

Case Report

Sinus Floor Elevation From a Maxillary Molar Tooth Extraction Socket in a Patient With Chronic Inflammation

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Background: *The compromised nature of the residual interradicular bone after extraction of periodontally hopeless maxillary molars often requires a sinus elevation procedure to ideally place the implants to accept future prosthesis. Maxillary sinus elevation surgery is a procedure used to increase the volume of bone mass so that dental implants can be placed. This article documents a sinus floor elevation technique through an extraction socket in a 65-year-old white male with chronic inflammation to increase the bone mass after the extraction of a periodontally involved maxillary molar tooth.*

Methods: *Computerized tomography revealed an increased thickness of the sinus membrane, which was attributed to possible chronic sinus inflammation and periodontal inflammation. After consultation with the Department of Otolaryngology, it was diagnosed as chronic inflammation without any contraindication for sinus elevation surgery or implant placement. One month after the extraction, the sinus floor elevation surgery was performed through the extraction socket, and implants were placed 4 months later.*

Results: *An uneventful healing was noted after 6 months of osseointegration; two porcelain-fused-to-metal crowns were fabricated. Clinical follow-up took place every 3 months for 3 years, and successful healing was achieved. The patient was satisfied with the esthetic and functional results of the oral rehabilitation.*

Conclusion: *Sinus floor elevation through an extraction socket without any residual bone, followed by dental implant placement, provided successful functional results and acceptable stability. J Periodontol 2009;80:521-526.*

KEY WORDS

Bone regeneration; case report; dental implant; inflammation; periodontitis; sinus; surgery.

Dental implant therapy has become an excellent treatment modality for patients with partial or full edentulism. Sufficient volume and density of the alveolar bone for implant integration and load bearing are prerequisites for a good clinical outcome.¹ Dental implants are a viable option when there is sufficient quality and quantity of bone.² However, deficient alveolar ridges could jeopardize the application of implant dentistry.² Especially, an insufficient alveolar bone height below the maxillary sinus restricts insertion of the implant body in the upper jaw.^{3,4} Several sinus floor elevation techniques have been recommended in the literature to overcome these limitations. A lateral approach with a large amount of bone augmentation was initially described by Tatum⁵ in 1986, and a more conservative crestal approach with osteotomes with a limited amount of bone augmentation was advocated by Summers⁶ in 1994. Sinus floor augmentation has become widely accepted as a routine method to improve the amount of bone volume before implant placement.⁷⁻⁹ In recent years, sinus augmentation procedures that are performed by osteotomes at the time of dental extraction have been introduced.⁷⁻¹⁰

Chronic inflammation in the maxillary sinus necessitates the administration of pharmacologic treatment with decongestants, antihistamines, steroids, and possibly antibiotics as prescribed by an otorhinolaryngologist to complete resolution to provide the best possible surgical environment.¹¹ If conservative therapy fails, functional endoscopic sinus surgery should be performed. Clinical evidence suggests that maxillary sinus augmentation procedures have limited effects on sinus physiology,¹¹ even when intraoperative complications occur.¹²⁻¹⁴ Following sinus augmentation surgery, post-surgical complications or compromised results tend to be associated with preexisting sinus disease or a documented susceptibility to sinus disease.¹¹ Therefore, proper preoperative evaluation of a patient scheduled to undergo a sinus augmentation procedure is required to minimize postoperative adverse events.¹⁵

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This article documents a sinus floor elevation technique through an extraction socket in a 65-year-old white male with chronic inflammation to increase the bone mass after the extraction of a periodontally involved maxillary molar tooth.

CASE REPORT

A 65-year-old white male was referred to the Department of Periodontology, Hacettepe University, on June 12, 2005 for a hopeless maxillary first molar. The patient did not have any systemic disorders and was a former smoker. Following clinical and radiographic assessment (Fig. 1), computerized tomography (CT) was performed to determine whether adequate bone height was present crestal to the sinus floor. CT revealed an increased thickness of the Schneiderian membrane, which was attributed to periodontal inflammation and possible chronic sinus inflammation. Furthermore, there was no bone present between the most caudal part of the sinus and the roots of the maxillary first molar (Fig. 2). Additional bone height was needed to ensure placement of an implant. After consultation with the Department of Otolaryngology about his sinus membrane inflammation, it was diagnosed as chronic inflammation, indicating there was no contraindication for a sinus lift procedure and/or implant placement. Following local anesthesia, the periodontally involved molar tooth was carefully extracted (Fig. 3). The extraction socket healed successfully. A period of 4 weeks passed intentionally for the future planned surgical sinus membrane elevation to achieve primary soft tissue coverage. Local anesthesia was administered prior to the second surgical procedure. A crestal incision was made in the middle of the extraction socket and extended with the sulcular incisions to the first premolar.

Mesial and distal releasing incisions extending well up into the buccal fold were placed at the mesial aspect of the papilla between the right first premolar and the right canine and the distal ending of the crestal incision. The buccal mucoperiosteal flap was reflected in a full-thickness manner with care taken to create a freely moving flap, and a palatal mucoperiosteal flap was also reflected. After debridement of the healing tissues inside the extraction socket, care



Figure 1.

Panoramic radiograph of the hopeless maxillary molar with advanced periodontal disease.

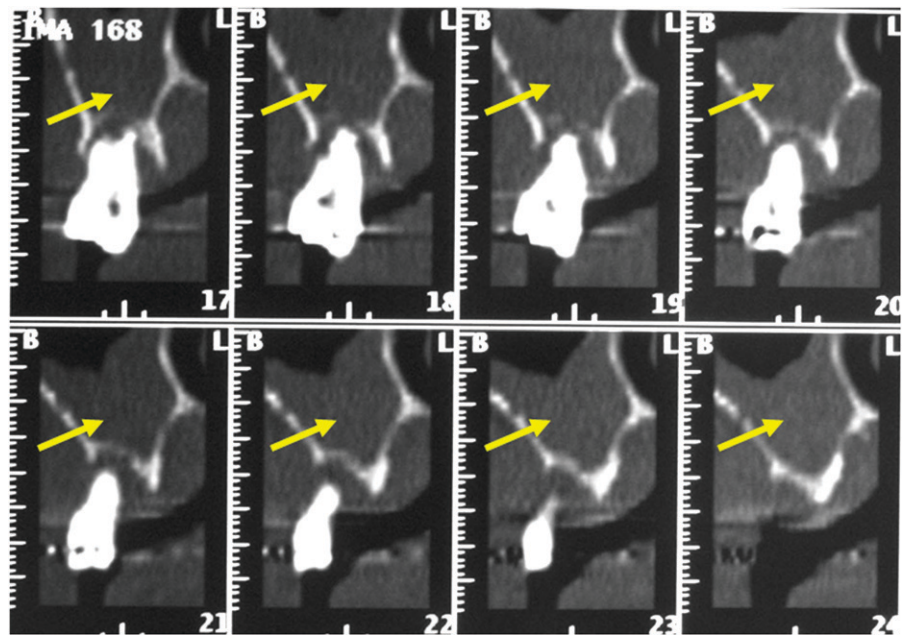


Figure 2.

CT scan of the maxillary molar tooth with an increased sinus membrane thickness (chronic sinus inflammation). Arrows denote the sinus pathology, which appears opaque in the CT scan.

was taken to free up the sinus membrane in all directions (anteriorly, posteriorly, and medially); no membrane perforation was seen. A space was created under the sinus membrane; bovine bone with synthetic hydroxyapatite^{†16} was used to fill the space and the extraction socket, and a bioabsorbable collagen membrane^{§17} was placed over the socket. The flaps were sutured using sling sutures to achieve passive primary closure. A cold compress was

† Dexabone, grain size: 1.0 to 2.0 mm, Cardiophil, Herzlia, Israel.

§ Hypro-Sorb F, Resorbable Bilayer Collagen Membrane, Cardiophil.



Figure 3.

Intraoperative view of the extracted molar; the sinus membrane is clearly noted without any native alveolar bone.

provided immediately after the surgery. Postoperative prescriptions included amoxicillin, 500 mg, three times daily for 7 days, 0.2% chlorhexidine gluconate twice daily for 3 weeks,⁸ and antihistamine¹⁸ once a day for 2 weeks. Four months after the sinus augmentation, two tapered screw-type dental implants,¹⁹ with a diameter of 4.8 mm and a length of 12 mm, were inserted into the area. Extensive care was taken during the entire surgical procedure. Because of the extraction of the periodontally involved molar tooth, no native bone was found in the region in which the implants were inserted through the augmented bone particles. After 6 months of osseointegration, an uneventful healing was achieved; two porcelain-fused-to-metal crowns were fabricated. The clinical examination (Fig. 4) and panoramic radiographs (Fig. 5) at the 3-year follow-up were evaluated; successful healing was achieved. When the cross-sectional views of the CT were evaluated (Fig. 6), the bodies of both implants were surrounded by the grafted bone particles. The patient was satisfied with the esthetic and functional outcomes.

DISCUSSION

Grafting of the maxillary sinus is a method for achieving sufficient bone height for posterior maxillary implant placement; it has proven to be a highly successful method with predictable results.²⁰⁻²² Because primary stability is essential for dental implants, ≥ 5 mm of alveolar bone height is recommended for the osteotome technique, whereas implant placement is recommended when the initial alveolar bone height is ≥ 5 to 7 mm.^{23,24} In the present case, there was no bone height at the sinus floor (only a space with a bas-

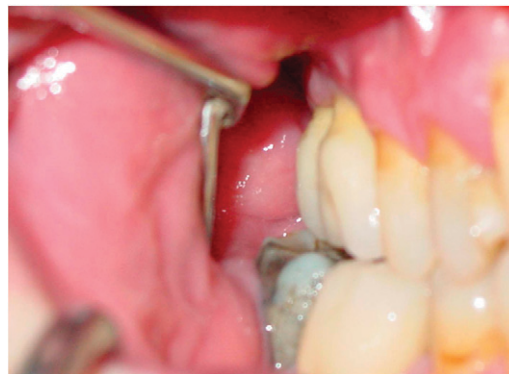


Figure 4.

Intraoral views of the rehabilitated area at the 3-year follow-up.

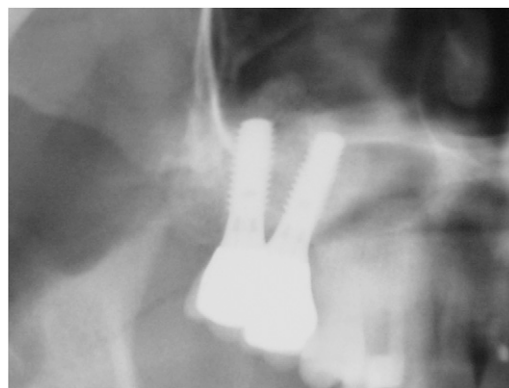


Figure 5.

Panoramic radiograph of the surgical site after 3 years.

ket shape). Therefore, a two-stage surgical intervention was chosen to build up vertical bone and to place dental implants with a successful primary stability.

Another critical factor was to determine how chronic inflammation at the maxillary sinus affects the success of sinus elevation surgery. Beaumont et al.¹⁵ reported that the prevalence of sinus-related

|| The Zimmer Screw-Vent Implant System, Zimmer Dental, Carlsbad, CA.

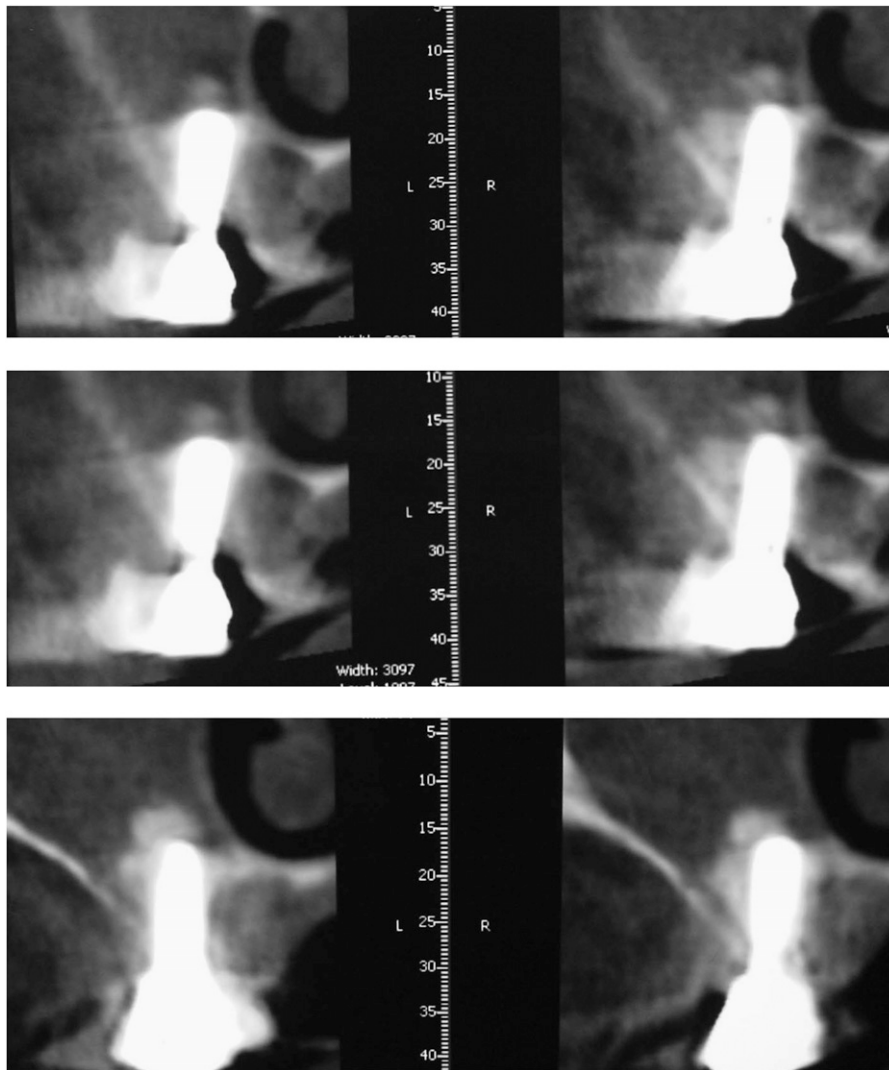


Figure 6.

CT scan of the region at the 3-year follow-up.

diagnoses in periodontal patients scheduled for a sinus augmentation procedure was 40%, based on radiographs (panoramic and CT) and a clinical (endoscopic) examination. In a prospective study¹¹ of 17 patients who were scheduled for sinus augmentation and prescreened for preoperative clinical and radiographic signs of sinusitis, radiographic (Water's projection) and endoscopic examination revealed preexisting mucosal disease in 18%. In a study with 293 elderly (76 to 86 years) subjects, Soikkonen and Ainamo²⁵ reported a 12% prevalence of radiographic evidence of sinus disease in panoramic radiographs. There are several plausible explanations for the discrepancies among the various studies, including population characteristics, preexamination screening, method of examination, and criteria used to define sinus disease. Another possible explanation

is the reported seasonal variations in the prevalence of sinus disease, which is greater in fall and winter.^{26,27}

Inflammatory conditions can affect the maxillary sinus from odontogenic and non-odontogenic reasons. The proximity of the roots of the maxillary posterior teeth to the antrum means that any inflammatory changes in the periodontium or surrounding alveolar bone may cause pathologic conditions in the maxillary sinus.²⁸ Sinusitis of odontogenic origin accounts for about one-tenth of all cases of maxillary sinusitis.²⁹ Periodontitis may produce generalized sinus mucosal hyperplasia that follows the contours of the sinus floor.²⁸ A normal sinus membrane has a thickness ~0.8 mm.²⁰ The sinus membrane usually becomes thicker with chronic sinus and/or periodontal inflammation. In our patient it was 7 mm; there was no contraindication for sinus augmentation surgery because there was no clinical diagnosis of acute sinusitis, which is characterized by a typical triad of symptoms: nasal congestion, pathologic secretion or obstruction, and headache.²⁷ At the 36-month follow-up, there was no dimensional change at the hypertrophic sinus membrane, and the patient did not present any complaints.

Various grafting materials have been used during sinus augmentation procedures, including autogenous bone, freeze-dried bone allografts, xenografts, alloplasts, or a combination of these materials,³⁰⁻³² as well as bone morphogenetic proteins.²¹ Even if their efficacy was not confirmed by large multicenter trials, bone substitutes might be as effective as autogenous bone grafts for augmenting extremely atrophic maxillary sinuses.³² In our case we used bovine hydroxyapatite bone with a bioabsorbable membrane as previously described.^{16,17}

According to the literature, sinus augmentation in periodontal patients can be successful, provided that preexisting sinus disease is adequately addressed.¹⁵ Studies^{33,34} demonstrated successful sinus augmentation and implant placement in periodontal patients. One can ask which is the most appropriate technique for the treatment of a maxillary molar residual

extraction socket? If a regenerative procedure is not performed, significant three-dimensional alveolar resorption may occur. In our case, the Tatum⁵ technique and the Summers⁶ technique, recently modified by Jensen et al.⁷ and Fugazzotto,⁸ was not preferred, because the surgical region had no residual bone at the sinus floor. Three years after prosthodontic rehabilitation, an uneventful period was analyzed by the patient and the authors.

CONCLUSIONS

Successful treatment was possible after the extraction of a periodontally involved molar with chronic sinus inflammation without any residual bone. Sinus floor elevation through an extraction socket without any residual bone was also possible, followed by the placement of dental implants that demonstrated successful functional results and acceptable stability.

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The authors report no conflicts of interest related to this case report.

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