

Research article

Simultaneous Implant Placement and Sinus Lift Augmentation with Surgical Removal Pseudo-Cyst

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Abstract

Background

In literature, several Authors showed the possibility to perform a sinus lift technique and pseudo-cyst simultaneous removal. The objective of this retrospective study was to assess the possibility to obtain the stability needed for placing implants inserted in association with sinus lift and to perform, in the same surgery treatment, a particular surgical access to the sinus cavity to remove the sinus pathology.

Materials and Methods

Two patients with posterior maxillary edentulia were included in this study. They showed a maxillary pseudo-cyst and were undertaken to a one step surgery, including the pseudo-cyst removal by lateral approach, the sinus lift and implant placement. Implant-prosthesis was loaded after 8 months from the procedures. The clinical and radiological follow-up was performed after the surgical intervention and after 1 month, 6, 12, 24 months from loading.

Results

A total of six implants were inserted and during follow-up, no failure was observed. No patient showed symptoms and mobility at the last clinical and radiological follow up.

Conclusions

Within the limitations of this study, it appears that implants placed simultaneously to pseudo-cyst ablations and sinus augmentations could be a safe procedure. A patient selection should however be performed with accuracy.

Keywords: pseudo-cyst; maxillary sinusitis; endoscopic surgery; sinus lift; implant placement.

Introduction

Pseudo-cyst developed when a duct of a seromucous gland of the maxillary sinus mucosa becomes obstructed. This pathological situation leads to a cystic dilation of the involved gland. This continued mucous secretion might lead up to the development of expanding epithelial-lined masses which, by the way, erodes the bone sinus margins [1-3].

The origin of this sinus pathology remains a subject under discussion in the international literature [2-3]. Pseudo-cyst appears

to be related to a chronic inflammatory process occurring in a closed space, related to a benign tumour, post-traumatic scarring or inflammation [4-5]. This continuous development leads to ostial obstruction and make favourable the following additional collection of mucus secretions [6].

Pseudo-cyst occurred when the drainage of the sinus is occluded such that mucus collects and can completely fill the sinus. The maxillary sinus is involved in only 10% of cases [7], moreover, pseudo-cyst can cause bone expansion leads by the pressure effect [8] and international paper showed how in the 10-12% of cases of inflammatory maxillary sinus diseases are of dental origin [9].

The reported incidence of these lesions is 1.4%- 9.6%, occurring primarily during the third and fourth decades of life, and it is usually discovered when routine radiologic examinations are taken [3,10]. This is because it is generally asymptomatic, but in some case it can cause facial swelling, nasal obstruction, postnasal drip, nasal discharge, headache, or periorbital or dental pain due to pressure exerted on the mucosa lining. Generally, pseudo-cyst was a self-limiting condition, with a rate of spontaneous regression and disappearance of 17.6%- 38% [10].

Radio graphical aspects of pseudo-cyst are represented by a rounded dome-shaped soft tissue mass, frequently located on the floor of the maxillary sinus and usually filled with clear yellowish fluid [11-13].

Surgery is the only curative treatment [19] and in International literature there are some surgical options available to eliminate

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these lesions.

The objective of this retrospective study was to evaluate the possibility to obtain the stability needed for placing implants inserted in association with sinus lift and to perform, in the same surgery treatment, a particular surgical access to the sinus cavity to remove the sinus pathology.

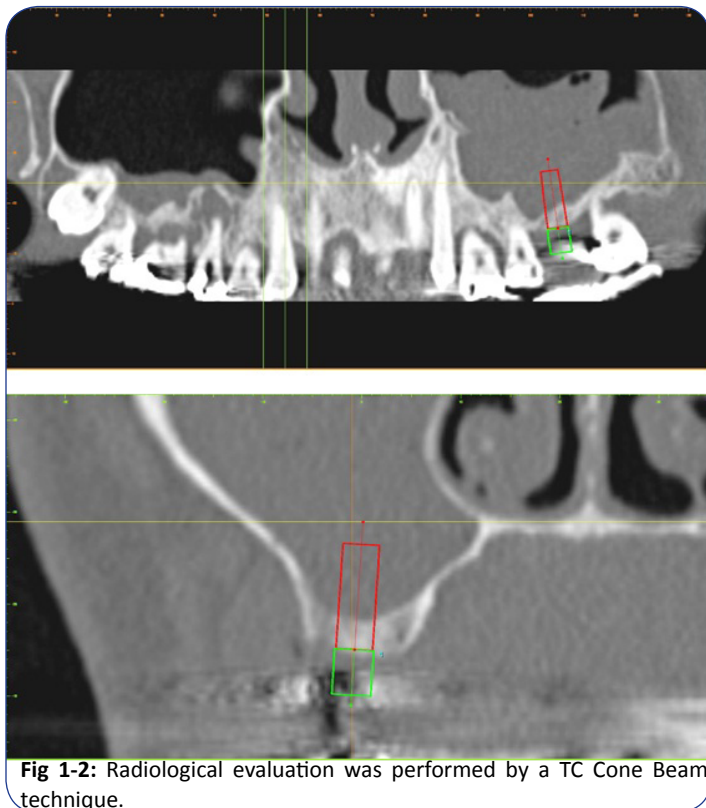
Materials and Methods

Studied Design

The present retrospective analysis included 2 patients (1 male, 45 age and 1 woman, 65 age), who needed prosthetic rehabilitation in posterior maxillary area and which showed a pseudo-cyst presence at the radio-graphical evaluation. The augmentation was obtained using a lateral approach and simultaneous implant placements; the procedure was performed by a single oral surgeon (M. J.) from January 2011 and February 2013. Patients were informed of all the possible treatment choices for tooth replacement, about the possibility of post surgical complications and they accepted the fixed implant supported prosthesis, and the muco pseudo-cyst's surgical treatment for which they signed an informed consent form. The included patients presented the crestal height 5 mm or less; they were no smokers and no general healthy complications or surgical contra-indication was recorded.

Surgical Procedures

Radiological evaluation was performed by an OPT x-ray evaluation, with apical radiographies and, when necessary, with a TC Cone Beam technique (Fig 1, Fig2).



All the patients were treated with an antibiotic treatment as Amoxicillin and Acid Clavulonic (Augmentin GlaxoSmithKline UK) 2 gr. 1 hour before of the surgical step and 1 gr each 12 hours during the following 6 days. In addition, all patients assumed acetylcysteine, as pre operative medication. At the surgical appointment washing with clorexidine 0-12% were done at least 1 minute before surgery. Surgery was performed under local anesthesia by Articaine infiltration (Ubistesin 4% - Espe Dental AG Seefeld, Germany) with adrenaline 1:100.000.

After a crestal and bi-lateral oblique releasing incision, surgical areas were exposed sufficiently by the full-thickness mucoperiosteal flap elevation (Fig 3). The window approach was made with a burr on a piezoelectric maniple (Surgysonic - Esacrom, Bologna - Italy). The bony window design was trapezoidal with the shorter side forward the coronal ridge (Fig 4). When the window was completely delimited, the bony window was designed on the lateral wall of the sinus and was removed.

Once exposed the membrane (Fig 5), on the apical side of the

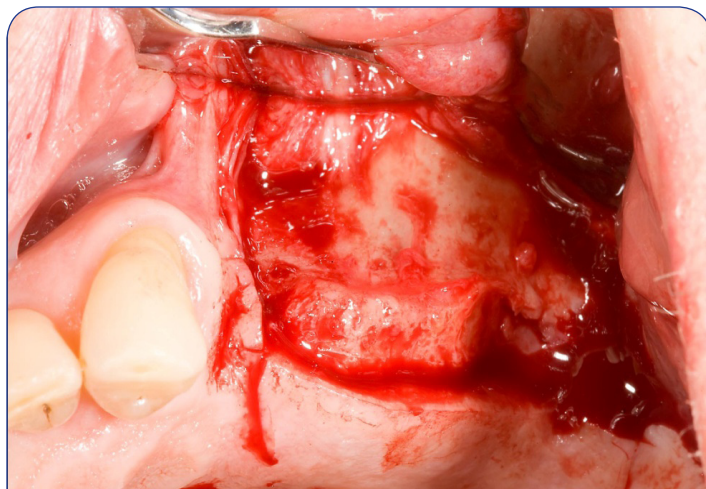


Fig 3: The surgical area were exposed by a full-thickness mucoperiosteal flap elevation with a crestal and bi-lateral oblique releasing incision.



Fig 4 The window approach was made with a burr on a piezoelectric maniple. The bony window design was trapezoidal with the shorter side forward the coronal ridge.

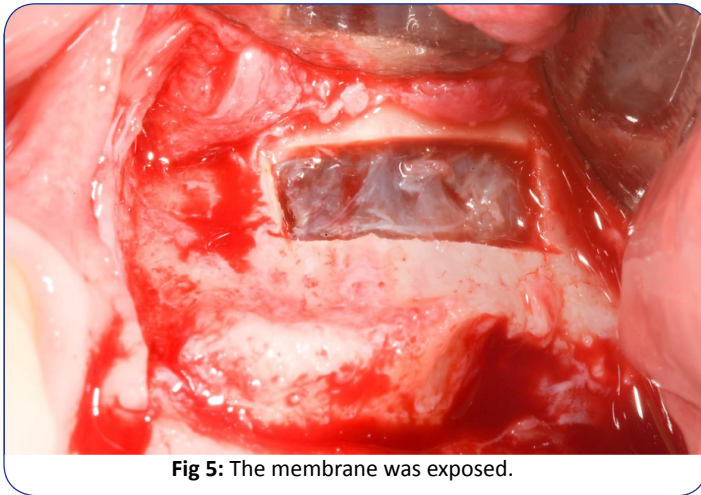


Fig 5: The membrane was exposed.

membrane, was performed an incision by a 15c (Fig 6), to make an access, and by a syringe the pseudo-cyst is aspirated (Fig 7). The Schneider and membrane, covering the bony sinus floor, was gently separated from the sinus floor. The open portion of the membrane is close by surgical forceps (Fig 8) and a resorbable membrane (Fig 9) (Jason- Bottis Balingen) was placed on the Schneider an membrane

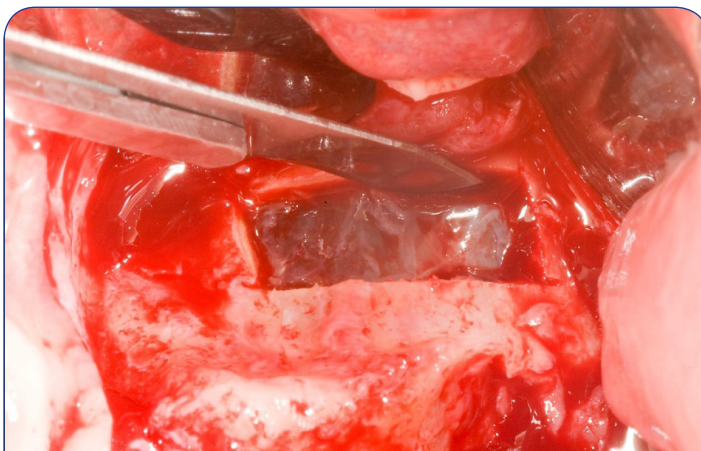


Fig 6: On the apical side of the membrane, was performed an incision by a 15c to make an access to the pseudo cysts.



Fig 7: The pseudo-cyst was aspirated by a syringe.

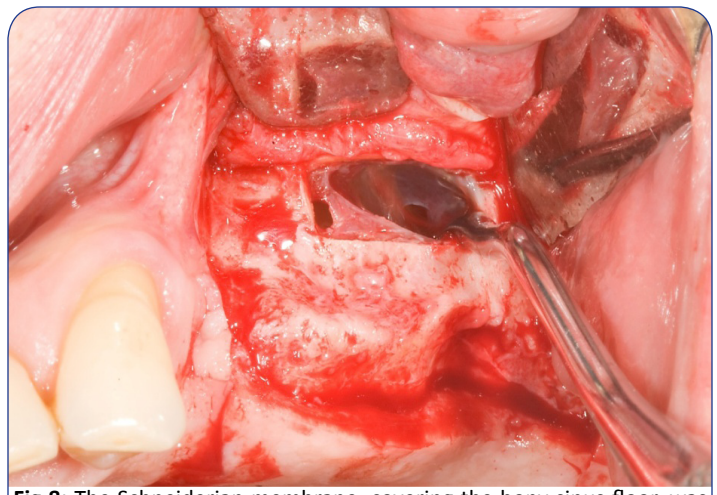


Fig 8: The Schneiderian membrane, covering the bony sinus floor, was gently separated from the sinus floor and the open portion of the membrane is close by surgical forceps.

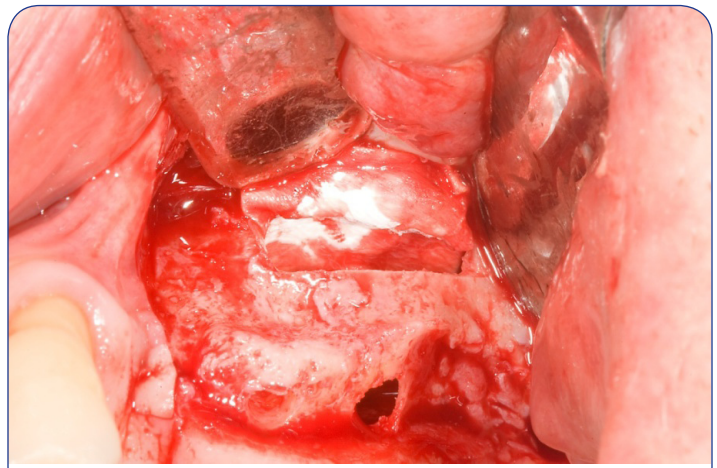


Fig 9: A resorbable membrane was placed on the Schneiderian

and graft material (BioOss, Geistlich Pharma AG Thiene - Vicenza) mixed with bone graft removed for making the lateral access were placed inferiorly (Fig 10).

Ideal implant position was highlighted with a round bur on straight hand piece. Using a surgical stent, the initial and serial drillings of the implant placement area were performed using implant's burr sequence on an implant's motors (Fig 11). The final drilling was performed with a counter sink when the bone density was really height. A total of 6 implants were placed, 3 in each patient (EZ Plus- Megagen, Pusiano, Como), with size 3, 75 x 10 mm. The BioOss mixed with the bone graft removed for making the lateral access to the sinus, was reduce in minimal particles for filling up the cavity at a later stage. A periosteal incision, in horizontal direction, made the flap more elastic and it allowed to closed hermetically the surgical site, by a suture with a 4/0 supramid (Supramid, Milano - Italy) for the crest incision and a 6/0 (Supramid) for lateral oblique releasing incisions (Fig 12). Sutures were removed after 10 days.

Radiographic Evaluation

The radiographic examinations, OPT and CT scan, were performed



Fig 10: Graft material was placed inferiorly to the membrane.

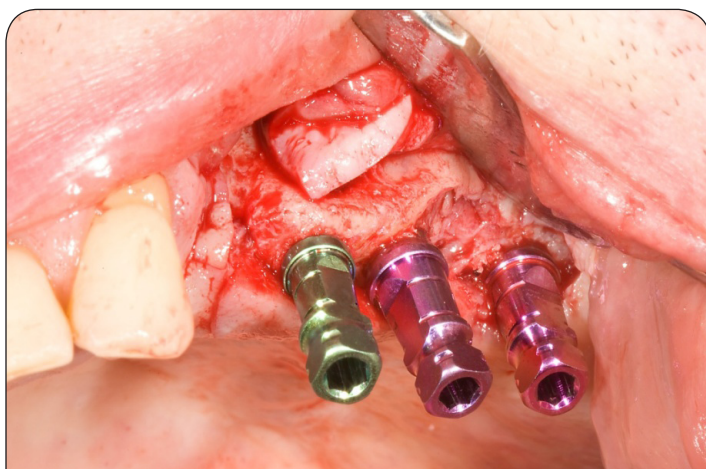


Fig 11: Ideal position were planned by the CBCT and implants were placed.

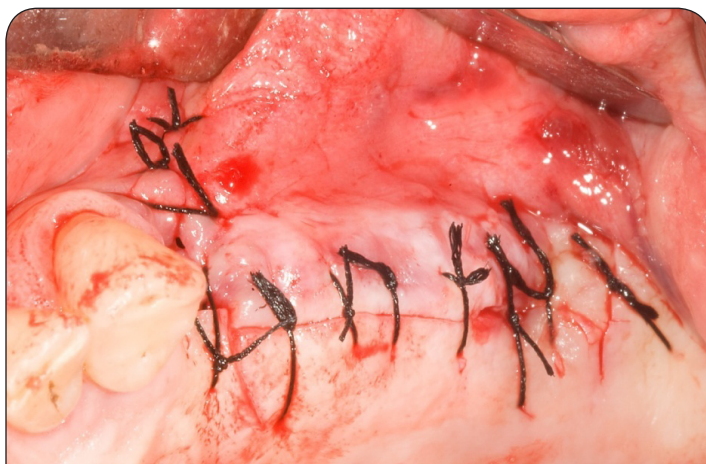


Fig 12: A suture were done for ensure an hermetic closure.

after a period of 2 months to evaluate the outcome of the surgical procedure The radiographic examinations, OPT and periapical were performed after the surgical intervention and after 1 month, 6, 12, 24 months from loading. The radiographic evaluation, combined with the following appropriate clinical criteria as described by Albrektsson [14] was also reported.

Implant Success Criteria

Authors recorded the following criteria to evaluate the implant success rate, as: no pain or tenderness on function; no mobility; overall interproximal radiographic bone loss 2 mm from time of initial implant placement; interproximal radiographic bone loss than 1.5 mm from time of crown placement and initial functional loading to 1 year of functional loading; no pathologic peri-implant attachment loss indicating [14].

Results

Clinical Evaluation

The postoperative healing was uneventful and free of complications or infection in all patients, except for the inflammation and swelling of the surgical procedure. After 6 months, at radiographic analysis, an adequate amount of radiopaque material with greater density than the bone was present and no signs of maxillary sinus disease were observed. No perforations of the Schneider an membrane were observed.

Implant Success Criteria

During the follow-up no implant failure was observed. Osseointegration was achieved in all 6 implants at the time of abutment connection. After 12 and 24 months of functional loading (Fig 13), all 6 implants inserted caused no pain, sensitivity, or mobility and maintained stable osseointegration. All the implants had marginal bone resorption values comparable to those proposed by Albrektsson et al [14]. Thus, the cumulative survival and success rates of the implants were 100%.



Fig 13: Follow-up after 24 months from prosthetic loading

Discussion

Pseudo-cysts of the paranasal sinuses are benign cyst-like expansible lesions lined with a secretory respiratory mucosa of pseudo-stratified columnar epithelium. This kind of lesion grows slowly, and could be originated from an obstruction of the sinus outflow in combination with superimposed infection, which can cause the release of cytokines from lymphocytes and monocytes. The cytokine release would stimulate fibroblasts to secrete

prostaglandins and collagenases, which could eventually lead to bone resorption [15-16].

CBCT (Cone Beam Computed Tomography) is paramount for the diagnosis of pseudo-cyst. It not only demonstrates sinus involvement, but it also provides information about bone erosion and other effects on neighbouring structures. CBCT shows pseudo-cyst as a homogeneous lesion with smooth clear-cut margins of bone erosions occurring in the sinus walls. In contrast, malignant lesions usually present irregular shapes, erosions or destruction of the sinus walls, infiltration into the surrounding soft tissues, and irregular margins of bone absorption [16-18].

Traditionally, pseudo-cyst have been treated by means of direct puncture and aspiration through the inferior meatus or natural ostium, or removed by using the Caldwell-Luc approach [16]. More recently, endoscopic intranasal sinus surgery has been used to remove pseudo-cyst of the maxillary sinus [16]. Although external resection remained the reference technique for many years, endonasal endoscopic sinus surgery is now generally used, as it is more conservative and less aggressive [19]. Some Authors mentioned that intranasal endoscopy techniques offer good results with very low morbidity. Nevertheless, these procedures require very specific equipment, not usually available in dental offices, and the need for an experienced surgeon.

In contrast to the classical surgery treatment, this endoscopic surgery constitutes one of the major causes of pseudo-cyst [20]; the incidence of pseudo-cyst has markedly increased since the 1990s, in parallel with the growth of endonasal endoscopic surgery [21-22].

A conventional lateral wall approach also has some advantages. It is a simple and safe technique, with a very low complication rate, and that allows a good exploration of the maxillary sinus. Furthermore, it permits performing sinus augmentation techniques in the same surgical procedure [23-24].

Yura et al [25] described a procedure for removing lesions in the maxillary sinus using bone flaps with sinus mucosa and muco-periosteum. The surgical design was to construct a rectangular trapdoor using 3 consecutive bur-cuts, fracture the upper margin, and lift the bone lid upward. The osteotomy site on the inferior, medial, and lateral sides of the bone lid was exposed sub-periosteally, but the muco-periosteal and sinus mucosal attachments on the superior and central areas of the lid were maintained. Then, following fracture of the upper bone margin, the lid was lifted upward. In this way, the integrity of the muco-periosteum and sinus mucosa was maintained.

Advantages of the bone flap with soft tissue pedicles technique may be quick recovery and restored integrity of the sinus wall, with a low probability of infection because of vascularisation of the bone lid. To realize this, a bone flap with both sinus mucosal and muco-periosteal pedicles is more suitable.

Learning from the experience described in literature, in this study

the surgeon decided to realize the lateral approach, with the lateral wall approach, including a simultaneous sinus lifts and implant placement to avoid multiple surgical appointments to the patients.

The surgical technique described in this paper presented a particularity. Surgeon made an incision of the membrane to get a direct access to the pathological structure and to make possible a direct aspiration of it.

By this procedure, operator could see directly the total cleaning of the sinus. A disadvantage of this technique was the impossibility to perform the biopsy of the lesion.

Conclusions

This retrospective study was conducted on patients underwent pseudo-cyst's ablation, sinus lift using a lateral approach and simultaneous implant placement, performed by a different surgical procedure. The present investigation included 2 patients and a total of six implants were placed at time 0 and they were all loaded after 8 months.

Within the limitations of this study, it appears that implants placed simultaneity to pseudo-cyst ablations and sinus augmentation could be a safe procedure. A patient selection should however perform with accuracy.

References

1. Marks SC, Latoni JD, Mathog RH (1997) Mucoceles of the maxillary sinus. *Otolaryngol Head Neck Surg* 117(1): 18-21.
2. Patrocínio LG, Damasceno PG, Patrocínio JA (2008) Maxillary mucocele in a 4-month infant. *Braz J Otorhinolaryngol* 74(3): 479.
3. Hadar T, Shvero J, Nageris BI, Yaniv E (2000) Mucus retention cyst of the maxillary sinus: the endoscopic approach. *Br J Oral Maxillofac Surg* 38(3): 227-229.
4. Lund VJ, Henderson B, Song Y (1993) Involvement of cytokines and vascular adhesion receptors in the pathology of fronto-ethmoidal mucocoeles. *Acta Otolaryngol* 113(4): 540-546.
5. Herndon M, McMains KC, Kountakis SE (2007) Presentation and management of extensive fronto-orbital-ethmoid mucoceles. *Am J Otolaryngol* 28(3): 145-147.
6. Kennedy DW, Josephson JS, Zinreich SJ, Mattox DE, Goldsmith MM, et al. (1989) Endoscopic sinus surgery for mucoceles: a viable alternative. *Laryngoscope* 99(9): 885-895.
7. Martin RJ, Jackman DS, Philbert RF, McCoy JM (2000) Massive proptosis of the globe. *J Oral Maxillofac Surg* 58(7): 794-799.
8. Ling FT, Kountakis SE (2006) Advances in imaging of the paranasal sinuses. *Curr Allergy Asthma Rep* 6(6):502-507.
9. Mehra P, Jeong D (2009) Maxillary sinusitis of odontogenic origin. *Curr Allergy Asthma Rep* 9(3): 238-243.
10. Wang JH, Jang YJ, Lee BJ (2007) Natural course of retention cysts of the maxillary sinus: long-term follow-up results. *Laryngoscope* 117: 341-344.

11. Whyte A, Chapeikin G (2005) Opaque maxillary antrum: a pictorial review. *Australas Radiol* 49:203-213.
12. Mardinger O, Manor I, Mijiritsky E, Hirshberg A (2007) Maxillary sinus augmentation in the presence of antral pseudocyst: a clinical approach. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 103: 180-184.
13. Har-El G (2001) Endoscopic management of 108 sinus mucoceles. *Laryngoscope* 111: 2131-2134.
14. Albrektsson T, Zarb G, Worthington P, Eriksson AR (1986) The long-term efficacy of currently used dental implants: a review and proposed criteria of success. *Int J Oral Maxillofac Implants* 1(1): 11-25.
15. Martin RJ, Jackman DS, Philbert RF, McCoy JM (2000) Massive proptosis of the globe. *J Oral Maxillofac Surg* 58(7):794-799.
16. Har-El G (2001) Endoscopic management of 108 sinus mucoceles. *Laryngoscope* 111(12): 2131-2134.
17. Misch CE (1987) Maxillary sinus augmentation for endosteal implants: organized alternative treatment plans. *Int J Oral* 4: 49-58.
18. Caylakli F, Yavuz H, Cagici AC, Ozluoglu LN (2006) Endoscopic sinus surgery for maxillary sinus mucoceles. *Head Face Med* 2: 29.
19. Matheny KE, Duncavage JA (2003) Contemporary indications for the Caldwell-Luc procedure. *Curr Opin Otolaryngol Head Neck Surg* 11: 23-26.
20. Busaba NY, Salman SD (1999) Maxillary sinus mucoceles: clinical presentation and long-term results of endoscopic surgical treatment. *Laryngoscope* 109: 1446-1449.
21. Moriyama H, Nakajima T, Honda Y (1992) Studies on mucoceles of the ethmoid and sphenoid sinuses: analysis of 47 cases. *J Laryngol Otol* 106: 23-27.
22. Raynal M, Peynegre R, Beauru R (1999) Sinus mucoceles and surgery in iatrogenic diseases. *Ann Otolaryngol Chir Cervicofac* 116: 85-91.
23. Serrano E, Klossek JM, Percodani J (2004) Surgical management of paranasal sinus mucoceles: a long-term study of 60 cases. *Otolaryngol Head Neck Surg* 131: 133-140.
24. Facon F, Nicollas R, Paris J, Dessi P (2008) Surgery of mucocele of the paranasal sinuses: report of 52 cases with a middle term follow up]. *Rev Laryngol Otol Rhinol (Bord)* 129(3): 167-173.
25. Yura S, Kato T, Ooi K, Izumiyama Y (2010) Access to the maxillary sinus using a bone flap with sinus mucosal and mucoperiosteal pedicles. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 109(2): e8-12.