Sinus lift, antral pseudocyst removal and horizontal bone augmentation using a bony lid - Case report

ABSTRACT
Purpose: Complex cases often require various treatment modalities that increase patients morbidity, treatment time and costs. In the present case we combined several techniques in order to perform a sinus lift, remove an antral pseudocyst and augment the site horizontally.
Case report: A 69 year old female patient presented herself at our office looking for an oral rehabilitation solution. A need for sinus grafting as well a horizontal augmentation was noticed. An antral pseudocyst occupied a large portion of the right sinus. We removed a bony lid to access the sinus, aspirated the antral pseudocyst’s content and removed it through the Schneiderian membrane. After suturing it, the membrane was elevated, the sinus lift performed and the access window closed with a collagen membrane. The bony lid was used to augment the adjacent area. Implants were placed 4 months later.
Conclusion: With the present method of treatment we were able to successfully perform a sinus lift, antral pseudocyst removal and bone augmentation, with a low morbidity, combined approach.

KEYWORDS
Sinus lift, Antral pseudocyst, Bony lid, Autogenous bone graft

doi: https://doi.org/10.35252/jspir.2019.1.001.2.03
INTRODUCTION
Limited availability of bone in the posterior maxilla is a common finding due to pneumatization of the maxillary sinus.1 A widely reported method in the literature, sinus lift,2,3 is often the surgical answer to such a clinical challenge, allowing the clinician to place dental implants in sites where the remaining alveolar bone is scarce.4 The lateral approach of the sinus lift technique consists of creating access through the alveolar bone, lifting the Schneiderian membrane, and then grafting the space comprised between the membrane and the sinus floor. In the literature, we can find several different materials that can be successfully used to graft the sinus cavity.5 The volume that results from this augmentation does not compromise the sinus function provided that the ostium is not obstructed, which in normal conditions is unlikely.6-8 However, it may be the case that a clinically asymptomatic condition occupies a significant volume in the sinus, which combined with a sinus lift may lead to ostium blockage.7-10 Radiographically, antral pseudocysts (APC) have a typical dome shape appearance and may reach a large volume in size. The prevalence of antral pseudocysts on a Computerized Scan (CT) is 12%.7 These conditions are often asymptomatic. Their treatment is usually unnecessary, and the lesions regress spontaneously in a large number of cases.11-13 The combined volumes of a sinus lift and an APC may impair the normal physiology of the sinus.5,10 In the literature, several examples of sinus lift in the presence of large APCs can be found.10,12,13

CASE REPORT
A 69-year-old female patient attended our private practice looking for a fixed dental rehabilitation. Upon Cone Beam Computed Tomography (CBCT) analysis, it was noticed that a sinus lift was needed in order to place implants on the first quadrant. The remaining bone height on the molar area was not enough for adequate implant placement (Figure 1). It was also noted the limited horizontal availability of bone on the area of the first premolar (Figure 2). The left sinus was normal. A radiopaque image with a dome shape was present on the patient’s right sinus occupying a large volume (Figure 3). It was decided to remove it and to graft the sinus, while also performing bone augmentation on the premolar area.

SURGICAL PROCEDURE
Prophylactic oral premedication, amoxicillin 2 g (Clamoxyl, GlaxoSmithKline) was used 1 hour before the operation, as well as mouth rinsing with 0.2% chlorhexidine (Eludril, Pierre Fabre) for 2 minutes. Local anesthesia (infiltration of posterior superior alveolar nerve and greater palatine nerve) was executed with articaine hydrochloride with 1:100,000 Adrenaline (Artinibsa, Inibsa).

A mucoperiosteal flap was raised with vertical incisions mesial to the canine and distal to the molar area. The flap was then reflected exposing the sinus lateral and posterior wall, as well as the premolar area. Using a piezotome (NSK, Japan) and a saw tip (SG1, NSK, Japan), a bony lid was outlined (Figure 4) on the lateral sinus wall leaving

Figure 1. Insufficient bone height for implant placement

Figure 2. Horizontal bone defect

Figure 3. Dome shaped radiopaque lesion
a minimum of 3mm of distance to the sinus lower border. Care was taken to maintain the saw tip in contact with bone at all times. As a result, a rectangle with roughly 10x8mm was defined (Figure 5).

With the use of a Lucas curette (#86, Hu-Friedy; USA) the bony lid was carefully detached (Figure 6) from the Schneiderian membrane, removed, and immersed in saline.

Using a 15c (Swann Morton®, England) blade, a cut was made through the Schneiderian membrane with a dimension of 3mm mesiodistally (Figure 7). A 20 ml Syringe (BD Discardit II™, Spain) and 21-gauge needle (BD micro lance 3, Spain) were used to suck out the liquid content of the APC reducing its volume prior to its removal (Figure 8,9). Tweezers were used through the Schneiderian membrane aperture to remove the APC (Figure 10). The specimen was later histologically examined and confirmed our initial diagnosis.

The membrane was sutured (Figure 11) with 4/0 and 6/0 resorbable suture GLYCOLON® (PGA RESORBA®, Germany). The sinus was lifted in a traditional way (Figure 12), with the use of dedicated instruments (Dio implants, South Korea).

An additional bone perforation, measuring about 1mm in size (Figure 13), was performed apical to the bony window. It helped to secure the sutures in place (Figure 14), ensuring sealing of the perforation, resulting in the membrane being folded onto itself apically.

A collagen membrane (Parasorb Forte, Resorba) was placed as a layer of protection against the Schneiderian membrane (Figure 15). The sinus was grafted with a 75% e HAp Hydroxyapatite 25% tricalcium Phosphate (TCP) (Biobone, Cpmpharma) large granules biomaterial (Figure 16). The lateral wall was covered with another collagen membrane (Parasorb Forte, Resorba, Germany) and stabilized with the use of two tacks (Devemed, Germany) placed coronally to the bony window’s lower border (Figure 17).

The detached bony lid was screwed at a distance in the premolar site (Figure 18) using 1,3 x 9 mm screws (Devemed, Germany).

The gap between the bony lid and the alveolar bone was filled using bone chips collected from the tuberosity area (Figure 19).
Figure 11. Schneiderian membrane suture

Figure 12. Membrane elevation using sinus curettes

Figure 13. 1mm apical hole

Figure 14. Membrane being sutured to the bone

Figure 15. Collagen membrane inside the sinus, bony lid screwed to the alveolar crest

Figure 16. Grafted sinus

Figure 17. Outer collagen membrane and tacks

Figure 18. Screwed bony lid

Figure 19. Tuberosity chips graft
The periosteum on the vestibular site was scored and mobilized in order to be mobilized, ensuring tension free suturing. 4 months later four implants were placed on the first quadrant (Dio implants, South Korea) (Figure 20). A CBCT showed (Figure 21) no remnants of the APC. The grafted area revealed an adequate volume for implant placement (Figure 22).

**DISCUSSION**

Ostium patency is required for a healthy sinus function. Located 25 to 35 mm above the antral floor, the ostium is usually not blocked by APCs. The great majority of APCs are asymptomatic and do not require surgical treatment. Several authors reported different techniques of grafting the sinus with APCs being present in cases with patent ostium.

In patients with a large APC, the ostium may become blocked due to the combined volume of an APC together with a sinus augmentation. Several authors have tried to technically address the challenge of enucleating APCs. Pikos described a one-stage protocol in which an APC was removed causing a membrane perforation which was concomitantly managed through the use of a collagen membrane and tacks thus allowing for the sinus to be grafted at the same time.

Chiapasco described a technique that combines enucleation of large APCs during sinus grafting via a lateral approach with preservation of the Schneiderian membrane periosteal layer but the cortical bone was not collected.

In the present case, it was decided to remove the APC in order to eliminate the chance of ostium blockage. In order to do so, the Schneiderian membrane has to be perforated. Ardekian found no statistical difference in the success rate of the immediate implants placed with sinus bone grafting in patients whose membrane was perforated (less than 10mm) and repaired with a collagen membrane versus those patients in whom an intact membrane was maintained.

In our case, a minimal perforation was performed but still allowed for the pseudocyst to come through it. After removal, the perforation was managed using non-resorbable sutures, having the membrane being folded onto itself apically. A collagen membrane secured by tacks on the alveolar process was used to ensure any micro perforation would be sealed.

The removed bony lid acts as a barrier composed of cortical bone that is very resistant to resorption. Being screwed to the alveolar bone at a distance creates a compartment that we filled with bone chips. The bone chips are easily vascularized and, due to the presence of the bony lid, not easily resorbed. Four months after the first surgery, it was possible to adequately place four implants on the intervened site.

**CONCLUSION**

Within the limitation of the present case, a sinus lift can be performed while simultaneously removing an APC through a minimal tear in the membrane. The use of resorbable sutures and collagen membranes are valid methods of managing a Schneiderian perforation. The sinus wall may be used successfully as a cortical shell for bone augmentation. Adequate knowledge of anatomy, pathology, and physiology are necessary to avoid unnecessary complications.
REFERENCES


