Complications When Augmenting the Posterior Maxilla

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KEYWORDS

• Sinus lift • Complications of sinus lift • Lateral window • Osteotome
• Bone augmentation

KEY POINTS

- Sinus augmentation is considered a successful procedure to provide adequate vertical bone augmentation in the maxillary posterior atrophic alveolar ridge for the placement of dental implant.
- Complications of maxillary sinus augmentation may occur during or after the surgical procedure.
- The most frequent intraoperative complication of maxillary sinus lift is perforation of the sinus membrane.
- The most common postoperative complication is sinus infection.

INTRODUCTION

Definition of Problem

A discussion of augmentation of the posterior maxilla is inadequate in view of therapeutic capabilities. Increasing the vertical dimension of bone alone should no longer be considered a successful treatment outcome. Rather, the clinician must look toward reconstruction of the posterior maxilla in a three-dimensional manner. Such reconstruction must have specific goals, which are attainable and address the multilevel concerns of both the clinician and the patient regarding comfort, function, aesthetics, and long-term predictability.

Sinus augmentation was once considered successful if adequate bone was present posttherapeutically for placement of at least a 10-mm-long implant. No consideration

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was given to the buccopalatal positioning of the implant, nor its diameter. The definitions of success often used after sinus augmentation, and subsequent implant placement and restoration, are flawed at best.

The surgical rehabilitation of the atrophic maxillary has been established as a predictable treatment.[1–7] Several recent reviews have shown implant survival rates using lateral window[2,5,7] and transcrestal techniques[8,9] for sinus elevation surgery to be more than 95%. Jensen,[7] in a review of 85 studies, reported survival rates for the rough-surfaced implants of 88.6% to 100%. These rates were found to be comparable with nongrafted sites.

The concept of implant success versus implant survival is still debated. Initially, all implants that attained osseointegration and fulfilled the criteria of Albrektsson and colleagues[10] regarding immobility, lack of suppuration, or tissue inflammation, and so forth were considered successful. As has long been evident through a historical analysis of the development of knowledge, concepts once believed revolutionary become foundational building blocks on which to evolve a more nuanced understanding and outlook. Although the Albrektsson criteria were an invaluable starting point, such criteria do not assess the stability of bone on the buccal or palatal/lingual aspects of an implant.

Any discussion of implant success must include an implant assessment, which combines the Albrektsson and colleagues' criteria with buccal and lingual/palatal bone assessment to ensure peri-implant marginal bone stability. Once these measurements are taken, the clinician can truly claim a successful implant therapeutic outcome. Such considerations are not purely semantic. To appropriately assess therapeutic efficacy in the long-term, criteria must be used that separate true success from mere survival. Unless the clinician is to assume the role of an actuarial, success is the only true goal.

As already mentioned, reconstruction of the posterior maxilla should always be viewed in a three-dimensional manner. Adequate bone must be present after regenerative efforts to place an implant in the ideal, prosthetically driven position. However, such a regenerative outcome is not in itself adequate. Although the concept of prosthetically driven implant placement is popular and well intentioned, it does not take into account the diameter of the tooth being replaced, or the fact that functional and parafunctional forces have their greatest effect on the peri-implant crestal bone. The greater the implant diameter, the greater the potential surface area of the osseointegrative bond at the crest of bone, to help better dissipate these forces. Therefore, buccopalatal/lingual regenerative efforts should be aimed at rebuilding adequate bone for prosthetically driven placement of an implant of the ideal diameter for the tooth being replaced (**Fig. 1**). Of course, when such placement results in a thin patina of bone on the buccal or palatal/lingual aspect of the implant, treatment should not be deemed successful. The likelihood of this thin patina of bone resorbing under function over time is high. Such resorption results in significant compromise of the osseous support of the implant. Buccopalatal/lingual regeneration should be considered successful if the following criteria are met.

An implant of ideal dimensions for the tooth being replaced may be placed in a prosthetically driven position, and show a minimum of 2 mm of bone buccally and palatally/lingually at the osseous crest. Such a treatment result helps ensure long-term stability of the bony support of the implant under function. Another and most important criterion for success is a maximization of treatment outcomes in conjunction with a minimization of therapeutic insult to the patient. The most conservative treatment approach possible must always be used, assuming that the final treatment