



Evaluation of the effectiveness of maxillary sinus floor augmentation using β -TCP and hydraulic pressure

YAGO.K¹⁾, KAWAMOTO.Y¹⁾, SATO.T¹⁾, YAYAMA.K¹⁾, KIZU.H²⁾, ASANAMLS.³⁾

1) Department of Oral Surgery, Mita Hospital, International Health and Welfare University, Tokyo, Japan
2) Department of Oral Surgery, Tachikawa Kyosai Hospital, Tokyo, Japan
3) Department of Oral Surgery, Sanno Hospital, Tokyo, Japan

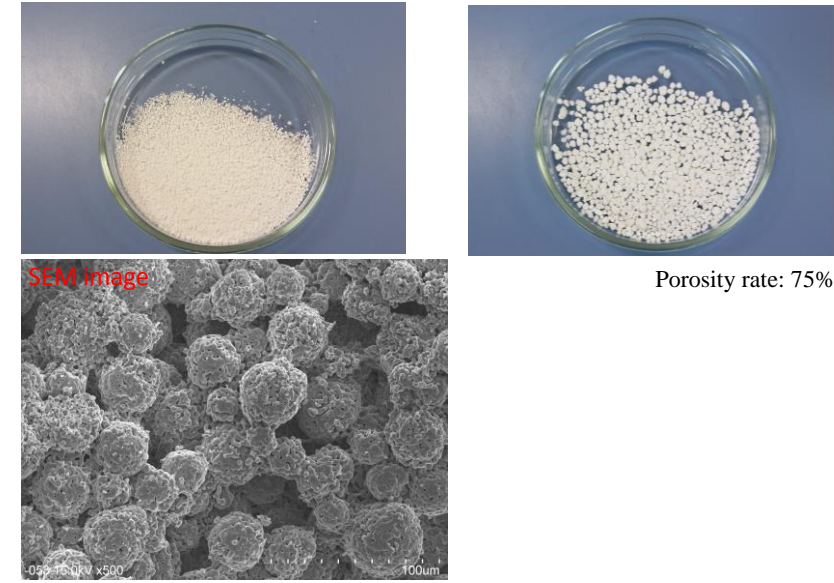
Introduction:

As maxillary sinus floor augmentation via the alveolar crest approach, a method involving elevating the maxillary sinus mucosa using hydraulic pressure generated by the injection of saline solution has been devised, with the usefulness thereof having been suggested due to its simplicity.

Materials and methods:

The subjects included 12 patients who underwent maxillary sinus floor augmentation using the hydraulic pressure at our hospital from September 2015 to October 2016. After maxillary sinus floor augmentation via the alveolar crest approach using CAS KIT (OSSTEM), only β -TCP (ArrowBone- β -Dental™, made in Japan) was filled into the same part, while simultaneously placing an implant. The postoperative course and bone regeneration ability were radiologically evaluated.

ArrowBone- β -Dental™



ArrowBone- β -Dental is a bone grafting material made in Japan and includes two types: AG1 (particle size 0.25 to 1.00 mm) and AG2 (particle size 1.00 to 2.00 mm). It is a highly pure beta-type calcium phosphate ceramic (β -Ca₃(PO₄)₂) of granular form, has high biocompatibility, is absorbed in the living body, and replaces autogenous bone. It has the micro- and macro-porous structure of natural cancellous bone, with a unique micro- and macro-porous structure promoting the adhesion, proliferation, and differentiation of cells as a site of cell activity. In vivo testing confirmed that bone growth in the internal macropores, microvessel formation, and granule absorption occur in a well-balanced manner in addition to being replaced with autogenous bone while maintaining the space, demonstrating good bone replacement properties. The hydrophilicity of granules is excellent, further promoting the adhesion of cells as well as angiogenesis. When mixed with physiological saline and blood at the time of filling operations, the granules assemble well, making it easy to carry out filling operations in addition to being excellent in terms of shaping and molding. Unlike xenograft, because there is no concern regarding risk of infection, it can be safely and securely used.

CAS-KIT

Crestal Approach - Sinus KIT



Inverse Conical Drill Tip:

This drill tip is designed to safely form a conical bone lid at the sinus floor, elevating the sinus membrane. It features four blades that shift bone particles toward the drill tip for safe sinus elevation.



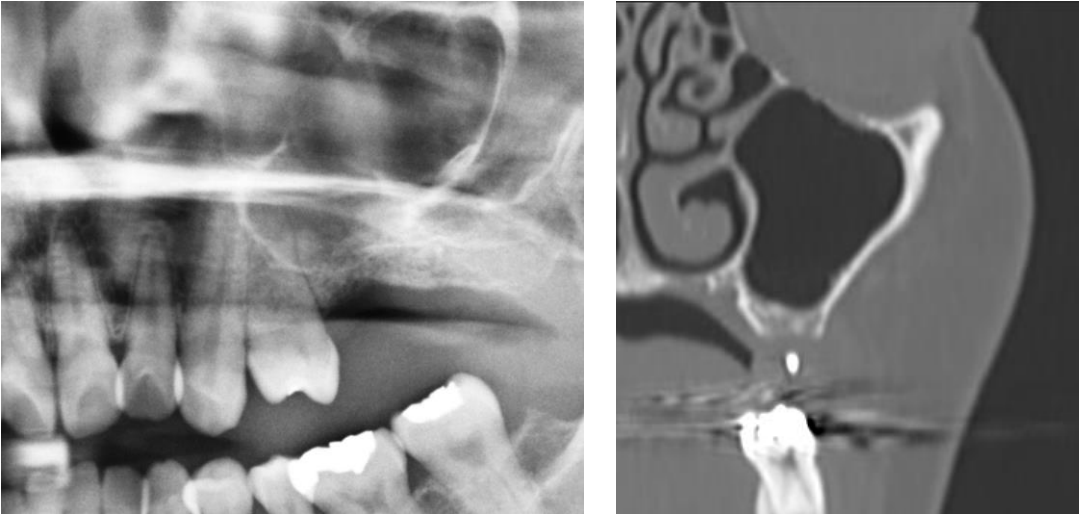
Stopper System:

The CAS dental drill system comes with a stopper system that allows for precise osteotomy depth control, preventing over drilling with stoppers of 11 different lengths. These stoppers can help prevent any damage to the soft tissue.

Results:

<Clinical Cases>

#25 Missing Case Pre-op



The remaining bone is 4.2 mm

Membrane Lift



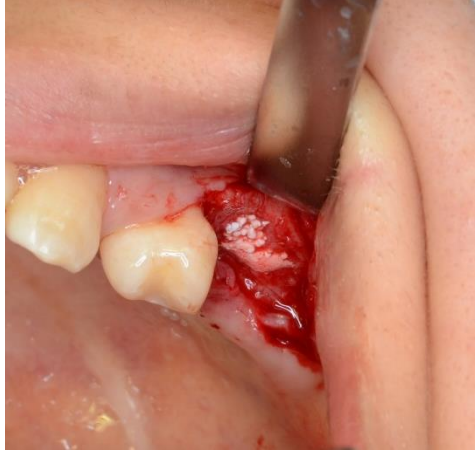
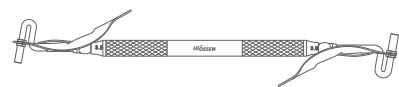
Hydraulic Lift System:

Drilling prepares the sinus membrane for the hydraulic lift system, which applies hydraulic pressure to the cavity and separates the membrane from the sinus floor. The membrane is lifted by slowly injecting 1.0cc of saline solution using a syringe.

There were four males and eight females, ranging in age from 33 to 66 (average: 52). The average remaining bone mass prior to surgery was 6.2 mm, while the average elevated bone mass after implantation was 6.1 mm. Placed implants include 12 camlog implants and 2 straumann implants, with an average of 1.1 implants.

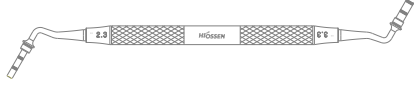
In all cases, there were no problems such as maxillary sinusitis or infection following surgery and no implants dropped out.

Bone carrier

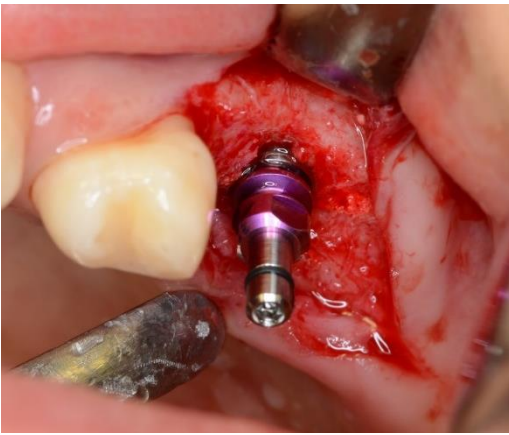


ArrowBone- β -Dental™ is transplanted to the grafting site

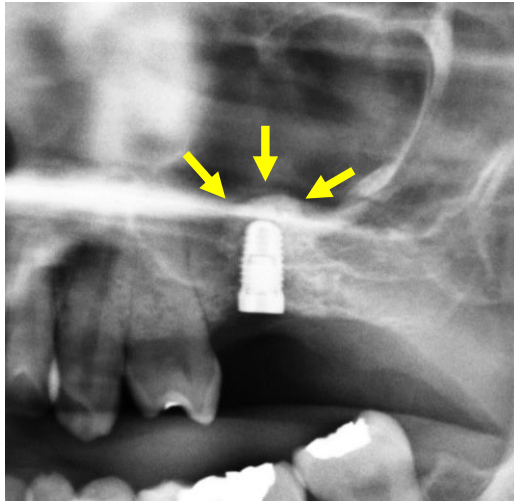
Bone condenser



Vertical compacting of the bone grafting material



#25 Camlog Ø4.3 x 9mm was implanted



The membrane is lifted about 7mm

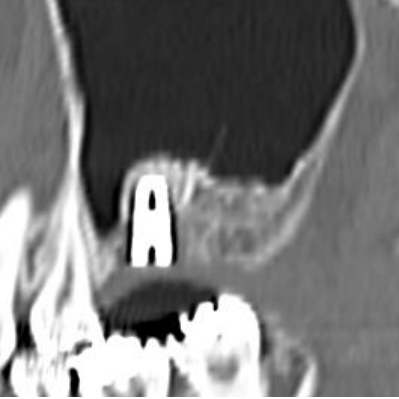
Post-op 1M



Axial section

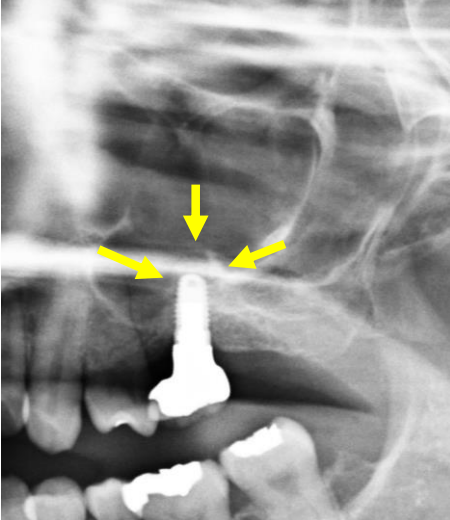


Coronal section



Sagittal section

Post-op 1Y8M



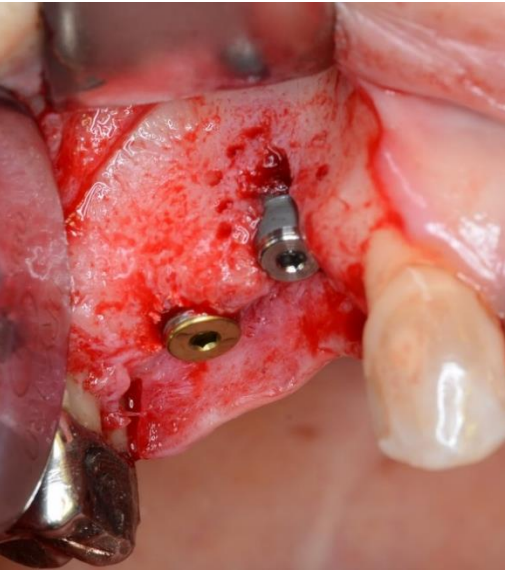
#14,15 Missing Case Pre-op



The remaining bone is 3.3 mm



ArrowBone- β -Dental™ is transplanted to the grafting site

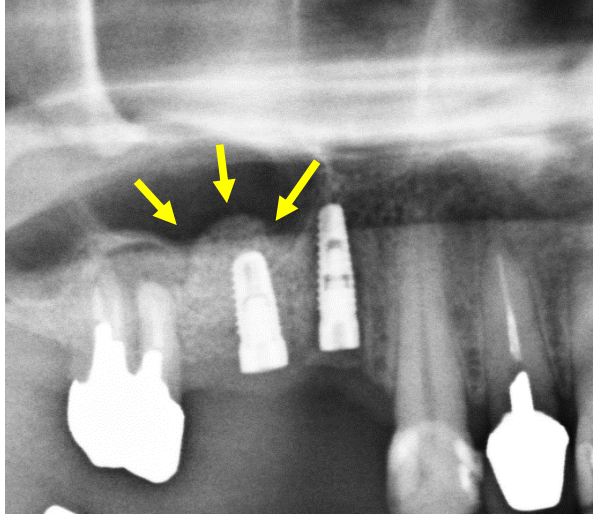


#15 Camlog Ø3.8 x 9mm was implanted



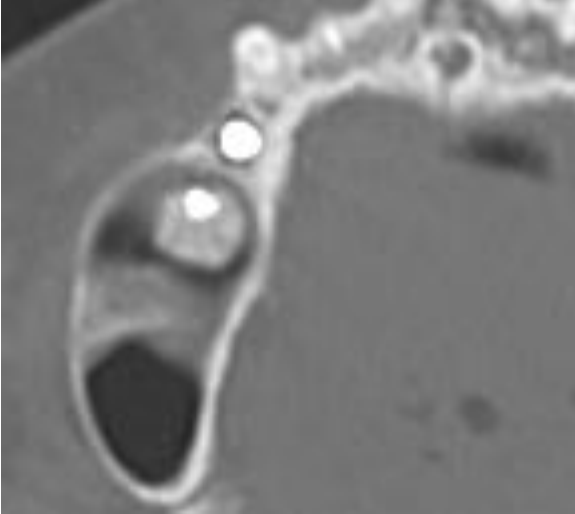
#14 Camlog Ø3.3 x 11mm was implanted

Post-op

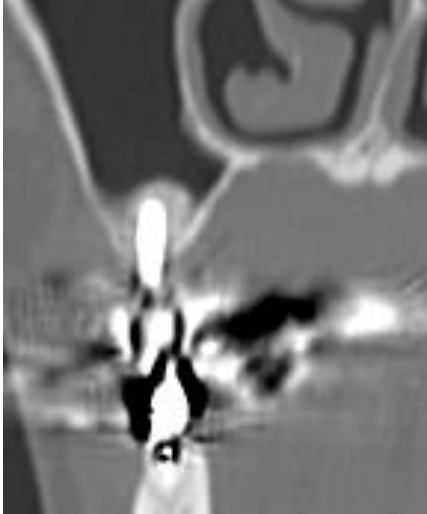


The membrane is lifted about 8mm

Post-op 1M

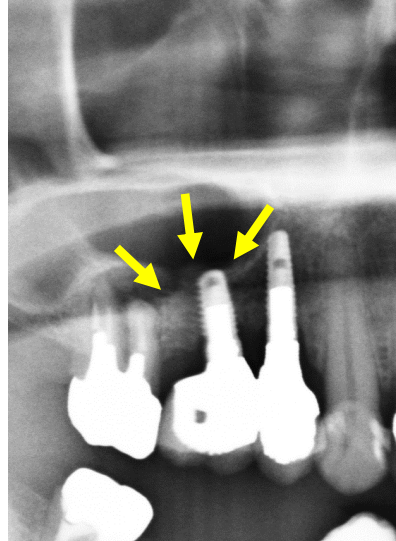


Axial section



Coronal section

Post-op 1Y8M



Conclusion:

We believe that maxillary sinus floor augmentation using hydraulic pressure was effective due to its simplicity and minimal invasiveness. It was also suggested that β -TCP (made in Japan) has excellent bone regeneration ability as bone filling material for maxillary sinus floor augmentation, in addition to being safe and effective.