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# Maxillary Dental Implant Placement with a Simultaneous Sinus Lift

A case report using Piezo surgical instrumentation and a Crestal Approach

Richard E. Schell, DDS, MS

Dental implants have now become an accepted and often preferred treatment of choice for many patients. As the result of increased patient awareness and documented case success, patients' interest and acceptance of implant treatment has risen significantly. However, significant anatomic conditions exist that limit the application of dental implants in many cases. One such challenge is the limited height present in the maxilla resulting from the position of the maxillary sinus. A range of answers have been proposed such as sinus lift osteotomes, angled implant placement, or simply using shorter implants. However, these solutions fail to provide both the predictability and long-term success that dental professionals seek to provide patients.[1] This article demonstrates a technique that allows the implant site preparation with a simultaneous maxillary sinus graft, allowing the safe and predictable placement of implants in the maxilla when anatomic limitations exist. The technique provides a conservative method that saves healing time, has less risk of infection, and allows the placement of implants of desirable length.[2]

Piezo surgical techniques offer several significant advantages in the practice of oral and maxillofacial surgery. For example, piezoelectric instrumentation offers selectivity in cutting bone while sparing vital soft-tissue structures.[3] As well, precise, fine, well-controlled procedures can be performed more accurately than with more conventional rotary instrumentation commonly found in dentistry.[4] Because of this precision, a lighter touch can be implemented, allowing quicker healing and better hemostasis. The following case demonstrates the advantages of applying piezosurgery to a dental implant case.

**Case Presentation**

A 61-year-old man presented with painful, fractured, non-restorable tooth No.15. His general dentist referred him for extraction (Figure 1). At the time of presentation, the patient was interested in a future restoration using a dental implant. A limited vertical bone height was noted at the site preoperatively. The patient presented with no swelling or drainage, but was placed on a 1-week course of amoxicillin starting the day before surgery. Atraumatic extraction was performed, including sectioning of the roots

and removal of the tooth with minimal loss of bone. An allogenic mineralized bone graft was placed and a resorbable barrier membrane was used (Figure 2) because limited bone height was present at the site. The surgical site was carefully closed using a PTFE suture. The postoperative course was uneventful. Following a 4-month healing period, a radiographic CT exam demonstrated good bone density with adequate healing with the expected compromised vertical bone height of 6 mm due to extensive pneumatization of the maxillary sinus (Figure 3).

A simultaneous dental implant placement with sinus graft was performed using a crestal ridge approach. The implant site was prepared to the final diameter using standard surgical protocol and standard implant drills with the exception that the osteotomy was made to a depth just 2 mm inferior to the sinus floor (Figure 4).

The additional bone was then selectively removed using a specially designed drill reamer system (SinusCrestal Approach Kit, Zimmer Dental, www.zimmerdental.com). The non-aggressive reamer is designed to selectively remove bone while sparing the delicate sinus membrane (Figure 5 ).

The reamer is designed to accept a series of depth stoppers. It is set to the last depth determined 1 mm to 2 mm below the sinus floor from x-ray or CT analysis. The reamer depth is then increased in 1 mm increments using the appropriate depth stops. The remaining bony floor of the sinus was then selectively removed using a cylindrical piezo surgical tip (Figure 6) with copious irrigation, checking the bony wall and integrity of the sinus with a blunt depth gauge (Figure 7).

Mineralized bone graft material was placed directly into the osteotomy site, the material gently condensed using bone condensers, compatible with the same depth stoppers used with the reamers. This allows controlled bone graft placement prior to placing the implant. The volume of the graft (one quarter cc in this case) depends on numerous factors, including the length and width of the implant, anatomy of the sinus at the osteotomy site, and resistance to the graft when placed. A 5-mm x 10-mm MIS seven dental implant was placed (Figure 8) following the placement of graft in the osteotomy.

The implant was found to have excellent initial stability. This is critical when placing an implant at the time of crestal sinus graft through the implant osteotomy. The postoperative x-ray demonstrated elevation of the sinus membrane greater than 3 mm above the apex of the dental implant. Implant healing and osseointegration was uneventful with a 4-month postoperative x-ray demonstrating good osseous healing and good retention of the bone 3 mm superior to and surrounding the implant and its apex. An increase in the density of the newly formed bone was also noted. The implant was restored without event. The patient's 2-year postoperative x-ray demonstrated no loss of bone at the implant (Figure 9).

**Final Thoughts**

The anatomy of the maxillary sinus can often limit the height of bone available for the placement of dental implants. Piezoelectric instrumentation allows precise surgical removal of bone while preserving delicate soft-tissue structures such as the sinus membrane. The described method offers a means to gain vertical height at the time of implant placement in the maxilla.

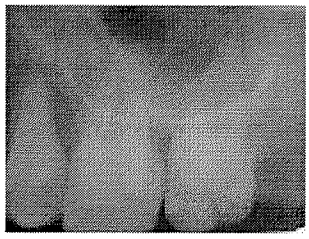

Figure 1

Figure 2

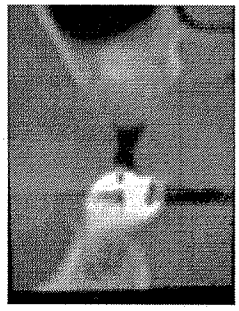

Figure 3

Figure 4

Figure 5

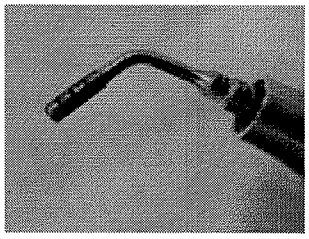

Figure 6

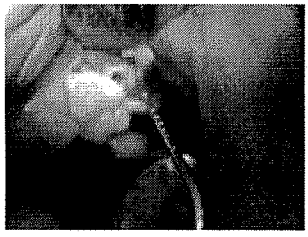

Figure 7

Figure 8

Figure 9

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## About the Author

Richard E. Schell, DDS, MS
Private Practice
*Redondo Beach, California*