

## Paradigm shift regarding sinus augmentation

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The atrophic posterior maxilla is a challenging site for oral rehabilitation with dental implants due to insufficient bone volume. Crestal or lateral window approaches for sinus augmentation are the most common surgical techniques to overcome the vertical deficiency of the atrophic posterior maxilla. Various bone graft materials have been used in recent decades as space makers in the compartment created under the elevated sinus mucosa. However, clinicians have occasionally experienced postoperative sinus complications after performing sinus bone graft. Sinusitis is the most serious complication associated with bone-added sinus augmentation. Sinusitis can be resolved using incision and drainage in some cases, but complete curettage of bone grafts and removal of implants is required when incision and drainage are not effective. When sinusitis occurs, the relationship between the patient and doctor can be harmed due to increased surgical costs and delayed healing; thus, prevention of sinusitis is key. To treat sinusitis is meaningless to our patients. How can we prevent sinusitis? Postoperative sinusitis is closely related to sinus mucosal perforation and bone graft. To reduce the rate of sinus perforation, first, clinicians should review in detail the step-by-step procedure for sinus augmentation. Second, a piezoelectric device should be used when preparing the bony window. A rotary bur has generally been used to prepare the bony window; however, surgeons who have limited experience with sinus augmentation may cause more frequent sinus membrane perforation during this part of the procedure. Mucosal perforation can delay surgery and lead to postoperative sinusitis. A piezoelectric surgical technique enables bone cutting with precision and has a low associated risk of sinus perforation. Furthermore, the ultrasonic piezoelectric surgical device minimizes damage to soft tissue and other structures, such as nerves and blood vessels, while cutting bone, even in cases of accidental contact. When a sizeable membrane perforation occurs, delay of sinus bone graft is recommended because mucosal perforation repair with a collagen membrane cannot completely prevent sinusitis. When the bone graft

procedure is continued after sinus perforation and repair, numerous clinical studies have revealed high rates of sinusitis and implant failure<sup>1,2</sup>. Third, the use of bone grafts should be limited in the sinus. The key to inducing new bone formation in the sinus is not bone substitution, but, rather, space maintenance in the new compartment. Bone grafts, as a foreign material, are susceptible to infection. In addition, compared to bone-added sinus augmentation, more new bone formation is reported when bone grafts are not used.

To enhance new bone formation in the sinus, the utilization of a replaceable bony window is strongly recommended. Unlike collagen membranes, replaceable bony windows act as a homologous osteoinductive barrier; as such, homologous bony windows are free from viral cross-contamination of animal or human origin, and precise adaptation of lateral bony windows completely prevents soft tissue ingrowth. Repositioning of the bony window clinically led to complete bone healing between the replaceable bony window and more mature bone was observed along the floor of the replaceable bony window than at the center of the graft site<sup>3,4</sup>. It is time to review and accept change to inflexible views regarding sinus augmentation in order to improve patient outcomes.

### Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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