

Case report



SINUS LIFT BY LATERAL APPROACH WITH SIMULTANEOUS IMPLANT PLACEMENT USING PLATELET-RICH FIBRIN AS SOLE GRAFTING MATERIAL. CASE REPORT

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ABSTRACT:

Introduction: The lack of sufficient bone in the distal part of the upper jaw is often a problem in the planning and placement of dental implants. In the lateral sinus lift, autogenous bone and other different bone substitutes are used alone and in combination to ensure sufficient bone volume. Recently, the use of PRF alone and in combination with various bone substitute materials in sinus lift procedures revealed promising clinical results.

Case report: Patient is a 56-year-old male with missing upper right molars and a residual bone height of 2.8 to 5.1 mm. A lateral sinus lift was performed using PRF alone. After filling the sinus cavity with PRF was inserted four dental implants.

Conclusion: The presented clinical case reveals rapid and uncomplicated post-operative period. The implant stability, measured in the fourth month, was with very good. The x-ray (CBCT) examination revealed the rapid formation of a new bone structure around the implants and good osteointegration as early as 4 months after the procedure. The clinical and radiographic results support the use of PRF as a sole graft material for lifting the sinus floor with simultaneous placement of dental implants.

Keywords: A-PRF, lateral sinus lift, dental implants, bone substitute,

INTRODUCTION

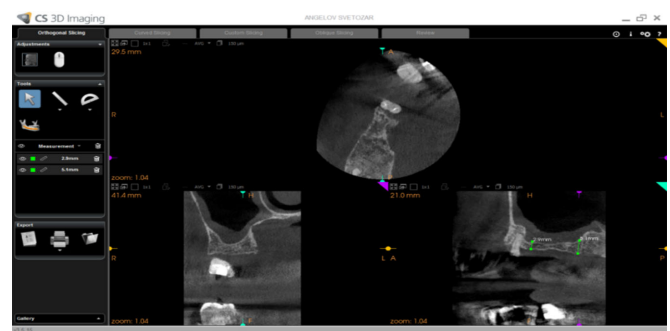
The Caldwell-Luc operation is historically the first technique described for lifting the maxillary sinus floor with a lateral approach, using bone graft material to provide sufficient bone for dental implant placement. [1] In 1980, Boyne PJ and James RA [2] first described this technique using autogenous bone and placing dental implants. The technique of lateral sinus lift recently has proven to be a predictable and reliable procedure for increasing the volume of the alveolar bone in the distal regions of the maxilla. Autogenous bone and various bone graft materials are used for sinus floor elevation. Recent studies reveal that autogenous bone and a variety of other bone graft materials are effective for sinus lift with lateral access. [3-6] It is well known that PRF is a source of multiple growth factors and biologically active substances which promote the rapid recovery of soft and hard tissues. [7, 8] Mazor Z et al. [1] support the use of

PRF as a sole graft material in lateral access to elevate the maxillary sinus floor and achieve very good radiological and histological results 6 months after the treatment. According to them, the successful results are due to both, the biological qualities of PRF and the osteogenic potential of the Schneiderian membrane, which is similar to the periosteum.

CASE REPORT:

The patient is a 56-year-old male with missing upper right molars and a residual bone height of 2.8 to 5.1 mm. (Fig.1) The patient was diagnosed and treated at the Oral surgery department – FDM Plovdiv.

Fig.1. 3D CBCT scan before surgery



Preparation of the PRF membrane:

After the venipuncture of v.cubity with a 10ml vacuum test-tube (Advanced-PRF™), 9ml of blood was taken from the patient. The blood was then immediately put into a PRF DUO (Process for PRF®-France) centrifuge for 8 minutes at 1300 rpm.

Surgical treatment:

After adequate local anesthesia was administered, a midcrestal horizontal incision of mucosa and periosteum was made. Two diverging vertical incisions reaching the mucogingival junction were performed. The releasing incisions were made beyond the borders of the planned bone window on the lateral sinus wall. A full-thickness flap was elevated to the mucogingival junction. The bone osteotomy was performed with a piezosurgical unit in order to be created a bone window on the lateral wall of the maxillary sinus. (Fig.2) Presurgical evaluation using a CBCT included determining the size of the bone window as well

as the size and number of dental implants to be placed. The lower (caudal) osteotomy was performed 2-4 mm, cranial above the maxillary sinus floor. The upper (cranial) osteotomy was determined depending on the height and size of the planned dental implants. The shaped bone fragment of the lateral sinus wall was carefully mobilized and pushed inwards into the sinus cavity. (Fig.3) The Schneiderian membrane was detached in all directions using a the piezosurgical unit with suitable nozzles and hand tools. The Schneiderian membrane was protected with a suitable instrument while forming the place for the implants. (Fig.4) The sinus cavity was filled with pre-prepared PRF membranes. (Fig.5) Four dental implants were placed, achieving very good primary stability. (Fig.6) After filling the sinus cavity and inserting the implants, the bone window on the lateral maxillary wall was covered with PRF membrane and resorbable collagen membrane. The mucoperiosteal flap was readapted and sutured with 000 thread. The patient was prescribed antibiotic therapy, including one day preoperatively and another 5 days post-operative (Augmentin 3x625mg). The sutures were removed 12 days after the surgery.

Fig. 2. Bone osteotomy with a piezosurgical unit.



Fig. 3. Shaped bone fragment, pushed into the sinus cavity



Fig. 4. Intraoral picture of protecting the Shneiderian membrane, while forming the place for the implants



Fig. 5. Sinus cavity filled with pre-prepared PRF membranes

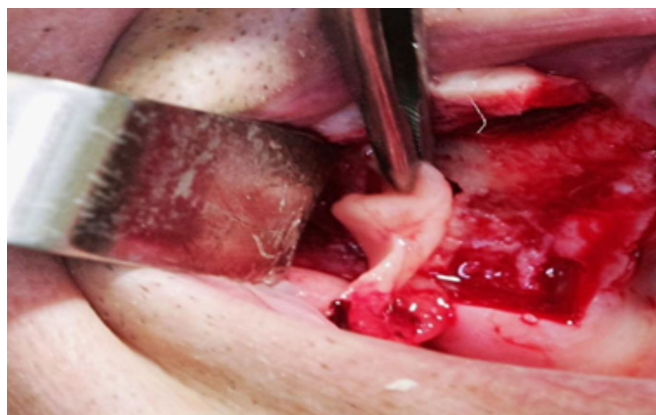


Fig. 6. Placed dental implants



DISCUSSION:

The deficient bone volume in the posterior maxilla is often a challenge when planning the placement of dental implants. In the practice different techniques of lateral and transalveolar sinus lift are used to ensure sufficient bone volume. When sufficient height of the alveolar bone is present for obtaining good primary stability of the dental implants, they can be placed simultaneously with sinus

lift procedure. The one-stage sinus lift was first described by Tatum JH in 1986. [9] There are different views in the literature on when to use sinus lifting procedures. According to Zitzmann N and Schärer P. [10] when a residual subantral bone height of $d'' 4$ is present, a 2-stage sinus lift procedure is recommended; if the bone height is between 4-6mm - one-stage sinus lift and in cases where the bone height is more than 6 mm a closed sinus lift procedure is recommended. A 1998 study showed that when appropriately designed implants and optimal surgical technique are used, placement of dental implants with simultaneous sinus lift procedure can be successful when the residual height of the alveolar bone is 1-2 mm.

Some authors support the concept of guided tissue regeneration (GTR) and perform a sinus lift procedure without placing bone grafting material.[11-13] This technique requires stabilizing the dental implants in the residual alveolar bone and lifting the Schneiderian membrane to the highest possible position. The implants hold the membrane elevated with their apical parts, similar to the feet of a tent. This technique leads to natural bone regeneration around the implants placed in the maxillary sinus. The main drawback of the method is the difficult atraumatic lifting of the Schneiderian membrane, which is crucial for preserving the osteogenic potential. The use of a PRF membrane is an additional option for lifting the sinus, especially in cases of injuring or tearing of the Schneiderian membrane.

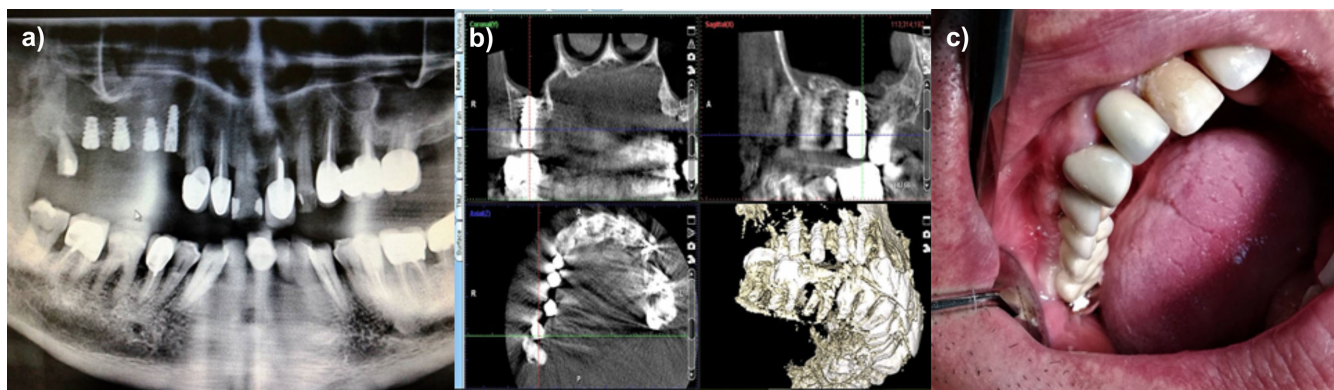
Choukroun, J et al. [14] first combine PRF in combination with allograft for sinus lift and report the reduction of the time required for loading the dental implants (from 8 to 4 months). Other authors combine PRF with dif-

ferent types of bone replacement materials in lateral sinus lift and also achieve very good results. Based on the aforementioned concept of the osteogenic potential of the Schneiderian membrane and considering the biological and therapeutic properties of PRF Mazor Z et al.[1] suggest the use of PRF as a sole graft material for lateral sinus lift procedure. Simonpieri A et al. [15] conducted a study of elevating the floor of the maxillary sinus with PRF as a sole graft material using lateral access and one-stage placement of dental implants. Patients were followed up clinically and radiographically for 6 years. The authors of this study conclude that PRF, as a sole graft material, leads to the formation of new bone around the dental implants after lifting the sinus floor with lateral access. The results obtained in the clinical case presented by us confirm the results obtained by the authors of the aforementioned study and by other authors.

CONCLUSION:

The presented clinical case reveals rapid and uncomplicated post-operative period. The implant stability, measured in the fourth month, was with very good. The x-ray (CBCT) examination revealed the rapid formation of a new bone structure around the implants and good osteointegration as early as 4 months after the procedure. The clinical and radiographic results support the use of PRF as a sole graft material for lifting the sinus floor with simultaneous placement of dental implants. (Fig.7 a, b, c.) This clinical approach can significantly shorten the necessary clinical time for recovering the the patient's lost function.

Fig.7 . a) Panoramic x-ray after the treatment **b)** CBCT after the treatment **c)** Intraoral picture of the fixed bridge



REFERENCES:

1. Mazor Z, Horowitz RA, Del Corso M, Prasad HS, Rohrer MD, Dohan Ehrenfest DM. Sinus floor augmentation with simultaneous implant placement using Choukroun's platelet-rich fibrin as the sole grafting material: a radiologic and histologic study at 6 months. *J Periodontol*. 2009 Dec;80(12):2056-64. [[PubMed](#)] [[Crossref](#)]
2. Boyne PJ, James RA. Grafting of the maxillary sinus floor with autogenous marrow and bone. *J Oral Surg*. 1980 Aug;38(8):613-6. [[PubMed](#)]
3. Geurs NC, Wang IC, Shulman LB, Jeffcoat MK. Retrospective radiographic analysis of sinus graft and implant placement procedures from the Academy of Osseointegration Consensus Conference on Sinus Grafts. *Int J Periodontics Restorative Dent*. 2001 Oct;21(5):517-23. [[PubMed](#)]
4. Browaeys H, Bouvry P, De Bruyn H. A literature review on biomaterials in sinus augmentation procedures. *Clin Implant Dent Relat Res*. 2007 Sep; 9(3):166-77. [[PubMed](#)] [[Crossref](#)]
5. Wallace SS, Froum SJ. Effect of maxillary sinus augmentation on the survival of endosseous dental im-

plants. A systematic review. *Ann Periodontol*. 2003 Dec;8(1):328-43. [[PubMed](#)] [[Crossref](#)]

6. Klijn RJ, Meijer GJ, Bronkhorst EM, Jansen JA. A meta-analysis of histomorphometric results and graft healing time of various biomaterials compared to autologous bone used as sinus floor augmentation material in humans. *Tissue Eng Part B Rev*. 2010 Oct;16(5):493-507. [[PubMed](#)] [[Crossref](#)]

7. Dohan Ehrenfest DM, Doglioli P, de Peppo GM, Del Corso M, Charrier JB. Choukroun's platelet-rich fibrin (PRF) stimulates in vitro proliferation and differentiation of human oral bone mesenchymal stem cell in a dose-dependent way. *Arch Oral Biol*. 2010 Mar;55(3):185-94. [[PubMed](#)] [[Crossref](#)].

8. Chenchev I, Ivanova V, Bachurska S. Socket preservation with PRF as a sole grafting material – clinical and histological evaluation. Case report. *IOSR-JDMS*. 2017 Oct;16(10):72-76.

9. Tatum H Jr. Maxillary and sinus

implant reconstructions. *Dent Clin North Am*. 1986 Apr;30(2):207-29. [[PubMed](#)]

10. Zitzmann NU, Schärer P. Sinus elevation procedures in the resorbed posterior maxilla. Comparison of the crestal and lateral approaches. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1998 Jan;85(1):8-17. [[PubMed](#)] [[Crossref](#)]

11. Lundgren S, Cricchio G, Palma VC, Salata LA, Sennerby L. Sinus membrane elevation and simultaneous insertion of dental implants: A new surgical technique in maxillary sinus floor augmentation. *Periodontol* 2000. 2008; 47:193-205. [[PubMed](#)] [[Crossref](#)]

12. Thor A, Sennerby L, Hirsch JM, Rasmusson L. Bone formation at the maxillary sinus floor following simultaneous elevation of the mucosal lining and implant installation without graft material: An evaluation of 20 patients treated with 44 Astra Tech implants. *J Oral Maxillofac Surg*. 2007 Jul;65(7 Suppl 1):64-72. [[PubMed](#)] [[Crossref](#)]

13. Hatano N, Sennerby L, Lundgren S. Maxillary sinus augmentation using sinus membrane elevation and peripheral venous blood for implant-supported rehabilitation of the atrophic posterior maxilla: Case series. *Clin Implant Dent Relat Res*. 2007 Sep;9(3):150-5. [[PubMed](#)] [[Crossref](#)]

14. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, et al. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part V: histologic evaluations of PRF effects on bone allograft maturation in sinus lift. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2006 Mar;101(3):299-303. [[PubMed](#)] [[Crossref](#)]

15. Simonpieri A, Choukroun J, Del Corso M, Sammartino G, Dohan Ehrenfest DM. Simultaneous sinus-lift and implantation using microthreaded implants and leukocyte- and platelet-rich fibrin as sole grafting material: a six-year experience. *Implant Dent*. 2011 Feb;20(1):2-12. [[PubMed](#)] [[Crossref](#)]

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