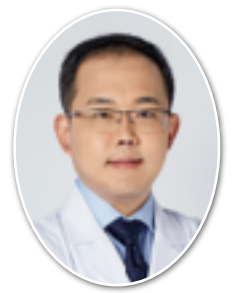


Achieving Predictable Maxillary Sinus Bone Augmentation: **BASS** Principles

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Introduction: Maxillary sinus floor elevation is a commonly used surgical method to solve the problem of insufficient bone mass in the posterior maxillary region. However, we also found that even when the maxillary sinus is healthy, the mucosal detachment is complete, or the sinus membrane morphology is intact through postoperative imaging examination, the osteogenic effect of the implanted bone graft material is sometimes not ideal.

Method: The factors affecting the effect of maxillary sinus bone augmentation were reviewed and summarized according to the logic of the author.

Results: Based on the special background of maxillary sinus bone augmentation, we explore the principles of achieving predictable maxillary sinus bone augmentation results from the mechanism of osteogenesis, which can be considered from four aspects: **Bone contact area, Angiogenesis, Stability of Space, and Safe healing, abbreviated as the "BASS" principle.**

Conclusion: According to BASS principles, it can provide clinical guidance for obtaining predictable maxillary sinus floor bone augmentation in clinic.



Bone contact area



Angiogenesis

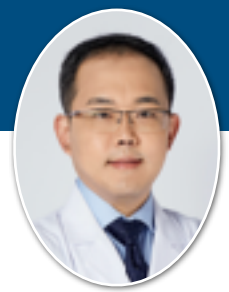


Stability of Space



Safe healing





B

Bone contact area

1、Morphology of the maxillary sinus floor

ORIGINAL RESEARCH
ARTICLE
New bone formation after transcrestal sinus floor elevation was influenced by sinus cavity dimensions: A prospective histologic and histomorphometric study

Does new bone formation vary in different sites within the same maxillary sinus after lateral augmentation? A prospective histomorphometric study

Claudio Stacchi¹ | Antonio Rapin² | Teresa Lombardi² | Fabio Bernardini² | Vanessa Nicolli² | Federico Beria²

PMJ / Periodontics Restorative Dent. 2023; 104(4):434-435. doi: 10.1902/pmj.2023.0001
Maxillary Sinus Elevation by Crestal Windows: Influence of DD Sinus Size on Bone Regeneration-A Retrospective Clinical and Histologic Evaluation

The effect of anatomy on osteogenesis after maxillary sinus floor augmentation: a radiographic and histological analysis

Wenjie Zhou¹ | Peng Wang¹ | Nader Nugh^{1,2} | Mingjie Zhuang¹ | Jun Sun³ | Yiqian Wu¹

2、Is the sinus membrane completely detached?

2.1. Operation difficulty caused by anatomic structure of maxillary sinus

2.2. Adhesion strength, lifting strength and elastic strength of maxillary sinus membrane

3、The range and number of sinus lateral window

A prospective randomized controlled trial of two-window versus solo-window technique by lateral sinus floor elevation in atrophic posterior maxilla: Results from a 1-year observational phase

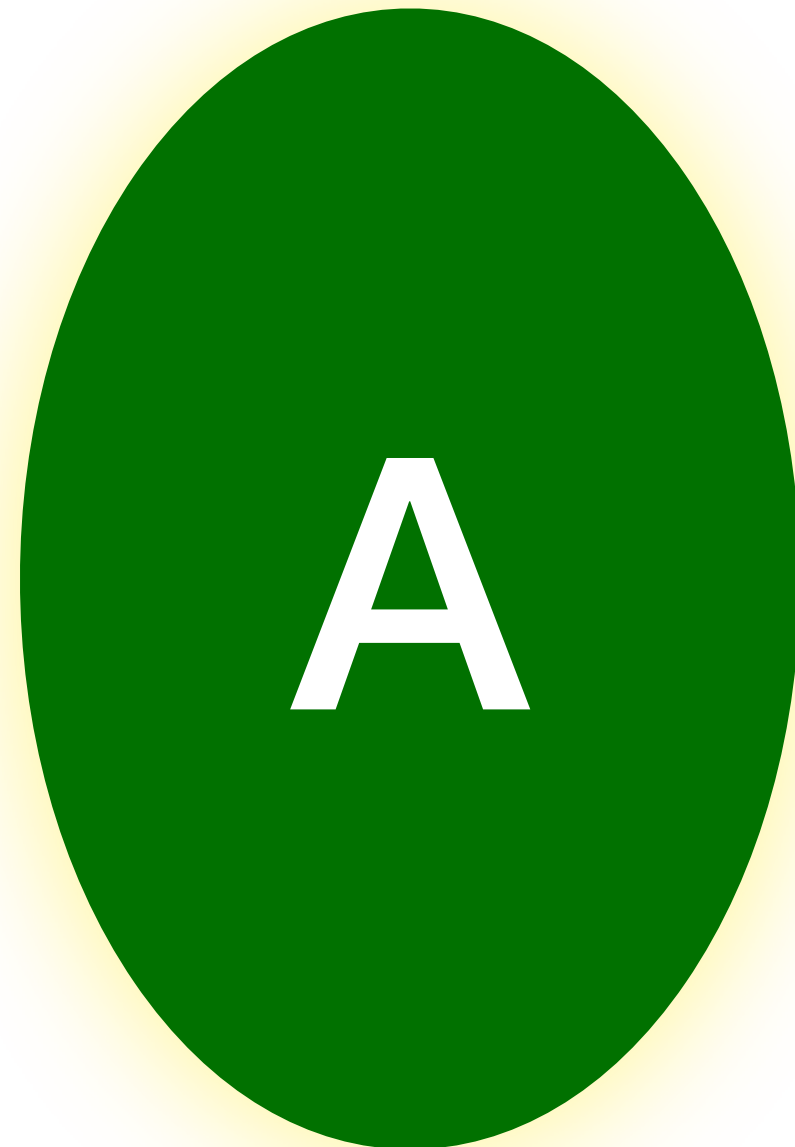
Huajie Yu, MD, DDS | Lixin Qiu, MD, DDS

Radiographic outcomes of lateral sinus floor elevation with and without bone window repositioning: one-year results of a randomized controlled trial

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P. Yu, W. Li, Y. Tang, M. Gao, L. Gao, Y. M. Tang, N. Zha: Radiographic outcomes of lateral sinus floor elevation with and without bone window repositioning: one-year results of a randomized controlled trial. *Int. J. Oral Maxillofac. Surg.* 2023; xxx: 1-7. © 2023. International Association of Oral and Maxillofacial Surgeons. Published by Elsevier Inc. All rights reserved.



Angiogenesis

1、Biocompatibility of materials

2、Osteogenic characteristics of materials

The surface morphology and internal pore structure (such as pore size, porosity, interconnectivity, and pore structure) of the graft material control its osteoconduction properties.

(Kasten et al., 2008; von Doernberg et al., 2006)

3、Hydrophilicity of materials

It has been reported that the hydrophilicity of the surface of the material significantly affects not only the adsorption of proteins, but also the attachment, growth, and proliferation of various cell types, including osteoblasts.

The high hydrophilicity suggests that it may have advantages in protein adsorption as well as in the cell adhesion and proliferation processes that arise after implantation.

4、Growth factors

Platelet concentrate can accelerate the angiogenesis process by promoting endothelial cell chemotaxis!

Evaluation of L-PRF combined with deproteinized bovine bone mineral for early implant placement after maxillary sinus augmentation: A randomized clinical trial
Elton Carlos Richetto DDS, MSc, PhD¹ | Rafael Souto de Mello DDS, MSc, PhD² |
Ricardo Vilela de Souza DDS, MSc, PhD³ | Robert S. Austin DDS, MSc, PhD⁴ |
Flávia Marcondes DDS, MSc, PhD⁵ | Daniela Leal Zaidan-Barcellos DDS, MSc, PhD⁶

5、Systemic diseases that may affect the potential revascularization

Bisphosphonate; Smoking; Diabetes; Head and neck radiotherapy; Alcohol



S

Stability of Space

1、Space **formation/maintenance** capacity of bone graft materials: **mechanical strength, substitution rate**

- 1.1. The mechanical properties of bone graft material determine the space formation ability of bone graft;
- 1.2. The replacement rate of bone graft materials determines the ability of bone graft space to be maintained

2、Stability of Implant

During the healing process of implants, decreased stability may have adverse effects. In particular, the remaining maxillary sinus bone is mainly cortical bone.

3、Stability of the wound

Wound dehiscence can cause bone graft material to overflow from the wound area.



S

Safe healing

1、 Postoperative sinus membrane perforation

Perforation in the mucoperiosteal (occult perforation) of the maxillary sinus floor elevation, defect in the repair of the perforation, and mucoperiosteal necrosis due to excessive pressure and overfilling of the bone graft material may lead to postoperative perforation.

2、 Postoperative infection

Intra-maxillary sinus displacement of bone graft material may lead to occlusion of the maxillary sinus opening, resulting in acute or chronic maxillary sinusitis.

Bone graft material is contaminated with bacteria

3、 Unhealthy living habit, such as, smoking et al.