



Multidisciplinary Management of Candidates for Maxillary Sinus Augmentation by a Surgeon and ENT Specialist

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INTRODUCTION

Maxillary sinus augmentation has been shown to be a predictable treatment option for placing dental implants in areas of posterior maxilla with lack of sufficient residual alveolar bone height.¹ The transalveolar (crestal) and the lateral window are the main techniques for the maxillary sinus augmentation with the goal of creating a space beneath the Schneiderian membrane in which to place various grafting materials in order to increase alveolar bone height. Different studies have found high implant survival rates following the utilization of bone substitutes in sinus grafting procedures.¹

Although sinus augmentation is considered a successful procedure, surgeons need to know that the proximity of the maxillary sinus means that sinus augmentation may compromise sinus function causing unpleasant complications that may affect a positive outcome. Therefore, cooperation of the ear, nose, and throat (ENT) specialist and the surgeon is a very critical step prior to the surgery, which results in a diagnosis of a preexisting condition or susceptibility to sinus disease. This article highlights the conditions that need multidisciplinary management of

patient by a surgeon and ENT specialist prior to or after the maxillary sinus augmentation.

Prescribing cone beam computed tomography (CBCT) prior to treatment planning for the maxillary sinus elevation is critical and recommended as the best radiographic modality for cross-sectional imaging because it provides the greatest diagnostic information at an acceptable radiation dose risk.² Cone beam computed tomography can help us to comprehensively evaluate anatomical structures of the sinus including septa, intraosseous anastomosis of vasculature, proximity of medial and lateral walls, thickness and configuration of lateral wall, Schneiderian membrane thickness, and residual alveolar bone architecture.^{3,4} Clinicians can assess the approximate bone graft volume required prior to sinus elevation procedure and also volumetric and density changes of grafted area after the procedure.⁵ Cone beam computed tomography is considered as a diagnostic tool for evaluation of pathologic conditions, such as cysts and malignancies of the maxillary sinus.⁶ It is very important to get the high-resolution scan with a field of view involving all the sinus structures, especially osteomeatal complex (OMC). Radiologic evaluation of OMC prior to sinus augmentation should be performed to indicate patency and the position of sinus ostium from the sinus floor and detect any related OMC anatomic changes or concomitant sinus pathologies.⁷ Any pathologic alterations of middle meatus or maxillary sinus should be addressed prior to sinus augmentation in order to avoid the risk of developing postoperative sinusitis, especially in cases with compromised sinus clearance.

Taking comprehensive medical history is necessary with the emphasis on the presence of recurrent or chronic nasosinus diseases, previous trauma to nasal cavity, as well as nasal respiratory obstruction.^{7,8} In addition, all the cases with radiologic and clinical symptoms suggesting

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deterioration in sinus ventilation and drainage should undergo further ENT examination.

A close collaboration of ENT specialist and implant surgeon is required to provide the patient with a prophylactic hygienic regimen prior to sinus augmentation and minimize the risk of postoperative complications. This regimen includes avoiding inhalation of pollutant, smoking cessation, avoiding mucosal dehydration by exposure to dry and low-temperature air.⁷

The main etiology of maxillary sinus disease is altered mucociliary clearance, impaired drainage of the sinus, or altered nasal secretion.⁹ Sinusitis may compromise the outcome of the sinus augmentation by increasing the chance of postoperative infection and inflammation, which may also affect the proper ventilation and possible bone graft loss.^{7,9} Patients with chronic sinusitis related to allergies are at higher risk of postoperative complications.¹⁰ Therefore, it is highly recommended to control and resolve the symptoms prior to surgery, which can be done with steroids and antihistamines.

It has been shown that chronic and subacute maxillary sinusitis developed in 1.3 and 4.5% of cases with sinus augmentation procedure respectively.¹¹ Maxillary sinus augmentation affects the sinus homeostasis by various mechanisms. Reflecting a Schneiderian membrane causes a minor trauma to the membrane, which may inhibit ciliary activity of sinus lining temporarily. It may also lead to perforation of the membrane that can alter mucus composition due to bacterial infections. Osteomeatal complex patency might be affected in different ways^{7,12}:

- Excessive vertical bone augmentation, especially in cases with antral pathologies.
- Entrapment of grafting materials into the ostium.
- Transient inflammatory periosteal swelling.

It is noteworthy to mention that the chance of sinus ostium obstruction increases when the size of the displaced grafting material is greater than 5 mm.¹²

Common anatomic alterations, such as the existence of paradoxical middle turbinates or small concha bullosae or mild deviation of the septum do not need any surgical correction by ENT specialists prior to sinus augmentation.⁸ However, the patient should be closely monitored for the presence of any discharge or dysventilation and symptoms of sinus disease.

Referral to ENT specialist is not necessary in cases with normal anatomy or symptom-free small benign polyps (≤ 0.7 cm) without any compromised sinus drainage.¹⁰

It has been demonstrated that mild postoperative inflammatory reaction is the result of transient physiological expression of mucosal lining defense system and the sinus can return to preoperative homeostasis after the procedure. Intrinsic potential of the sinus mucosal lining to

achieve its original normal homeostatic status after sinus augmentation procedure is known as sinus compliance.^{7,8} High sinus compliance, the better starting condition of the sinus, guarantees lower postoperative complications and vice versa. This fact puts more emphasis on the importance of the clinical and radiographic examinations of the maxillary sinus prior to surgery.

It has been shown that there is a direct association between odontogenic infection and maxillary mucosal impairment. Dental infection can slowly progress and spread to the sinus mucosa and compromise implant survival and success of the sinus augmentation due to a possible silent maxillary sinusitis of dental origin.¹³ Therefore, patients who previously had dental treatment need careful radiographic and clinical evaluation prior to surgery.

The main conditions that should raise clinician's attention prior to sinus augmentation are severe sinus inflammation, oroantral communication, nasal/sinus obstruction or any disease that compromises nasal/sinus drainage, and previous sinus surgery.^{7,10}

The main postoperative complications of sinus augmentation are protrusion of grafting materials into the sinus cavity followed by the perforation of Schneiderian membrane, formation of oroantral communication followed by wound dehiscence, displacement of the implant into the sinus due to the lack of primary stability, acute or chronic maxillary sinusitis, bone sequestration, and hematomas.^{7,14,15}

Perforation of the sinus membrane might happen due to overfilling of the created space, especially with sharp-angled grafting materials. Small perforation of the sinus membrane is usually not considered a risk factor for maxillary sinusitis after sinus augmentation, specifically in patients without prior clinical symptoms; however, larger perforation puts the patient in higher risk of complications due to greater exposure of grafting material that might penetrate into the sinus cavity.¹²

In conclusion, multidisciplinary management of patients prior to sinus augmentation could aid in diagnosis of a preexisting sinus disease and prevention of further complications after surgical procedure. Patients with the radiographic signs of sinus disease or conditions with compromised nasal/sinus drainage or impaired epithelial function require a referral to ENT specialist for further assessment.

REFERENCES

1. Del Fabbro M, Rosano G, Taschieri S. Implant survival rates after maxillary sinus augmentation. *Eur J Oral Sci* 2008 Dec;116(6):497-506.
2. Tyndall DA, Price JB, Tetradis S, Ganz SD, Hildebolt C, Scarfe WC, American Academy of Oral, Maxillofacial

- Radiology. Position statement of the American Academy of Oral and Maxillofacial Radiology on selection criteria for the use of radiology in dental implantology with emphasis on cone beam computed tomography. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2012 Jun;113(6):817-826.
3. Rosano G, Taschieri S, Gaudy JF, Weinstein T, Del Fabbro M. Maxillary sinus vascular anatomy and its relation to sinus lift surgery. *Clin Oral Implants Res* 2011 Jul;22(7):711-715.
 4. Danesh-Sani SA, Movahed A, ElChaar ES, Chong Chan K, Amintavakoli N. Radiographic evaluation of maxillary sinus lateral wall and posterior superior alveolar artery anatomy: a cone-beam computed tomographic study. *Clin Implant Dent Relat Res* 2016 May.
 5. Sbordone C, Toti P, Guidetti F, Califano L, Bufo P, Sbordone L. Volume changes of autogenous bone after sinus lifting and grafting procedures: a 6-year computerized tomographic follow-up. *J Craniomaxillofac Surg* 2013 Apr;41(3):235-241.
 6. Beaumont C, Zafiroopoulos G-G, Rohmann K, Tatakis DN. Prevalence of maxillary sinus disease and abnormalities in patients scheduled for sinus lift procedures. *J Periodontol* 2005 Mar;76(3):461-467.
 7. Pignataro L, Mantovani M, Torretta S, Felisati G, Sambataro G. ENT assessment in the integrated management of candidate for (maxillary) sinus lift. *Acta Otorhinolaryngol Ital* 2008 Jun;28(3):110-119.
 8. Torretta S, Mantovani M, Testori T, Cappadona M, Pignataro L. Importance of ENT assessment in stratifying candidates for sinus floor elevation: a prospective clinical study. *Clin Oral Implants Res* 2013 Aug;24 Suppl A100:57-62.
 9. Timmenga NM, Raghoobar GM, Liem RS, van Weissenbruch R, Manson WL, Vissink A. Effects of maxillary sinus floor elevation surgery on maxillary sinus physiology. *Eur J Oral Sci* 2003 Jun;111(3):189-197.
 10. Cote MT, Segelnick SL, Rastogi A, Schoor R. New York state ear, nose, and throat specialists' views on pre-sinus lift referral. *J Periodontol* 2011 Feb;82(2):227-233.
 11. Timmenga NM, Raghoobar GM, van Weissenbruch R, Vissink A. Maxillary sinusitis after augmentation of the maxillary sinus floor: a report of 2 cases. *J Oral Maxillofac Surg* 2001 Feb;59(2):200-204.
 12. Zimble MS, Lebowitz RA, Glickman R, Brecht LE, Jacobs JB. Antral augmentation, osseointegration, and sinusitis: the otolaryngologist's perspective. *Am J Rhinol* 1998 Sep-Oct;12(5):311-316.
 13. Legert KG, Zimmerman M, Stierna P. Sinusitis of odontogenic origin: pathophysiological implications of early treatment. *Acta Otolaryngol* 2004 Aug;124(6):655-663.
 14. Aimetti M, Romagnoli R, Ricci G, Massei G. Maxillary sinus elevation: the effect of macrolacerations and microlacerations of the sinus membrane as determined by endoscopy. *Int J Periodontics Restorative Dent* 2001 Dec;21(6):581-589.
 15. Danesh-Sani SA, Loomer PM, Wallace SS. A comprehensive clinical review of maxillary sinus floor elevation: anatomy, techniques, biomaterials and complications. *Br J Oral Maxillofac Surg* 2016 Sep;54(7):724-730.