korea) & resorbable porcine collagen membrane were used for labial bone augmentation.

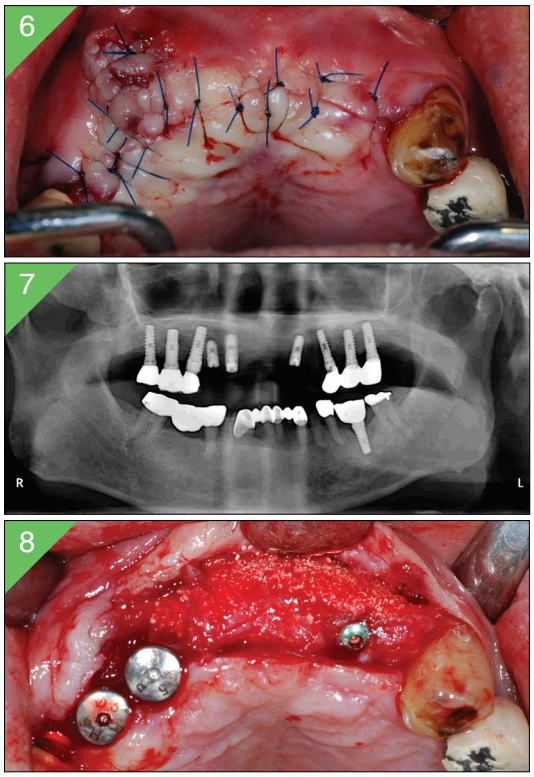

Figure 6-8. 5 months after GBR, 2nd stage surgery was done. Augmented alveolar bone volume was maintained stably. Bone quality of graft site was favorable.

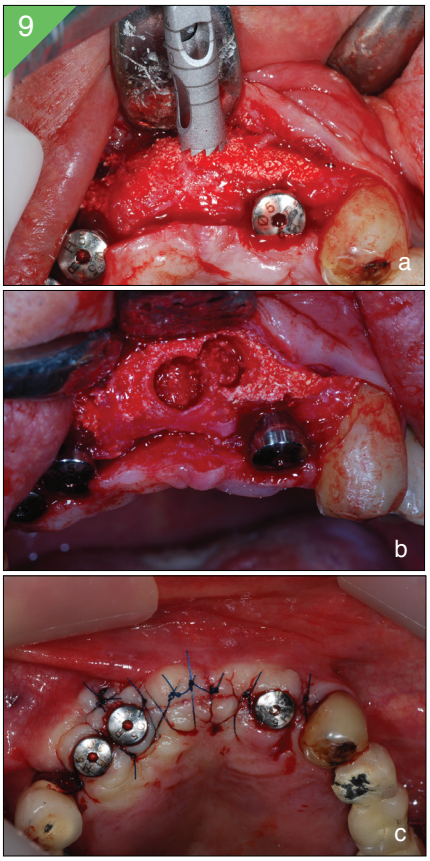

Figure 9. For histomorphologic evaluation, two bone cores were harvested from the augmentation site using a trephine bur.

Histologic Evaluation

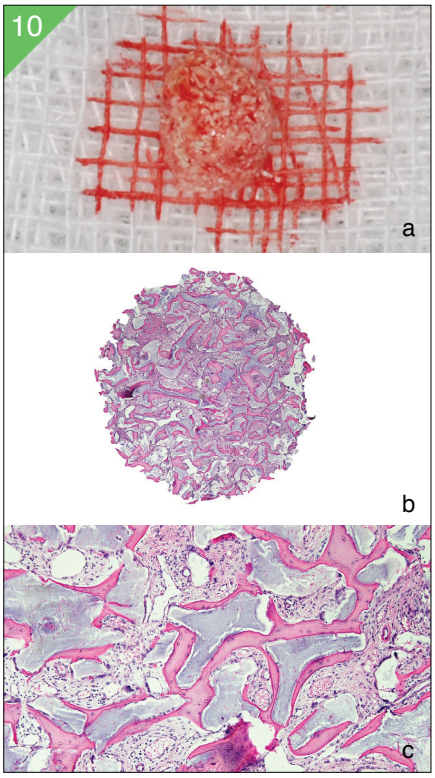

Figure 10a-c. a) A bone core harvested 5 months after GBR from the graft site using a trephine bur. b) H & E staining, original magnification X40. c) H & E staining, original magnification X100. Histological view of the specimen showing new bone formation through the specimen. Note that the Ovis Xeno-P® particles were embedded in the woven bone.

Results & Conclusion

The extent of osseous penetration of xenogenic apatite depends on its properties of osteoconduction, i.e. the ability to act as a spacer and conducting structure for newly-forming bone. This arises from an interconnecting pore system and physical and chemical properties similar to those of human cancellous bone. Even without the demonstrable resorption of the bone substitute material via osteoclasts, the porosity of the material provides an excellent basis for vascularization and penetration of associated cells which integration of the substitute material requires sufficient vascularization being an absolute precondition to the osteogenetic process (Bereiter *et al.* 1991). Growth penetration of bone tissue is only ensured if pore diameter is at least 100µm, and formation of osteo-like structures require a pore diameter of 200µm (Klawitter & Hulbert 1971). The pore system of Ovis Xeno-P® is architecturally structured to allow vascularization of new bone. High stability and long-term maintenance in the augmented region is achieved through integra-

tion of Ovis Xeno-P® granulate into the new bone formations. Good clinical results in the form of stable augmented bone volume was achieved. Histologically, osseous integration of Ovis Xeno-P® granulate was observed. These findings appear to support Ovis Xeno-P® as a useful human bone substitute material where volume augmentation and maintenance is needed. The osteoconductive properties of the graft lead to the development of new bone formation both at the surface of the substitute material and at trabeculae between the Ovis Xeno-P® particles of the substitute material. Long-term results following prosthetic loading of the inserted implants will have to prove whether an appropriate implant site can be obtained by augmentation using Ovis Xeno-P®.

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Conflict of interest:
The author declares that he has no conflict of interests relating to this article.

Products Used

- DENTIS™, Implants
- DENTIS™, Ovis Xeno-P®
- Trephine Bur

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