

Postoperative Maxillary Cyst Following Sinus Bone Graft: Report of a Case

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Sinus bone grafting with autogenous bone is routinely performed to allow placement of endosseous dental implants. Although numerous maxillary sinuses have been successfully grafted, some complications of this procedure have been reported. These include maxillary sinusitis, resorption, infection and possible failure of grafts, loss of implants after 1-stage surgery, and oroantral fistulae. Only one case of postoperative maxillary cyst developing in the graft has been reported in the literature. Here, the authors report a similar case that necessitated grafting of the cyst with autologous iliac bone. (INT J ORAL MAXILLOFAC IMPLANTS 2000;15: 583-586)

Key words: bone transplantation, cysts, endosseous dental implants, maxillary sinus

Since Boyne and James's 1980 study,¹ sinus bone grafting has become a routine procedure to increase bone volume in the edentulous posterior maxilla for endosseous implant placement. Various materials and techniques have been used, with a high success rate for implants placed in the grafted area.^{2,3} Complications related to the grafts are rarely reported.

In 1991, Misch et al⁴ reported a case of a postoperative maxillary cyst following maxillary sinus elevation. He predicted that other similar complications would occur with the increase in pre-implantation sinus surgeries. However, no other cases have been reported in the literature.

CASE REPORT

A 41-year-old female presented with a nearly completely edentulous maxilla (only the right second

molar was present) and a desire for an implant-supported prosthesis. Her past dental history revealed that, 2 years previously, 8 implants were placed in the maxilla, from the first left premolar to the first right molar. All implants were lost 8 months later, and a traditional removable prosthesis was made. It was uncomfortable and required adhesive for good retention. At that time a pre-implant reconstruction with parietal bone grafts was considered because of insufficient bone volume in the maxilla for reimplantation. The alveolar crest on the anterior and right maxilla was not wide enough to allow implant placement. On the left side, the residual crest was extremely atrophic, with increased antral pneumatization. Cortical onlay bone grafts were placed on the buccal crest of the right lateral and anterior maxilla, and grafting of the floor of the left antrum with particulate parietal bone was performed.

A routine computed tomographic (CT) scan was taken after a healing period of 6 months. It showed a round, well-defined, 1-cm cystic cavity close to the palatal crest in the central part of the grafted sinus, which precluded implant placement in this area. No other surgical or prosthetic treatment was undertaken at that time. The cyst appeared to be slightly larger on a second CT scan taken 12 months later (Figs 1a to 1c). There was also moderate resorption of the onlay grafts placed on the buccal crest. Despite widening of the alveolar crest, the prosthesis was still unstable and required adhesive. The patient had no desire for a fixed prosthesis but desired, if possible, an implant-supported overdenture. To place implants on the right side, it was

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Figs 1a to 1c Computed tomographic scans 18 months after left sinus bone graft. A maxillary cyst developed in the grafted bone.

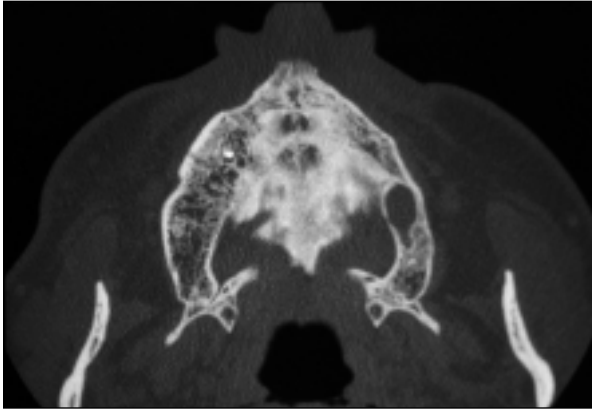


Fig 1a Axial view.

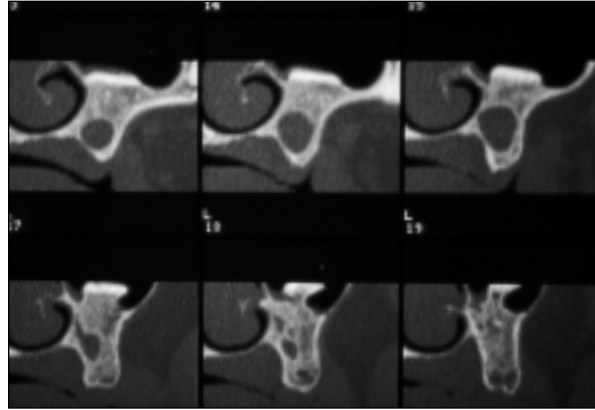


Fig 1b Coronal view.

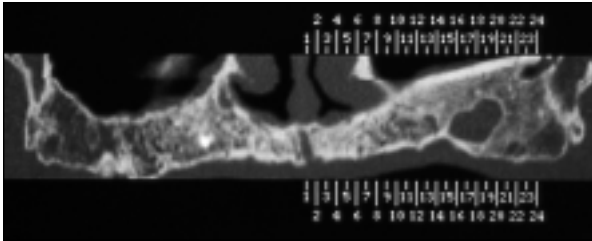
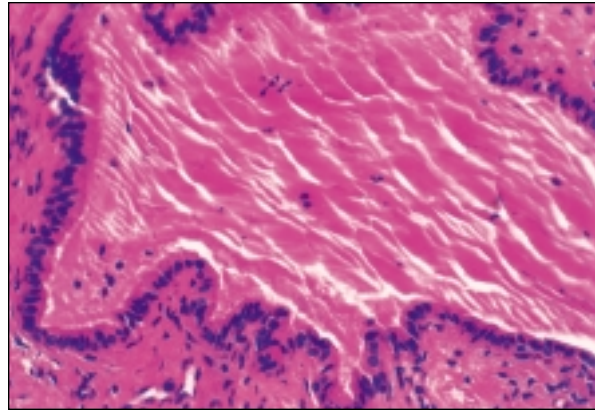


Fig 1c (Above) View of reconstruction.

Fig 2 (Right) Histologic section of cystic cavity containing mucus and lined with ciliated columnar respiratory epithelium (hematoxylin and eosin; magnification $\times 140$).



decided to further widen the alveolar crest through bone grafting. In addition, the authors took advantage of this procedure to treat the cyst on the left side.

Intervention was done under general anesthesia. Since the patient refused another parietal bone harvest, a corticocancellous graft was harvested from the superior anterior medial part of the iliac crest. Then a mucoperiosteal flap was elevated on both sides to expose the right grafted alveolar crest and the lateral aspect of the left maxillary sinus. The thin bony wall of the cyst was fenestrated with a round bur. It was lined with a membrane whose appearance was similar to normal sinus mucosa and contained a clear fluid. Following enucleation, the cyst cavity was grafted with packed cancellous bone, covered with a cortical graft, and secured with a screw. The membrane was sent for histologic examination. On the right side, a corticocancellous graft was placed, after splitting of the cortical parietal

graft from the residual crest, and secured with 2 titanium screws. The wounds were closed with absorbable sutures. The postoperative period was uneventful. The patient complained of moderate pain at the site of the iliac bone harvest. On the sixth day after surgery the prosthesis was relined with a soft material and the patient was allowed to wear it.

On histologic examination, the membrane was seen to consist of a sclerous sinus mucosa lined with a respiratory ciliated epithelium. This confirmed the diagnosis of a secondary maxillary cyst that had developed in the grafted bone (Fig 2).

Ten months later, a CT scan was performed after removal of the titanium screws under local anesthesia. The cyst area appeared to be completely filled with bone as dense as that in the rest of the grafted sinus and the maxilla, and there was enough bone to place 3 implants on each side of the maxilla (Figs 3a to 3c). However, stability of the prosthesis increased

Figs 3a to 3c Control CT scans taken 10 months after grafting of the cyst and widening of the right crest with iliac bone, demonstrating healing and good density of the graft.

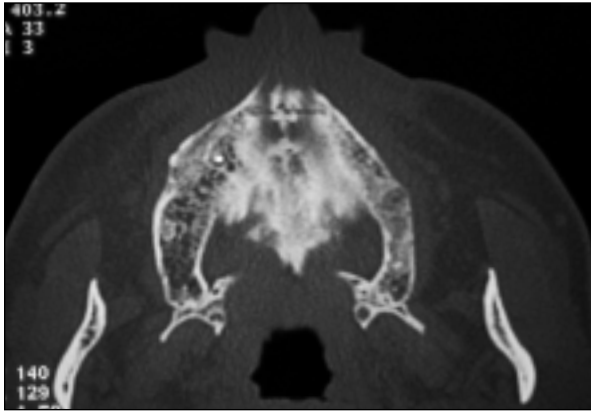


Fig 3a Axial view.

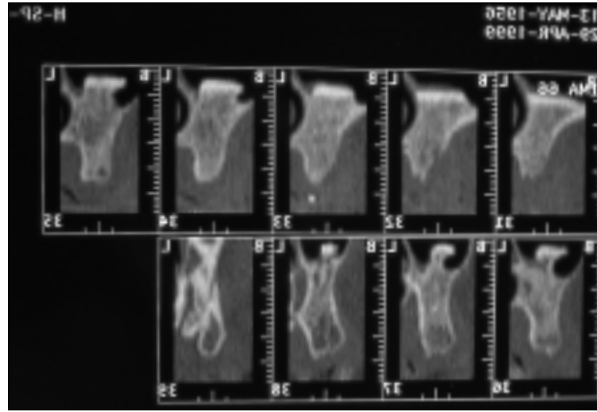


Fig 3b Coronal view.

significantly secondary to the second grafting procedure, and the patient decided that implants were not necessary.

DISCUSSION

Normal, healthy maxillary sinuses are maintained in a sterile environment through the action of the mucociliated mucosa, which ensures effective drainage through the ostium and inhibits epithelial colonization by microorganisms. Mucocoeles can affect all the paranasal sinuses, especially the frontal sinus and ethmoidal cells. They are defined as pseudo-cystic, expansive formations lined with a normal or modified mucosa and containing aseptic fluid. After a more or less protracted and asymptomatic period, they deform and destroy the bony walls of the sinus, and septic complications may appear. Mucocoeles of the maxillary sinus are rare and most frequently are associated with trauma or surgery of the antrum (usually the Caldwell-Luc procedure). A partitioned sinus with entrapment of a fragment of mucosa resulting from trauma or surgery may explain the occurrence of secondary mucocoeles or postoperative maxillary cysts.⁵ Complete enucleation is necessary to prevent recurrence of the cyst.

Elevation of the sinus membrane during the sinus lift procedure may be difficult, especially in cases of roots penetrating the sinus and in the presence of septa. Despite meticulous dissection, perforation or tearing of the membrane are not uncommon. Raghoebar et al⁶ and Jensen et al⁷ both reported a 35% rate of membrane perforation during bone grafting of the maxillary sinus without any complication or loss of bone. Postoperative compli-

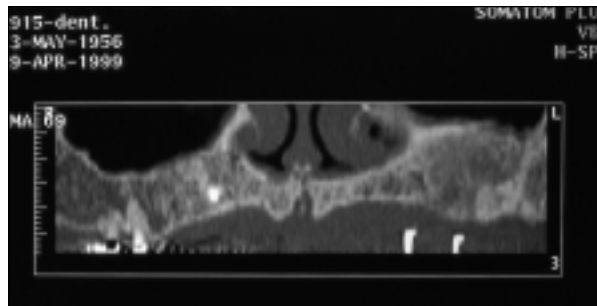


Fig 3c View of reconstruction.

cations and incidents are rarely reported and occurred in approximately 8% of the cases in Chanavaz's experience.⁸

The main complications of this sinus surgery are maxillary sinusitis, infection with possible failure of grafts, partial resorption of grafts, loss of implants after 1-stage surgery, and oroantral fistulae. Occurrence of a postoperative maxillary cyst following grafting of the maxillary sinus is exceptional, and only 1 case has been previously reported.⁴ In that case the cyst was asymptomatic and discovered on a panoramic radiograph 3 years after sinus elevation and placement of a blade implant. After removal of the implant, the cyst was curetted and filled with demineralized freeze-dried bone and resorbable calcium phosphate.

In the present case, as in that reported by Misch et al,⁴ the initial sinus surgery was performed by another surgeon, and no information was available concerning possible problems encountered during

the sinus membrane elevation. On the CT scan taken before the first grafting procedure, the present patient had a typical image of pseudocyst of the sinus floor. One can only assume that a fragment of mucosa, entrapped in the grafted bone, was responsible for the occurrence of the cyst. Results of the grafting procedure are usually assessed, in the absence of early postoperative complications, by a control CT scan done after a healing period of 6 months. This examination allows observation of the quality of healing of the grafted bone, measurements of the height and width of the reconstructed area, and detection of possible late complications related to the graft.

CONCLUSION

Contrary to what was hypothesized by Misch et al, occurrence of a maxillary cyst following sinus grafting is exceptional. Knowledge of this complication reinforces the need for good surgical technique, with careful elevation of the sinus membrane, and long-term clinical and radiologic follow-up.

REFERENCES

1. Boyne PJ, James RA. Grafting of the maxillary sinus floor with autogenous marrow and bone. *J Oral Surg* 1980;38:613-616.
2. Jensen OT, Shulman LB, Block MS, Iacono VJ. Report of the sinus consensus conference of 1996. *Int J Oral Maxillofac Implants* 1998;13(suppl):11-32.
3. Tong DC, Rioux K, Drangsholt M, Beirne OR. A review of survival rates for implants placed in grafted maxillary sinuses using meta-analysis. *Int J Oral Maxillofac Implants* 1998;13:175-182.
4. Misch CM, Misch CE, Resnik RR, Ismail YH, Appel B. Post-operative maxillary cyst associated with a maxillary sinus elevation procedure: A case report. *J Oral Implantol* 1991;17:432-437.
5. Gardner DG, Gullane PJ. Mucocoeles of the maxillary sinus. *Oral Surg Oral Med Oral Pathol* 1986;62:538-543.
6. Raghoobar GM, Vissink A, Reintsema H, Batenburg HK. Bone grafting of the floor of the maxillary sinus for the placement of endosseous implants. *Br J Oral Maxillofac Surg* 1997;35:119-125.
7. Jensen J, Sindet-Petersen S, Olivier AJ. Varying treatment strategies for reconstruction of maxillary atrophy with implants: Results in 98 patients. *J Oral Maxillofac Surg* 1994;52:210-216.
8. Chanavaz M. Maxillary sinus: Anatomy, physiology, surgery and bone grafting relating to implantology—Eleven years experience (1979-1990). *J Oral Implantol* 1990;16:199-209.