

Implants placed simultaneously with maxillary sinus floor augmentations in the presence of antral pseudocysts: a case report

Z. H. Tang, M. J. Wu, W. H. Xu
Second Dental Center, Peking University
school and hospital of Stomatology, Beijing
100101, PR China

Z. H. Tang, M. J. Wu, W. H. Xu: *Implants placed simultaneously with maxillary sinus floor augmentations in the presence of antral pseudocysts: a case report. Int. J. Oral Maxillofac. Surg.* 2011; 40: 998–1001. © 2011 International Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Abstract. An antral pseudocyst on the maxillary sinus has previously been a contraindication for sinus augmentation. The authors report the case of a patient with an antral pseudocyst (16.7 mm × 27.6 mm) in his left sinus, who was referred for dental implant treatment. The surgical plan was to perform the sinus augmentation after removing the cyst whilest simultaneously placing implants. During the operation the cyst could not be found in the left sinus. The sinus augmentation was carried out successfully without sinus membrane perforation and the implants were placed according to plan. Three mouths later, the cyst was still present and good osseointegration of the implants was achieved. After the implants had been in place for a year, a CT scan showed that the cyst had decreased in size. The authors conclude that it is may not be necessary to remove a sinus cyst before sinus augmentation or during the sinus augmentation operation if the patient does not have any symptoms and the cyst is not large. In cases with large lesions or an unclear diagnosis, further evaluation is needed before surgical intervention.

Keywords: Dental implant; Maxillary sinus; Sinus augmentation; Cyst; Cone beam CT.

Accepted for publication 22 February 2011
Available online 19 May 2011

The use of dental implants has gained popularity for treating edentulism, but in some patients jaw atrophy leaves insufficient bone for the placement of dental implants. The placement of dental implants in patients who are edentulous in the posterior maxilla can present difficulties because of a deficient posterior alveolar ridge and increased pneumatization of the maxillary sinus, resulting in a minimal hard tissue bed. The sinus lift procedure was developed to treat these patients. Maxillary sinus floor augmentation techniques are frequently used to increase bone volume in the posterior edentulous maxilla to enable placement

and integration of titanium implants^{1,3}. The lateral window approach to sinus augmentation aims to increase bone height and volume inferior to the maxillary sinus membrane to enable subsequent placement of dental implants. This is one of the most predictable regenerative surgical procedures performed in guided bone augmentation surgery and implant survival is highly successful^{1,3,9,10}.

According to ZICCARDI and BETTS¹⁰, the presence of maxillary cysts is an absolute contraindication for sinus grafting. Maxillary sinus cysts are a group of lesions in which the nomenclature and pathogenesis have been controversial. On rare occa-

sions, the cyst may become infected. Such an infection may cause one or more symptoms². Consequently maxillary sinus antral pseudocysts have been considered a contraindication for sinus augmentation.

This report presents the surgical procedure and outcome of dental implant placement in a patient who had sinus augmentation in the presence of a sinus antral pseudocyst.

Case report

A 45-year-old patient who required implants due to missing upper molars on both sides was referred to the authors'

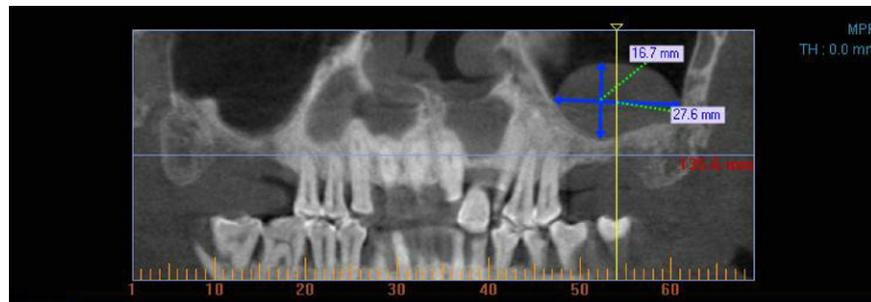


Fig. 1. Cone beam CT findings show the crestal bone height between the sinus floor and the alveolar ridge of the posterior maxilla is only 5 mm. A dome-shaped cyst is visible (16.7 mm × 27.6 mm).

clinic. He received a course of periodontal treatment due to periodontal disease.

A complete dental examination, which included panoramic and cone beam computed tomography (CT) scans (dental) was performed to help determine the available maxillary alveolar bone height. The crestal bone height between the sinus floor and the alveolar ridge of the posterior maxilla was only 5 mm on both sides. There was a cyst (16.7 mm × 27.6 mm) in the left sinus (Fig. 1); the right sinus was normal. The panoramic reformatted images (Fig. 1) clearly showed the sinus cyst was firmly attached to the sinus floor and the maxillary alveolus height was only about 5 mm. As the patient did not have any symptoms, the otolaryngologist suggested no treatment for the cyst before the operation. The authors decided to treat the sinus cyst during the sinus augmentation operation.

Surgical procedure

The surgery was performed under local anaesthesia and a modified Caldwell-Luc approach was used. After the lateral maxillary wall was exposed, a round bur was used in a low-speed, high-torque straight headpiece at 2000 rpm with copious ster-

ile saline irrigation to create a hole in the lateral wall of the left maxillary sinus. As no cyst liquid leaked out, a 20 ml injector was used to suck the cyst liquid out from a different direction, but it failed to obtain anything in the left sinus. A Piezotome (Acteon, France)TM ultrasonic osteotomy was carried out to create an oval-shaped outline in the lateral wall of the maxillary sinus. After removing the oval-shaped bone from the lateral wall of the maxillary sinus, the authors found the sinus membrane was not perforated, that it vibrated with the patient's breathing and that it was thicker than normal sinus membrane. The sinus membrane was lifted 7 mm without perforation. Once the implant sites had been prepared, a bovine allograft (BIO-OSS Geistlich, Wolhusen, Switzerland) bio-oss was 'injected' into the maxillary sinus and packed against the intact medial wall. After this, the medial portion of the sinus was grafted with two integral cylindrical dental implants (Straumann standard implants sand-blasted, large grit, acid-etched [SLA] 10 mm, regular neck [RN] 4.8 mm, Straumann AG, Switzerland) placed in the augmented sinus. Both implants were placed stably with regards to future restorative treatment. A Bio-Gide (Geistlich Pharma AG, Switzerland) was

used to cover the window in the wall of the maxillary sinus and then a mucoperiosteal flap was sutured.

The patient had no symptoms after surgery, other than minor swelling. Three months later, before the second operation was performed, a cone beam CT scan (dental) was carried out. The scan showed that the implants were placed correctly in the augmented sinuses, osseointegration was achieved and the cyst was still there (Fig. 2). The screw-retained provisional restorations were inserted on both sides and the implants were functionally loaded.

One year later, when the patient was followed up, the cone beam CT scan (dental) was performed again, which showed that the dome-shape in the left sinus had decreased in size and no bone graft resorption was observed on either side (Fig. 3). There were no problems with the implants nor the superstructures. The patient did not have any other symptoms and was satisfied with the implant restoration (Fig. 4).

Discussion

The sinus lift procedure, developed in the mid 1970s, has been refined and is now frequently performed^{1,3,9,10}. The proce-

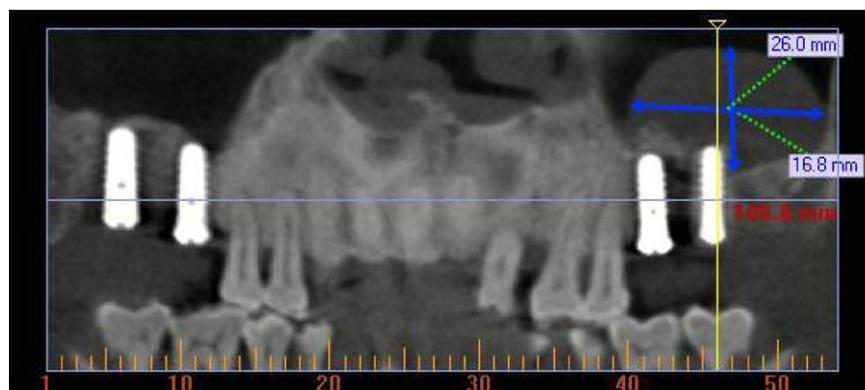


Fig. 2. Three months after surgery the cyst was still present. The implants were correctly placed in the augmented sinuses and osseointegration was achieved.

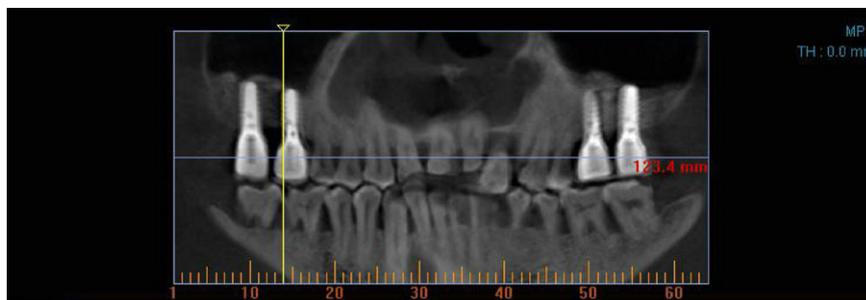


Fig. 3. At 1 year follow up, the cone beam CT scan indicated the dome shape in the left sinus had decreased in size.

ture has proven to be an acceptable modality for bone augmentation to provide a base for endosseous implant placement. The presence of a maxillary sinus cyst has been considered a contraindication for this operation. The indications for sinus augmentation in patients with sinus cysts are not clearly defined in the literature. According to ZICCARDI and BETTS¹⁰, mucocele of the maxillary sinus is a relative contraindication for sinus augmentation. The term mucocele was used for what they defined as an antral pseudocyst⁴. They suggest that the cyst should be removed or aspirated prior to sinus augmentation and the presence of maxillary (antral) cysts is an absolute contraindication for sinus grafting¹⁰.

The therapeutic approaches to the removal of such cystic lesions and the following sinus augmentation are controversial. LIN et al. present a modified tech-

nique that can be used for predictable removal of a maxillary sinus cyst and sinus augmentation after a shortened healing period in patients with maxillary sinus pseudocysts⁸. KARA et al. present a different experience of maxillary sinus floor augmentation in the presence of antral pseudocysts⁷.

Dome-shaped or cyst-like opacity in the maxillary sinus is a common finding. The prevalence of antral pseudocysts depends on the type of radiograph taken: on panoramic radiograph the range is reported to be 1–10%⁶, on CT scan 12%⁹, and on magnetic resonance image examination 21%^{2,9}.

On a panoramic radiograph, an antral pseudocyst is seen as a dome-shaped, faintly radiopaque lesion arising from the floor of the maxillary sinus. In most cases, treatment is not necessary unless a significant expansion is evident radiogra-

phically or the pseudocyst is associated with symptoms, such as headache⁵. Consequently, the authors concluded that it should be possible to carry out sinus augmentation and implant placement simultaneously, when there are no symptoms associated with the cyst and when it is not a large lesion. If the sinus antral pseudocyst is a large lesion or in cases with an unclear diagnosis, further evaluation is needed before this type of surgical intervention takes place.

In the present case, the patient had no associated symptoms and the authors carried out the sinus augmentation without sinus cyst treatment before the operation. Although an attempt was made to remove the cyst during the sinus augmentation operation by sucking the liquid out, the cyst could not be found and the sinus augmentation and implant placements were carried out simultaneously without treatment of the



Fig. 4. The implants achieved osseointegration and no bone graft resorption was observed.

sinus cyst. Three months later, the cyst was still present and the implants had achieved osseointegration. As a result of this the authors concluded that it may not be necessary to remove a sinus cyst before sinus augmentation or during sinus augmentation surgery, if the patient does not have any symptoms and the cyst is not a large lesion. As a clear conclusion cannot be reached from a small number of cases, more cases of this type are required with longer follow up to confirm these findings.

Funding

None.

Competing interests

No competing interests.

Ethical approval

No ethical approval was given, because this report do not have ethical problem. Not required.

References

1. AGHALOO TL, T.L.AghalooMOY PK. P.K.MoyWhich hard tissue augmentation

techniques are the most successful in furnishing bony support for implant placement? Int J Oral Maxillofac Implants 2007; **22**: 49–70.

2. BHATTACHARYAN N. N.BhattacharyyanDo maxillary sinus retention cysts reflect obstructive sinus phenomena? Arch Otolaryngol Head Neck Surg 2000; **126**: 1369–1371.

3. BROWAEYS H, H.BrowaeysBOUVRY P, P.BouvyDE BRUYN H. H.De BruynA literature review on biomaterials in sinus augmentation procedures. Clin Implant Dent Relat Res 2007; **9**: 166–177.

4. GARDNER DG. D.G.GardnerPseudocysts and retention cysts of the maxillary sinus. Ora Surg Oral Med Oral Pathol 1984; **58**: 561–567.

5. GARDNER DG, D.G.GardnerGULLANE PJ. P.J.GullaneMucocoeles of the maxillary sinus. Oral Surg Oral Med Oral Pathol 1986; **62**: 538–543.

6. HALLMAN M, M.HallmanHEDIN M, M.HedinSENNERBY L, L.SennerbyLUNDGREN S. S.LundgrenA prospective 1-year clinical and radiographic study of implants placed after maxillary sinus floor augmentation with bovine hydroxyapatite and autogenous bone. J Oral Maxillofac Surg 2002; **60**: 277–284.

7. KARA IM, I.M.KaraKÜÇÜK D, D.KüçükPOLAT S. S.PolatExperience of maxillary sinus floor augmentation in the presence of antral pseudocysts. J Oral

Maxillofac Surg 2010; **68**(7): 1646–1650.

8. LIN Y, Y.LinHU X, X.HuMETZMACHER AR, A.R.MetzmacherLUO H, H.LuoHEBERER S, S.HebererNELSON K. K.NelsonMaxillary sinus augmentation following removal of a maxillary sinus pseudocyst after a shortened healing period. J Oral Maxillofac Surg 2010; **68**(11):2856–2860.

9. MACDONALD-JANKOWSKI DS. D.S.MacDonald-JankowskiMucosal antral cysts observed within a London inner-city population. Clin Radiol 1994; **49**: 195–198.

10. ZICCARDI VB, V.B.ZiccardiBETTS NJ. N.J.BettsComplications of maxillary sinus augmentation. In: JENSEN OT, ed: O.T.JensenThe sinus bone graft. Carol Stream, IL: Quintessence Publishing Co 1999: 201–208.

Address:
 W.H. Xu
 Second Dental Center
 Peking University
 School and hospital of Stomatology
 Anli Garden B5
 #66Anli Road
 Beijing 100101
 PR China
 Tel: +86 10 64906556
 Fax: +86 10 64907970
 E-mail: xwh1998zyb@126.com
 doi:10.1016/j.ijom.2011.02.038