Simultaneous Indirect Sinus Lift and Implant Insertion. Case Report for Extreme Bone Resorption

Faaiz Alhamdani, PhD, Oral and Maxillofacial Surgery Department, College of Dentistry, Ibnsina University, Baghdad, Iraq.
Corresponding Author: Faaiz Alhamdani
e.mail: faaiz@ibnsina.edu.iq

Abstract
Sinus lift is the procedure performed to overcome shortage in alveolar bone height in posterior maxilla. Alveolar bone shortage occurs due to maxillary sinus pneumatization after tooth extraction. This might interfere with primary implant stability. There are two methods to elevate the sinus membrane for better accommodation of dental implant without jeopardizing the Schniderian Membrane. Direct (lateral) Approach and indirect (crestal approach). Direct approach is preferable when bone height is less than 4 mm, whereas indirect sinus approach is more suitable for cases with ≥ 5 mm bone height. However, excessive sinus pneumatization remains a challenge even for cases with direct sinus approach. Such cases require two step procedures for implant replacement. It seems unlikely to achieve sinus lifting and direct implant placement for cases with extreme alveolar bone height shortage in the same surgical procedure. In this case report indirect sinus lift has been performed utilizing IBS® CMC Technique and IBS thread design to perform one step bone implant placement for alveolar bone height of 0.5 mm.

Introduction

Sinus lift is the procedure performed to overcome shortage in alveolar bone height in posterior maxilla. Alveolar bone shortage occurs due to maxillary sinus pneumatization after tooth extraction. This might interfere with primary implant stability (Lundgren et al., 2008). There are two methods to elevate the sinus membrane for better accommodation of dental implant without jeopardizing the Schniderian Membrane. Direct (lateral) Approach and indirect (crestal approach). Direct approach (Boyne and James, 1980; Tatum, 1986) is preferable when bone height is less than 4 mm (Aly and Hammouda, 2017; Pai et al., 2017), whereas indirect sinus approach (Summers, 1994) is more suitable for cases with ≥ 5 mm bone height (Chen et al., 2009; He et al., 2013). However, excessive sinus pneumatization remains a challenge (Sharan and Madjar, 2008) even for cases with direct sinus approach. Such cases require two step procedures for implant replacement. There is no solid evidence regarding the potential of indirect sinus lift and simultaneous dental implant placement (Esposito et al., 2014). In this case report the author performed indirect sinus lift utilizing IBS® Crestal Approach with Sinus Membrane Control (CMC) Technique utilizing IBS® Fin Thread dental implant design to perform bone implant placement with bone augmentation simultaneously for alveolar bone height about 0.5 mm.

Case Report

Thirty years old male attended Training Dental Centre in Baghdad for dental implant in the posterior maxilla. Medical and dental histories were taken. The patient had neither history of systemic disease nor a history of maxillary sinus infection or complaint.

Intraoral examination showed #15 and #16 were extracted. #16 was extracted seven years ago. Adequate both bucco-palatal and mesio-distal distance were available for insertion of two implants. However, the periapical radiograph showed severe shortage of alveolar bone height in #16 areas (about 0.5 mm using digital periapical intra-oral radiography). Treatment options have been discussed with the patient and the decision was to perform indirect sinus lift using IBS® CMC Technique (Crestal Approach with sinus Membrane Control) with simultaneous dental implant insertion. No pre-operative antibiotic was prescribed for the patient. Before the procedure, the patient was asked to rinse his mouth with 0.12% Chlorhexidine Digluconate (Abraham et al., 2015; Young et al., 2002) for 2 minutes. Local anesthesia (2% Lignocaine with 1:100 000 Epinephrine) was infiltrated before the surgical procedure. Following a video demonstration of unpublished case (for 0.7mm bon height) the author decided to perform flapless indirect sinus lift procedure using Sinus Lift Technique provided by IBS and utilizing IBS Fin Thread Design. Using trephine bur, the gingival tissue over the intended implant was removed and the bone was exposed. Magic Short Drill with 1000 r/m was used to carefully to create a notch in the bony surface of alveolar cortex and provide application point for the Magic Sinus Lifter. Sinus Lifter, which was handled with hand lever, was gently tapped to preserve the sinus membrane. IBS® Magic Sinus lifter has lateral blades for controlled lifting action and a 3mm empty hallow space for offset-loading effect and control of bone block to be tapped slowly and elevate the sinus membrane up to 9 mm height. After cleaning the surgical site, the patient was asked to breath normally to make sure that no perforation has been made on the sinus membrane. Bone substitute material (Osteon®II) was applied using IBS Bone Pusher. The cavity was filled with the material. Size 5 with 7 mm length IBS FC® Implant was inserted manually into the cavity. IBS® Torque Ratchet was used to insert the implant to the required depth. According to the manufacturer's instruction The primary stability was achieved by 15 N. Following the procedure, the patient was given instructions to ensure very good oral hygiene using 3 times mouth rinse daily until the closure of the wound.

According to the manufacturer's surgical protocol, second stage surgery was carried out after 8 months second stage surgery was decided. X ray examination showed elevation of maxillary sinus floor for about 9 mm. The implant was exposed and gingival former (healing abutment) was secured successfully at the implant site (Figure 3a). Figure 3b shows the implant with the final prosthesis in place.

Figure 1: (a) Preoperative photograph for the missing #15 and #16. (b) Preoperative radiograph with about 0.5 mm height in #16 areas.

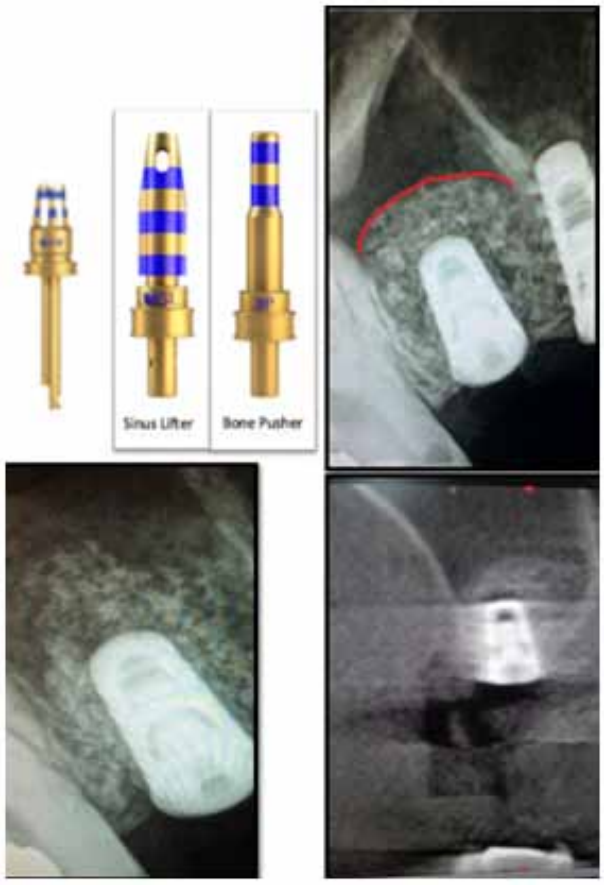

Figure 2: (Upper left) IBS sinus lift armamentarium (https://ibsofamerica.com/newtechnology/instrumentation/sinus-lifting-the-mechanics/) from left to right: Short Magic Drill, IBS Sinus Lifter and Bone Pusher. (Upper right) postoperative radiograph for upper right 5 and 6. It shows the uniform elevation pattern around the implant. : (lower right) periapical radiograph 8 months for the upper right# 6 postoperatively. (Lower left) 3D image (coronal view) for the implant in place.

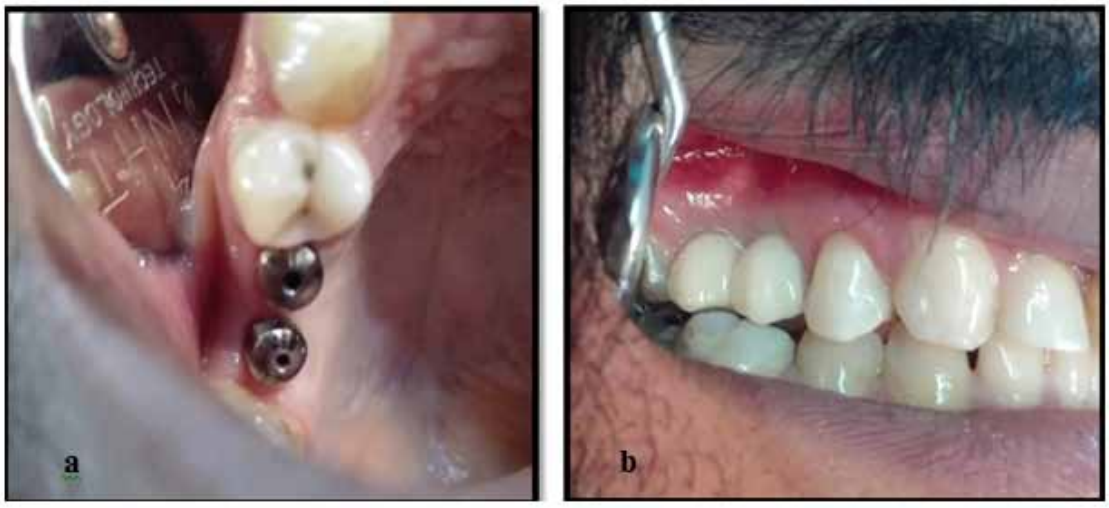

Figure 3: (a) Gingival formers secured in place. (b) Final prosthesis in position.

Discussion

Inadequate bone height in the posterior maxillary area due to maxillary sinus pneumatization remains as one of the challenges for dental implant dentistry (Schlegel et al., 2008). It is, even, more challenging in sinus lifting using crestal (indirect) approach. It is agreed that less bone height less the chance for success for dental implant. Studies have shown that bone height less than 4 mm might not be enough to ensure successful implant stability (Asawa et al., 2015; Romero-Millan et al., 2012). However, it seems there is tendency toward indirect sinus lift procedure, because it is less invasive (Shetty et al., 2016). This might be the main drive for dental implant companies to improve its chances of success utilizing different surgical equipment and related techniques. These include osteotomes (Romero-Milla´n et al., 2012), maxillary sinus balloon (Penarrocha-Diago et al., 2012) and specially designed burs (Alsabbagh et al., 2017). This, in turn has been reflected by the cases reported recently in the literature challenging the reported evidence related to residual bone height. The lowest bone height as reported in the literature with indirect sinus lift was 2-4 mm (Neamat et al., 2017). Recently, the author was involved in a research on graftless indirect sinus lift using IBS CMC Technique. The research team was able to achieve primary stability for residual bone height of 1.75 mm with sinus floor elevation for 7 mm. the study results are about to be published soon. The ability to achieve successful indirect sinus lift might not be related to the usefulness of sinus lifter used in this case report, but to the fin thread design invented by IBS® This thread design allows more room between the threads for better bone and/or bone substitute material engagement with more chance of primary stability with extreme alveolar bone deficit. With thin bony plate, such as in this particular case, it might be difficult to provide controlled bone separation at the osteotomy site with open flap technique. This is why the author believes that doing flapless technique with soft tissue still attached to the bone surrounding the osteotomy site (sinus lift site) have provided support to prevent its fracture.

Conclusion
Indirect Sinus Lifting with (IBS® CMC Technique) seems to be effective in cases with crestal bone shortage (<1 mm) with minimum instrumentation and less hard and soft tissue trauma.

Acknowledgement The author would like to thank Dr. Noor Nabih for her help throughout the treatment period.

References
Abraham HM, Jacob M P, Kruppa J, Ashish R J, C.J. VK (2015). Use of Chlorhexidine in Implant Dentistry. Biomedical & Pharmacology Journal 8(Spl. Edn.):341-345.

Alsabbagh AY, Alsabbagh MM, Nahas BD, Rajih S (2017). Comparison of three different methods ofinternal sinus lifting for elevation heights of7 mm: an ex vivo study. International Journal ofImplant Dentistry 3(40):2-7.

Aly LAA, Hammouda NI (2017). Evaluation of implant stability simultaneously placed with sinus lift augmented with putty versus powder form of demineralized bone matrix in atrophied posterior maxilla. Future Dental Journal 3 (2017) 28e34 Future Dental Journal (3): 28e34.

Asawa N, Bulbule N, Kakade D, Shah R (2015). Angulated Implants: An Alternative to Bone Augmentation and Sinus Lift Procedure: Systematic Review. Journal of Clinical and Diagnostic Research 9(3):10-13.

Boyne P, James R (1980). Grafting of the maxillary sinus floor with autogenous marrow and bone. J Oral Surg 38):813.

Chen ST, Beagle J, Jensen SS, Chiapasco M, Darby I (2009). Consensus statements and recommended clinical procedures regarding surgical techniques. Int J Oral Maxillofac Implants 24 Suppl(272-278.

Esposito M, Felice P, Worthington H (2014). Interventions for replacingmissing teeth: augmentation procedures of themaxillary sinus (Review). JohnWiley & Sons, Ltd.: Cochrane Database of Systematic Reviews.

He L, Chang X, Liu Y (2013). Sinus floor elevation using osteotome technique without grafting materials: a 2-year retrospective study. Clin Oral Implants Res 24 Suppl A100(63-67.

Lundgren S, Cricchio G, Palma VC, Salata LA, Sennerby L (2008). Sinus membrane elevation and simultaneous insertion of dental implants: a new surgical technique in maxillary sinus floor augmentation. Periodontology 47(193–205.

Neamat AH, Ali SM, Boskani SW, Mahmud PK (2017). An indirect sinus floor elevation by using piezoelectric surgery with platelet-rich fibrin for sinus augmentation: A short surgical practice. Int J Case Rep Images 8(6):380–384.

Pai UY, Rodrigues S, Hegde P, Khurana N (2017). Indirect Sinus Lift Done Using «Autogenous Core Lift» Technique in Combination with Alloplastic Phosphosilicate Putty in Atrophic Maxillary Posterior Region: A Clinical Report with 1-Year Follow-Up. Contemp Clin Dent 8(4):627-631.

Penarrocha-Diago M, Galan-Gil S, Carrillo-Garcia C, Penarrocha-Diago D (2012). Transcrestal sinus lift and implant placement using the sinus balloon technique. Med Oral Patol Oral Cir Bucal 17(1):e122-128.

Romero-Milla´n J, Martorell-Calatayud L, arrocha MP, Garcı´a-Mira B (2012). Indirect Osteotome Maxillary Sinus Floor Elevation: An Update. Journal of Oral Implantology. XXXVIII(6):799.

Romero-Millan J, Martorell-Calatayud L, Penarrocha M, Garcia-Mira B (2012). Indirect osteotome maxillary sinus floor elevation: an update. The Journal of oral implantology 38(6):799-804.

Schlegel A, Hamel J, Wichmann M, Eitner S (2008). Comparative Clinical Results after Implant Placement in the Posterior Maxilla with and without Sinus Augmentation. The International Journal of Oral & Maxillofacial Implants 23(2):289-298.

Sharan A, Madjar D (2008). Maxillary sinus pneumatization following extractions: a radiographic study. Int J Oral Maxillofac Implants 23(1):48-56.

Shetty M, Thulasidas NHR, Hegde C (2016). An indirect sinus lift with ridge splitting procedure for implant placement: A case report. IJMDS 5(1):1088-1092.

Summers RB (1994). A new concept in maxillary implant surgery: the osteotome technique. Compendium 15(2):152, 154-156, 158 passim; quiz 162.

Tatum HJ (1986). Maxillary and sinus implant reconstructions. Dent Clin North Am 30):207.

Young MP, Korachi M, Carter DH, Worthington HV, McCord JF, Drucker DB (2002). The effects of an immediately pre-surgical chlorhexidine oral rinse on the bacterial contaminants of bone debris collected during dental implant surgery. Clin Oral Implants Res 13(1):20-29.