

When to Treat Sinus Proximity

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Implant dentistry has drastically improved our ability to replace missing teeth and stabilize dentures. It has become the standard of care in many treatment cases and continues to grow, providing more ways we can help our patients. As implant dentistry grows, so does our knowledge of how and where we can use implants. While some cases may be considered simple or straightforward, others are complicated and fraught with significant patient complications.

One of the more common complications encountered in implant dentistry is maxillary sinus proximity. As our patients age and their sinuses pneumatize, the bone available between the alveolar crest and the sinus floor decreases. As this “height” of bone decreases, we are forced to either put in shorter implants or elevate the sinus floor. Arlin (2006) brought attention to short implant failure rates demonstrating decreased survival rates when using implants less than 8 mm in length. Eight years later, we are finding improved survival with shorter implants. Earlier this year, Srinivasan et al. released a

meta-analysis reporting 6mm implants with a 94.7 percent survival in the maxilla and 98.6 percent in the mandible over one to eight years.² While these success rates are decent, they emphasize one of the problems with short implants — they tend to fare worse in the maxilla, nearly four times worse in Srinivasan’s report. When dealing with sinus proximity, short implants for the posterior maxilla would be an ideal and simple solution. Unfortunately, the literature often reports decreased survival rates, especially in the maxilla.^{2,3}

The literature has reported excellent success with subantral augmentation, or sinus lifting.⁴ This procedure changes the bony height available for implant placement by elevating the Schneiderian or sinus membrane. In this manner, a complex case with only 2 mm of bone available can be transformed into a 12 mm space. Sinus lifting can change cases that may be complicated to treat into cases that are relatively simple.

There are two major styles of sinus lifts performed. The first is

the classic lateral window approach described by Tatum in 1976. The lateral window approach involves cutting a window into the lateral side of the maxilla. This window, or antrostomy, is then used to gain access to the outer aspect of the sinus membrane, which is carefully lifted off the bone to a more superior position. The lateral approach allows access to lift the sinus membrane to any desired height with excellent visualization and control. Although this procedure does not produce much post-operative discomfort, it can cause significant bruising and swelling.

The second major style of sinus lift is the osteotome technique published by Summers in 1994.⁵ The osteotome technique uses a transalveolar or crestal approach to the sinus floor. An osteotomy for an implant is prepared and osteotomes are used to elevate the sinus floor and attached membrane locally at the osteotomy site. This approach typically has no side effects and is very easy for the patient to tolerate. Additionally, this style of sinus lift allows an implant to be placed simultaneously. Unfortunately, there is



FIGURE 1—Radiographs of a missing 1.6 with 7 mm of bone from the sinus floor to the alveolar crest. An 8 mm implant is placed with a crestal approach sinus lift and then buried with no grafting material. Final radiograph at uncover four months later.

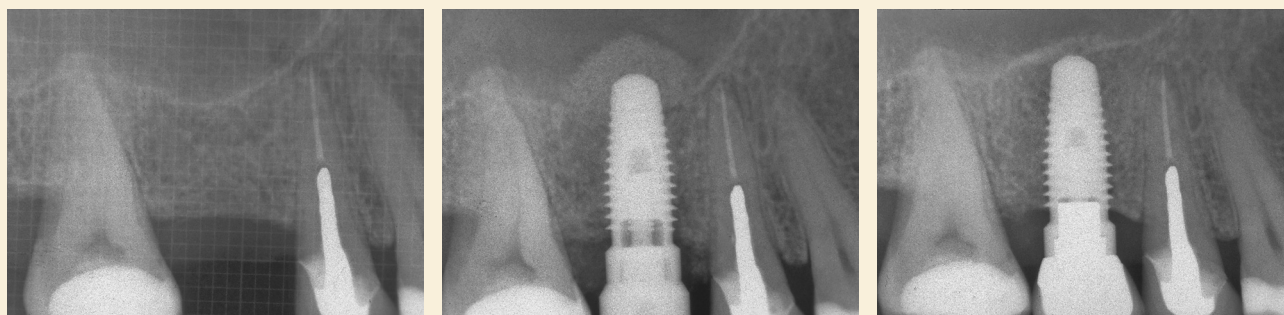


FIGURE 2—Radiographs of a missing 1.6 with 8 mm of bone. A 10 mm implant is placed with a crestal approach sinus lift using a particulate allograft. Final radiograph is six months later after restoration.

limited visual access to the sinus membrane and with this process the membrane may be easily torn.

There are other techniques to deal with sinus proximity as well, either by lifting (balloons or water pressure) or by avoiding it (angled implants) or sometimes going straight through it (zygomatic implants). All of these methods to deal with sinus proximity have shown efficacy and there is no literature proving one is superior to another. Despite this, the lateral and crestal approach are well researched, relatively simple to perform and work in the majority of situations.

So this brings us to the following question. In which situation do I use which technique?

It is hard to discuss appropriate treatment for sinus proximity without also delving into the literature on short implant length.

Although this article does not intend to provide a thorough review of implant length, I'll touch on a few points so that the treatment decisions for sinus proximity are clear. Although some people would argue against it, the literature is populated with excellent evidence

suggesting lone-standing 8 mm implants work well.⁶ This is not to say that 10 mm are not preferred, but simply that the literature has demonstrated five-year survival equivalence. Additionally, implants shorter than 8 mm can work well, but are often prone to increased failure rates, especially in the maxilla. Srinivasan et al.

recently demonstrated this with 6 mm implants and Perelli et al. (2012) demonstrated this with 5 mm and 7 mm implants.^{2,7} Although ideally we might place a 10 mm implant or longer, and we certainly could place an implant less than 8 mm, for this discus-

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sion we'll assume a goal of achieving room for an 8 mm implant length.

The most obvious case to treat is when a patient has 8 mm or more of bone between the alveolar crest and sinus floor. In this case, sinus augmentation is unnecessary, although some practitioners

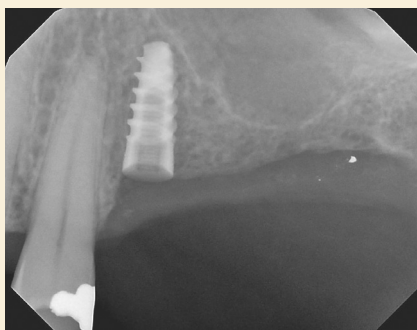
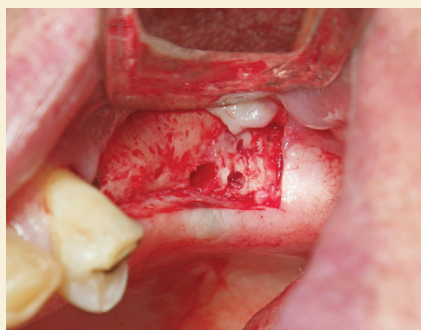


FIGURE 3A—An implant has been placed at 2.5 and another one is intended at 2.7. The alveolar crest to the sinus floor is 4 mm at the 2.7 mesial. An osteotomy has been prepared to the sinus floor.

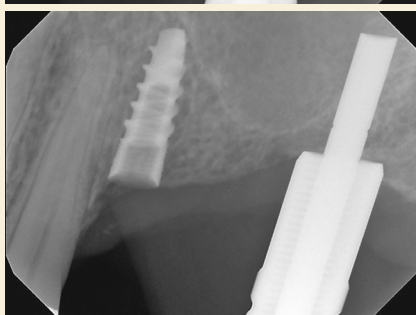
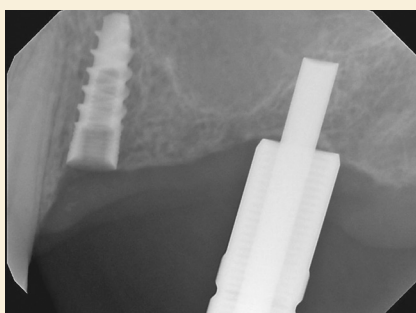
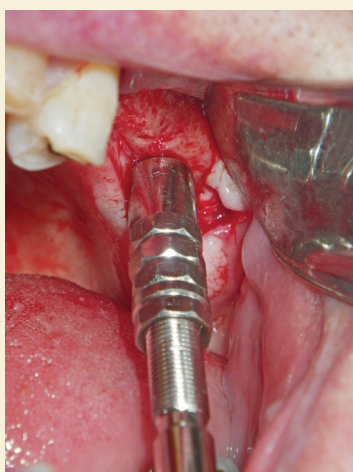


FIGURE 3B—An osteotome is initially used with a stop at 4.5 mm to fracture the sinus floor. After completion, an osteotome is carefully used to elevate the sinus floor and membrane to 8 mm.

study comparing the differences between 10+ mm implants placed after lateral window sinus lifts and 8 mm implants placed with crestal sinus lifts.⁹ In this study, the maxillary bone height varied between 3 mm and 6 mm. Cannizzaro found no significant difference between implant survival in either group after following them for five years respectively. Based upon this information, if the bone between the alveolar crest and sinus floor is between 3 mm and 8 mm, sinus augmentation is advised using a crestal approach.

Although a crestal sinus lift is recommended between 3 mm and 8 mm, practitioners must be careful in performing this approach. Sinus anatomy can vary greatly and a thick lateral sinus wall or undetected sinus septum can severely complicate a crestal sinus lift. In cases of complicating sinus anatomy or conditions, it may be best to perform a lateral approach or seek an alternative treatment option. In addition, performing a crestal sinus lift to elevate a sinus from 3 mm to 8 mm is not an easy feat; it takes experience and expertise. With that in mind, practitioners with less surgical experience manipulating the sinus may perform better with a lateral approach if there is less than 5 mm of bone.

Finally, if the bone between the alveolar crest and sinus floor is less than 3 mm, a lateral approach is recommended. Specific measurements have been suggested as to when an implant can be placed simultaneously with a lateral approach. However, the bone quality in the posterior maxilla is highly variable, so a specific “height” of bone may be sufficient or insufficient to stabilize an implant. Summarily, the necessity for simultaneous implant placement is simply bone that can

may decide to perform a sinus lift using a crestal approach at the time of implant placement to achieve a 10 mm length.

The next type of case is when a patient has between 3 mm and 8 mm of bone. Traditionally, the crestal approach was not indicated for sinus elevation of greater than 2 mm or 3 mm. The fear was

that extending the elevation beyond this would tear the sinus membrane and prevent appropriate bone healing. Recent research has challenged this. Nooh (2013) demonstrated that implants placed with intentional membrane perforation during crestal sinus lifts retained excellent survival rates.⁸ Cannizzaro et al. (2013) published a high quality

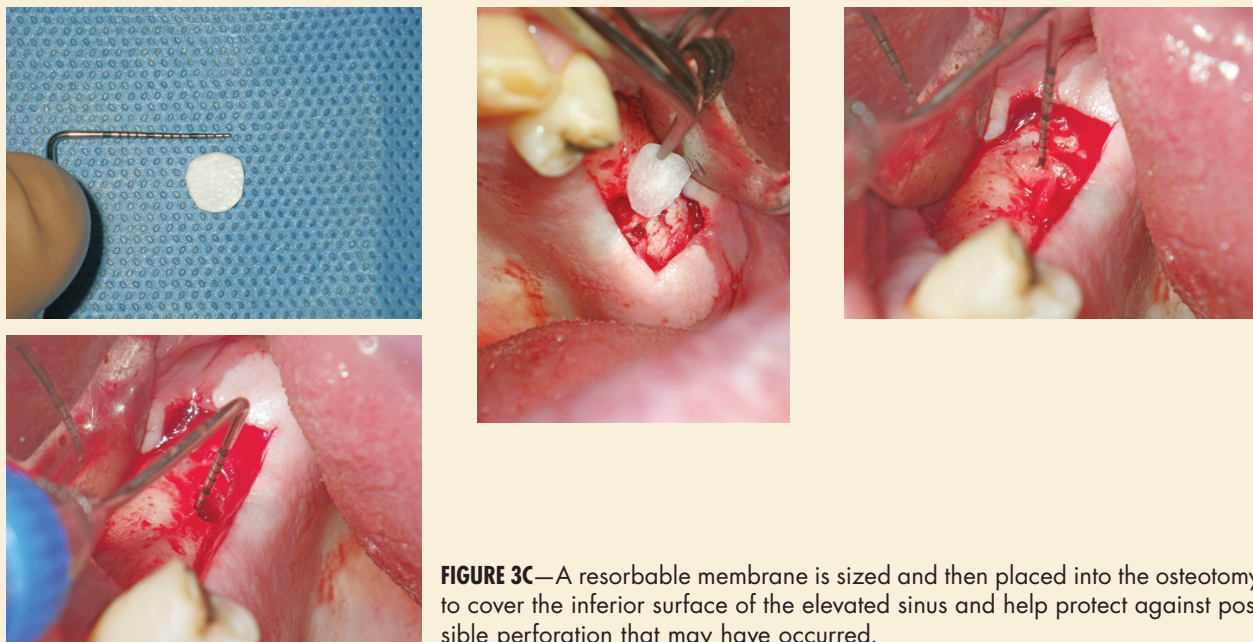


FIGURE 3C—A resorbable membrane is sized and then placed into the osteotomy to cover the inferior surface of the elevated sinus and help protect against possible perforation that may have occurred.



FIGURE 3D—A xenograft particulate is mixed with sterile saline and added to the subantral space below the elevated sinus.

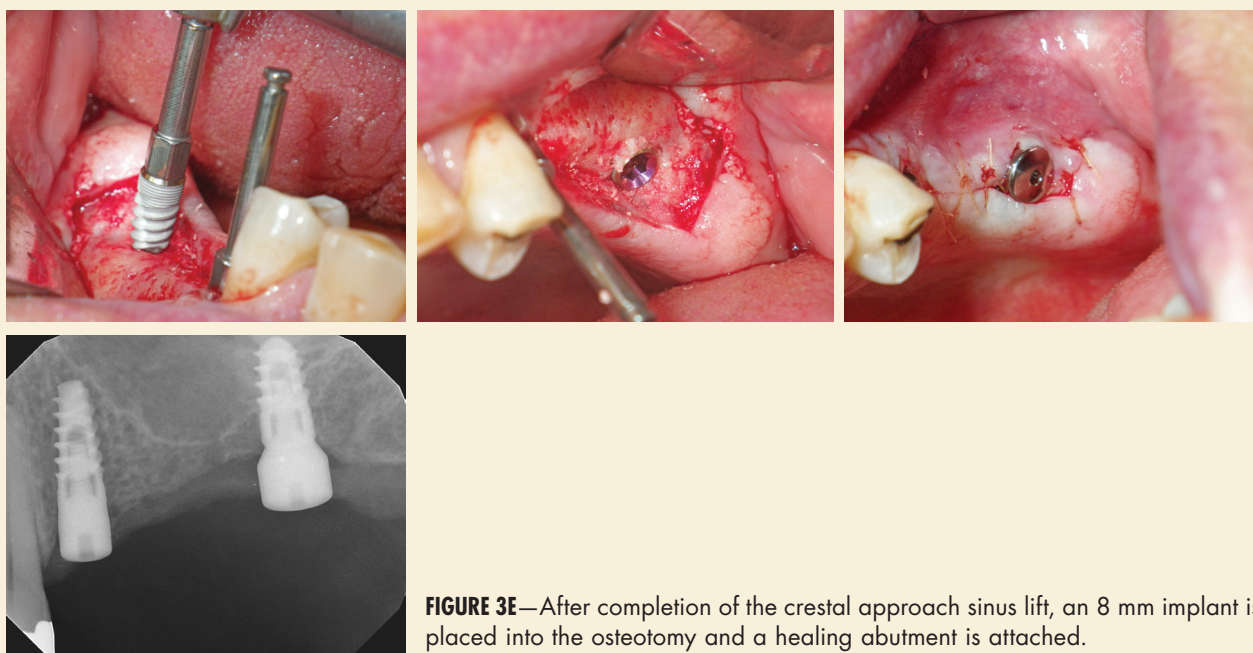


FIGURE 3E—After completion of the crestal approach sinus lift, an 8 mm implant is placed into the osteotomy and a healing abutment is attached.

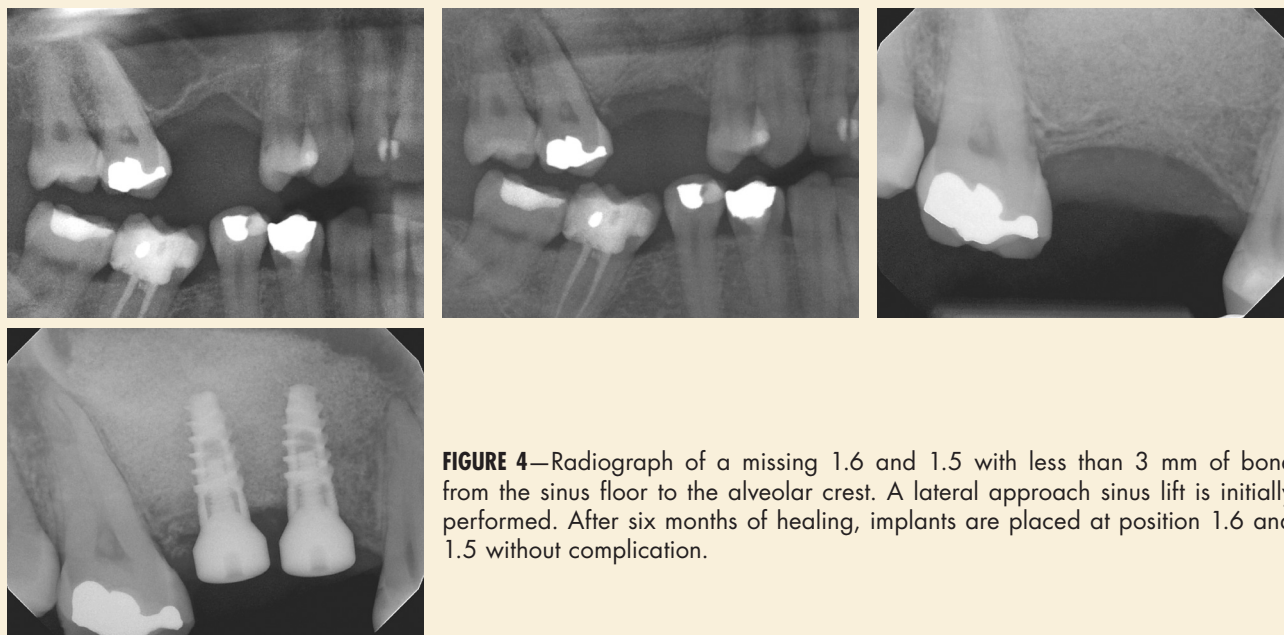


FIGURE 4—Radiograph of a missing 1.6 and 1.5 with less than 3 mm of bone from the sinus floor to the alveolar crest. A lateral approach sinus lift is initially performed. After six months of healing, implants are placed at position 1.6 and 1.5 without complication.

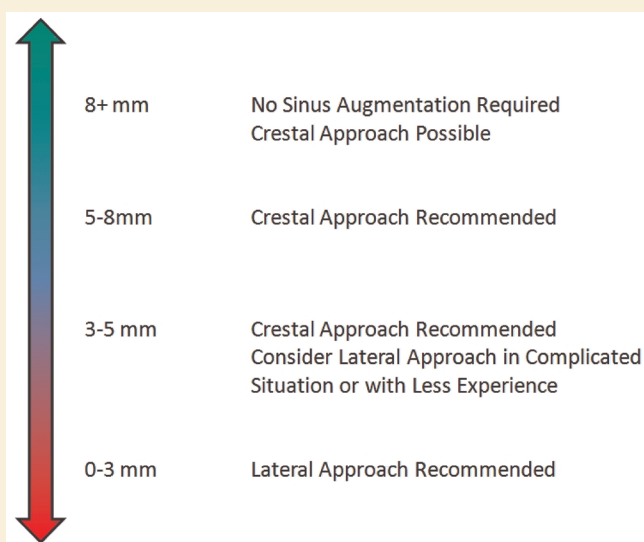


FIGURE 5—Diagram of sinus floor to alveolar crest distances and suggested sinus treatment for implant placement.

provide sufficient initial stability. This is often most accurately assessed during surgery rather than prior to.

Although sinus lifts are not the only treatment for implant placement in areas with sinus proximity, they are a highly effective one. Knowing which procedures are indicated for which patient conditions helps the practitioner make expert decisions during treatment planning.

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Dr. Mark Nicolucci graduated from the University of Western Ontario School of dentistry in 2006 and continued his education at a residency program at Temple University in Philadelphia. In 2010, he graduated from Temple's Periodontology program with a certificate in Periodontology and Oral Implantology. He has a Masters in oral biology and is a diplomat of the International Congress of Oral Implantologists. Since returning to Canada, Dr. Nicolucci has been

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Oral Health welcomes this original article.

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