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Sinus Floor Elevation: A Retrospective Study of 59 Cases from the Oral Implantology Department of the Central Military Hospital-Algiers

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ABSTRACT

Introduction: Implant placement in the posterior atrophic maxilla sometimes represents a challenge and requires pre-implant sinus floor elevation surgery. The objective of this study was to evaluate the success rate of sinus floor elevation techniques performed using the lateral and crestal approaches.

Materials and Methods: A retrospective study was conducted on 59 cases. Two surgical techniques were used: 32 patients underwent the crestal approach, whereas 27 patients were treated using the lateral approach.

Results: The success rate of the crestal sinus lift technique was 93.84%, with a failure or complication rate of 6.16%. The complications included two cases of sinus membrane perforation, one case of vestibular cortical plate fracture, and one case of implant instability.

For the second technique, the success rate was 90.56%, with six failure cases, represented by three cases of membrane perforation, two cases of sinusitis, and one case of hemorrhage due to injury of the alveolo-antral artery.

Conclusion: Mastery of the sinus lift technique enables initiation of implant treatment and helps meet patients' expectations.

Keywords: Sinus floor elevation; Dental implants; Pre-implant surgery; Maxillary sinus

INTRODUCTION

Resorption of the alveolar bone following tooth extractions and the continuous pneumatization of the maxillary sinus can lead to vertical bone defects, making implant placement in the posterior atrophic maxilla impossible. In such cases, pre-implant Sinus Floor Elevation surgery (SFE) becomes essential to restore sufficient bone height to allow implant placement.

This procedure was first described by Tatum in 1974 and later by Boyne and James in 1980 [1].

The principle is based on new bone formation in a space created at the base of the maxillary sinus between the Schneiderian membrane and the bony floor to prepare a future implant site [2].

The objective of this study is to evaluate the success rate of sinus floor elevation techniques performed *via* the lateral and crestal approaches.

MATERIALS AND METHODS

As part of our clinical activity, a retrospective study was conducted on a sample of 59 patients who underwent sinus floor elevation between 2014 and 2021 using either the lateral or crestal approach, with the aim of implant-supported prosthetic rehabilitation.

Inclusion criteria

- Patients presenting partial or total maxillary edentulism with radiologically insufficient posterior bone height for implant placement.
- Patients without local or systemic contraindications to this type of surgery.

Exclusion criteria

- Patients with a history of cervico-facial radiotherapy or bisphosphonate therapy.
- Patients with previous episodes of sinusitis.

Surgical protocol

All procedures were performed in a dental chair within a surgical room under strict aseptic conditions.

Each patient underwent a clinical examination complemented by radiological assessment using Panoramic Radiography (OPT) and cone beam Computed Tomography (CT).

Preoperative hemostasis tests were prescribed Complete Blood Count (CBC), Prothrombin Time (PT), Activated Partial Thromboplastin Time (aPTT).

All patients received appropriate postoperative medication.

Two surgical techniques were used:

- Crestal sinus floor elevation
- Lateral sinus floor elevation

The crestal technique was followed by immediate implant placement in a single surgical stage, whereas implant placement was delayed for the lateral approach.

Crestal approach

After local anesthesia, a crestal incision followed by elevation of a mucoperiosteal flap was performed. Sequential drilling along the height of the alveolar crest was carried out. Using an osteotome, gentle elevation of the Schneiderian membrane was achieved with compaction and condensation of bone substitute material-this constitutes the key step of the procedure. The implant was then placed. Finally, the flap was repositioned and sutured.

Immediate radiographic control was performed.

Lateral approach

After local anesthesia, a vestibular flap was elevated to access the maxillary sinus. A bony window was created using a piezotome. Through this window, gentle elevation of the Schneiderian membrane was performed using dedicated instruments.

Intraoperative verification of membrane integrity was carried out systematically.

A filling material (Bio-Oss in our study) was placed and gently compacted into the created space beneath the membrane. The flap was then repositioned and sutured.

RESULTS

- 32 patients underwent crestal SFE, with 65 implants placed.
- 27 patients underwent lateral SFE, with 53 implants placed.

The overall implant success rate was 108 out of 118 implants (91.5%).

The overall failure rate was 10 implants (8.5%).

COMPLICATIONS

Crestal approach

Three types of immediate complications occurred in 4 cases (6.16%):

- 2 cases of sinus membrane perforation
- 1 case of vestibular cortical plate fracture
- 1 case of implant instability requiring delayed placement

Success rate: 93.84% (28 cases) (Figure 1).

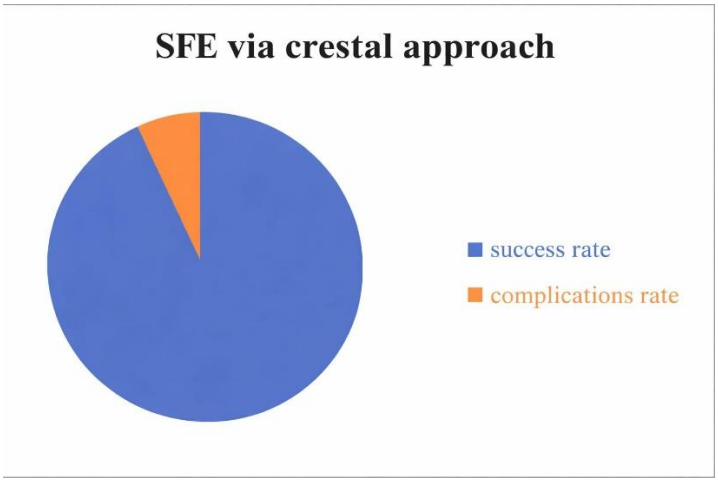

Figure 1: Success and complications rates of SFE *via* crestal approach.

Lateral approach

Success rate: 90.56% (21 cases).

Complications included:

- 3 cases of Schneiderian membrane perforation
- 1 case of hemorrhage due to injury of the alveolo-antral artery

Late complications: Episodes of sinusitis (Figure 2).

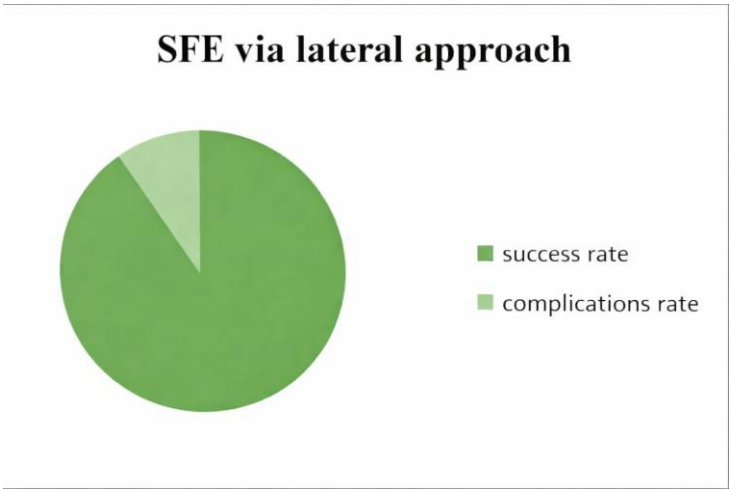

Figure 2: Success and complications rates of SFE *via* lateral approach.

DISCUSSION

Sinus floor elevation is a reliable and reproducible technique for compensating for insufficient bone height in the posterior atrophic maxilla. However, potential complications may occur [3].

The success rate of pre-implant procedures, particularly sinus floor elevation, and dental implants is high. However, postoperative complication rates range from 0% to 22% depending on the literature [4-6].

In our study, complication rates were 6.16% for the crestal approach and 9.44% for the lateral approach, consistent with published data [7,8].

According to Chiapasco et al, the most frequently reported intraoperative complications are sinus membrane perforations, occurring in 4.8% to 5.8% of cases. Most perforations are closed using resorbable materials such as collagen sponges or membranes [9].

Various grafting materials can be used, including autogenous bone or deproteinized bovine bone (Bio-Oss), with or without guided bone regeneration membranes. Autogenous bone remains the gold standard for comparison in terms of success, survival, and histological outcomes.

In our study, Bio-Oss was used as the grafting material. Esposito et al, demonstrated that bone substitutes provide reliable and reproducible results and can replace autogenous bone in sinus grafting [10].

No sinus graft failure attributable to the graft material was observed.

The overall implant success rate in this study was 91.5% using both techniques. This high success rate is attributed to careful management of complications and appropriate postoperative care. Hemorrhage caused by injury to the alveolo-antral artery was effectively controlled by electrocautery. Postoperative recovery was favorable in the majority of patients.

CONCLUSION

Sinus floor elevation (sinus lift) remains a reliable and reproducible pre-implant surgical technique for posterior maxillary atrophy. Mastery of this procedure enables successful implant treatment planning and restoration. Intraoperative complications are generally manageable. Literature data, particularly since the 1996 sinus consensus conference, confirm the effectiveness of this technique.

DECLARATIONS

Conflict of interest

The author declares no conflicts of interest in relation to this work.

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Author contributions

The author solely contributed to the conception, design, drafting, and final approval of this manuscript.

Ethical approval

Not applicable, as this article does not contain any studies with human participants or animals performed by the author.

Consent for publication

Not applicable.

Availability of data and materials

No datasets were generated or analysed during the current study.

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REFERENCES

1. Katsuyama H, Jensen SS. Sinus Floor Elevation Procedures: ITI Treatment Guide 5. Quintessence Publish Co, Ltd. 2012.
2. Huang F, Wajszczak BL, Ahossi V. Préparation pré-implantaire par comblement sinusien et gestion de ses complications: une étude rétrospective de 81 cas au CHU de Dijon. Médecine Buccale Chirurgie Buccale. 2016;22(3):185-192.
3. Pikos MA. Complications of maxillary sinus augmentation. The Sinus Bone Graft Quintessence. 2006;103-113.
4. de Gabory L, Catherine JH, Molinier-Blossier S, Lacan A, Castillo L, Russe P, Limbour P, Doliveux R, Catros S, Papon JF. French Otorhinolaryngology Society (SFORL) good practice guidelines for dental implant surgery close to the maxillary sinus. Europe Annal Otorhinolaryngol Head Neck Dis. 2020;137(1):53-58.
5. Elwany S. Kennedy D, Hwang P. Rhinology: Diseases of the Nose, Sinuses, and Skull Base. New York Thieme Med Publish. 2012. 270:387.
6. Lundberg JO, Farkas-Szallasi T, Weitzberg E, Rinder J, Lidholm J, Anggaard A, et al. High nitric oxide production in human paranasal sinuses. Nature Med. 1995;1(4):370-373.
7. Hamad WA, Matar N, Elias M, Nasr M, Sarkis-Karam D, Hokayem N, et al. Bacterial flora in normal adult maxillary sinuses. America J Rhinol Allergy. 2009;23(3):261-263.
8. Chiapasco M, Felisati G, Maccari A, Borloni R, Gatti F, Di Leo F. The management of complications following displacement of oral implants in the paranasal sinuses: A multicenter clinical report and proposed treatment protocols. International J Oral Maxillofacial Surgery. 2009;38(12):1273-1278.
9. Chiapasco M, Casentini P, Zaniboni M. Bone augmentation procedures in implant dentistry. International Journal of Oral & Maxillofacial Implants. 2009;24: 237-259.
10. Esposito M, Felice P, Worthington HV, Cochrane Oral Health Group. Interventions for replacing missing teeth: augmentation procedures of the maxillary sinus. Cochrane Database Systemat Review. 1996;5:2014-2018.

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