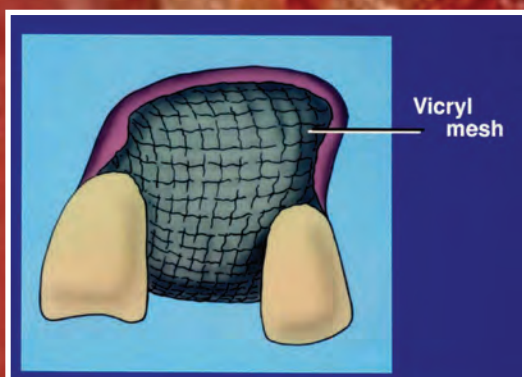


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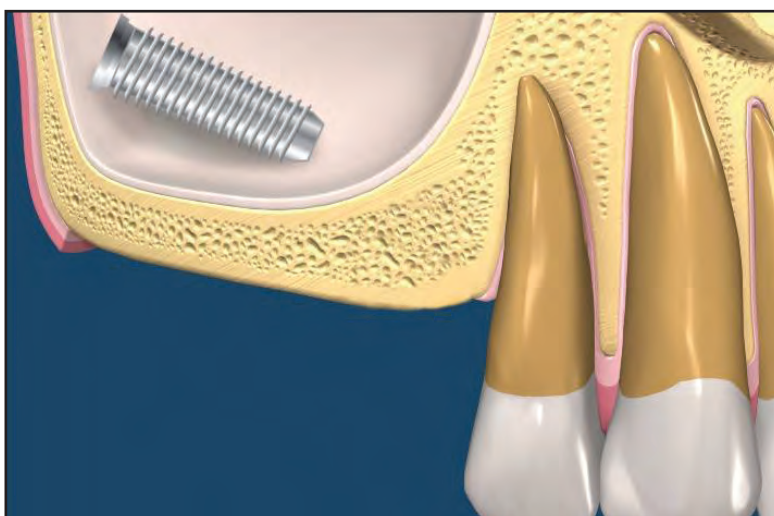


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Dental Implant Migration into Two Different Maxillary Sinus Cavities

Leon Chen, DMD, MS¹ • Jennifer Cha, DMD, MS¹

Abstract



The field of maxillary sinus augmentation and dental implant placement is expanding rapidly. A recently released American Dental Association (ADA) survey reveals a significant and consistent increase in the number of implants placed annually. Although numerous studies have shown the overall implant survival rate in the maxillary region to be over 91%, invasion of the maxillary sinus cavity is a frequent complication in dental implant treatment. The main contribution to this phenom-

enon is likely due to a simple increase in the number of implants placed. Yet, there is a paucity of reports in the literature of implants migrating into the sinus space. This case study presents two different types of invasion of the maxillary sinus by dental implants. These cases serve to remind specialists in dentistry that an aberrantly extruded implant can be occupied in two different spaces within the maxillary sinus cavity, and the necessity to differentiate and/or identify these two spaces.

KEY WORDS: Dental implants, sinus lift, complications

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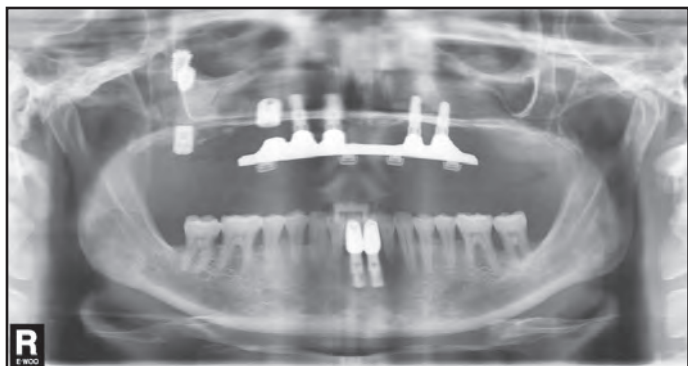


Figure 1: Panoramic radiograph showing 2 aberrantly located implants in the right maxillary sinus.

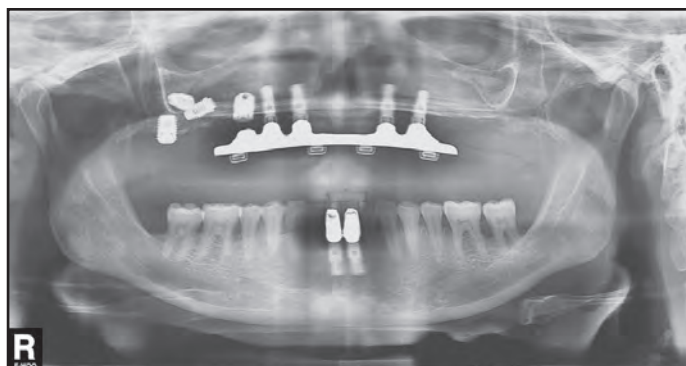


Figure 2: Compared to Figure 1, note the movement of the aberrant implants upon patient repositioning.

INTRODUCTION

The field of maxillary sinus augmentation and dental implant placement is expanding rapidly. A recently released American Dental Association (ADA) survey reveals a significant and consistent increase in number of implant placed.¹ Although numerous studies have shown the overall implant survival rate in the maxillary region to be over 91%,² invasion of the maxillary sinus cavity is a frequent complication in dental implant treatment. The main contribution to this phenomenon is likely due to a simple increase in the number of implants placed. Yet, there is a paucity of reports in the literature of implants migrating into the sinus space.³ This case study presents two different types of invasion of maxillary sinus by dental implants. These cases serve to remind specialists in dentistry that an aberrantly extruded implant can be occupied in two different spaces within the maxillary sinus cavity, and the necessity to differentiate and/or identify these two spaces. Clarification of different spaces within maxillary sinus will be further discussed later.

CASE REPORTS

Case 1: Two Extruded Implants in the Maxillary Sinus Cavity Space

The patient is a healthy 51 year-old female with fully edentulous maxilla. In 2009, she received two dental implants in right maxillary region. The patient later presented in April of 2010 with complaints of “hearing transient clicking sounds and sinus congestion” that started about a month after her implant surgery. The panoramic radiograph revealed two extruded dental implants in the right maxillary sinus cavity. It was speculated from the residual bone height that no grafting or sinus elevation techniques were performed. It was agreed that 6 implants should be placed with a temporary prosthesis, and the two aberrant extruded implants be extracted. An initial radiograph was taken before implant surgery, and the positions of the aberrant implants were located to be in the most lateroinferior region within the maxillary sinus cavity. Six implants were placed avoiding right maxillary sinus region for extraction procedure, and another radiographs was taken (Figure 1). A second radiograph revealed the extruded

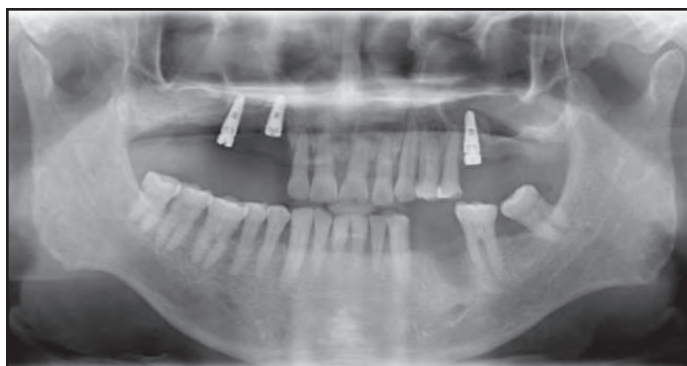


Figure 3: Panoramic radiograph immediately after surgical sinus elevation and placement of a dental implant at the site of the maxillary left first molar.



Figure 4: One month post-surgical panoramic radiograph suggesting aberrant movement of the dental implant from Figure 3.

implants had relocated to a more superior lateral region. This movement was speculated to the fact that patient had been in supine position for more than 30 minutes for the new implant placement procedure. To confirm that these aberrant implants had perforated Schneiderian membrane into the sinus cavity space (SCS), one more panoramic radiograph was taken after patient's head was in anatomical position for 10 minutes. As expected, the aberrant implants had migrated back down to lateroinferior region in the maxillary sinus cavity (Figure 2), and it was confirmed that these implants were in sinus cavity space rather than sinus membranous space. After exact positions of aberrant implants were determined, the Transmaxillary Trapezoidal Osteotomy technique (TTO) was performed to extract the implants.⁴ Prognosis is expected to be good, and the patient is expected to return for one year follow up.

Case 2 – One Extruded Implant in the Maxillary Sinus Membranous Space

The patient is a 57 year-old male smoker but otherwise healthy, with partially edentulous max-

illa and mandible. In 2010, he received three dental implants in his maxilla by a colleague. On the date of surgery, the patient presented with 6mm of vertical residual bone height on the left maxilla. A total of 5mm maxillary elevation was performed using hydraulic sinus condensing technique,^{4,5} and xenograft was placed into the sinus. Following sinus elevation, a 4.5 x 11.5mm tapered implant was placed (Figure 3). Final torque achieved for the implant was not noted. At the one month follow-up visit, a panoramic radiograph revealed an extruded dental implant in the left maxillary sinus cavity (Figure 4). The patient presented without any symptoms and discomfort. However, to avoid any future complication, he was referred to us for extraction of the aberrant implant. The patient's history and post-surgical radiograph suggested that the Schneiderian membrane had not perforated. Based on this information, we surmised that the aberrant implant most likely had not invaded into the maxillary sinus cavity space, but rather was entrapped within the space between sinus membrane and bony wall of maxilla. In order to confirm

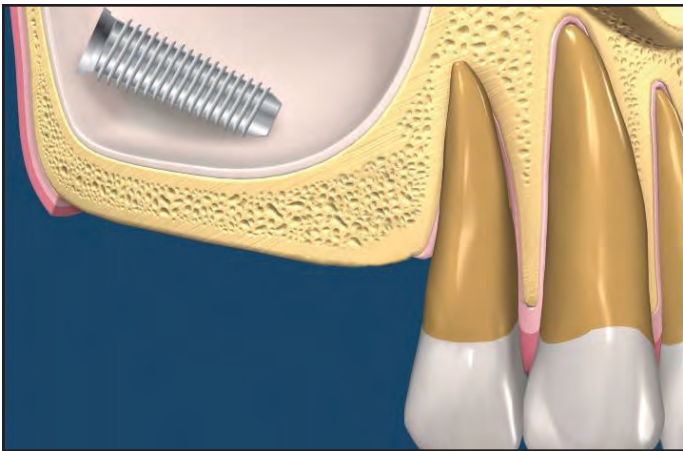


Figure 5: Aberrant dental implant located in the sinus cavity space (SCS). A perforation of the Schneiderian membrane must exist in order to enter this space.

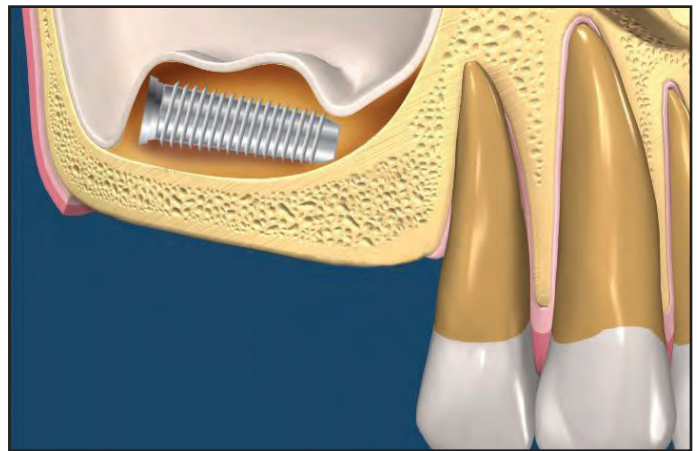


Figure 6: Aberrant dental implant located in the sinus membranous space (SMS). A perforation of the Schneiderian membrane does not have to exist in order to enter this space.

which space the implant was embedded in, 3 radiographs were taken at different time intervals. One radiograph was taken after patient was lying down in supine position and two additional radiographs were taken in an anatomical position to see if the implant was in any motion. All three radiographs revealed that the aberrant implant stayed in a static location. Again, the Transmaxillary Trapezoidal Osteotomy (TTO) technique was used to remove the implant after locating its exact position. Prognosis is expected to be good, and the case is in process of waiting for 1-year follow up.

DISCUSSION

In this study, we present two cases of invasion of the maxillary sinus by dental implants. These two cases clearly present extruded implants residing in two different spaces within the sinus cavity. Because differentiation of these two spaces has never been classified in anatomy, we would like to introduce novel terms

that better describe the two spaces within sinus cavity. In anatomy, the maxillary sinus cavity has been defined as one of the paranasal sinus spaces that occupy the bodies of the maxilla. Present at birth as rudimentary air cells, it develops throughout childhood as the largest paranasal sinus.⁶ The first novel term, *sinus cavity space* (SCS), refers to the space within maxillary sinus cavity surrounded by Schneiderian membrane (Figure 5). The significance of recognizing this space is that an extruded implant can reside in this space only if the Schneiderian membrane had perforated, thus providing passageway to this space. The second novel term, *sinus membranous space* (SMS), describes the space between the lining of an elevated Schneiderian membrane and bony surface of maxillary sinus (Figure 6). This space is normally non-existent (thus was never described by anatomy literature), but can be created either by separating the sinus membrane during a surgical procedure or by an end-

Table 1: Description of Proposed Sinus Spaces

Sinus Cavity Space (SCS)	Can only be reached by a perforation of sinus membrane	Must remain as a cavity space	Naturally occurring from birth
Sinus Membrane Space (SMS)	No sinus membrane perforation should exist	Can be filled in with bone graft	Created by surgical separation of the sinus membrane from the bone or by endodontic lesion

odontic lesion in maxillary teeth. Classifications of the two spaces are summarized in Table 1.

CONCLUSION

The authors feel that it is important to acknowledge and distinguish the different spaces within the maxillary sinus cavity. Depending on whether an extruded implant is occupied in sinus cavity space (SCS) or sinus membrane space (SMS), diagnosis, extraction planning, and surgical procedure should be changed. A standard diagnosis and surgical protocol for implant extraction procedures can be formulated in the future studies with larger sample for either space. ●

Disclosure

The authors report no conflicts of interest with anything mentioned in this article.

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