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MAGNETIC MALLET TECHNOLOGY IN COMPREHENSIVE REHABILITATION OF POSTERIOR MAXILLARY DEFECTS: A CASE REPORT

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ABSTRACT

Introduction: Rehabilitation of the atrophic posterior maxilla often requires sinus floor elevation to achieve adequate bone height. Magnetic mallet technology, a recent innovation in implant site preparation, offers a minimally invasive alternative to conventional drilling by condensing bone while preserving its vitality. This case report describes the staged management of a patient with cystic lesions involving teeth #16 and #17, subsequent sinus augmentation, and implant placement using the magnetic mallet (Osseotouch, Italy).

Case Presentation: A 43 year old female presented with purulent cystic lesions associated with teeth #16 and #17 and reactive sinus involvement. Initial treatment comprised extraction of the affected teeth, cyst enucleation, and placement of a calcium phosphate graft. After ten months, residual bone height was around 2 mm, necessitating lateral sinus floor elevation with bone grafting and a platelet rich fibrin (PRF) membrane. Four months later, cone beam computed tomography confirmed adequate bone dimensions. Implants were placed using a magnetic mallet with osteotomic inserts, achieving good primary stability. Final restorations were metal free crowns.

Conclusion: The staged approach combining cyst enucleation, sinus augmentation with PRF, and magnetic mallet assisted implant placement resulted in successful functional and aesthetic restoration. The magnetic mallet allowed conservative, heat free bone preparation, contributing to favorable implant stability and healing.

Keywords: Sinus floor elevation, dental implant, magnetic mallet, PRF, posterior maxilla, osseodensification.

1. INTRODUCTION

Placement of dental implants in the posterior maxilla is frequently complicated by pneumatization of the maxillary sinus and post extraction alveolar ridge resorption [1]. When residual bone height is less than 4–5 mm, sinus floor elevation is considered the standard of care to create adequate bone volume for implant osseointegration [2]. Various techniques, including the lateral window approach and transalveolar (osteotome) method, have been described with high success rates[3,4].

In addition to anatomical challenges, pre existing periapical or cystic lesions may compromise implant sites. Complete enucleation of pathologic tissue and adequate healing time are essential before grafting or implant placement [5]. The use of bone graft materials, such as calcium phosphates, and bioactive adjuncts like platelet rich fibrin (PRF) can accelerate wound healing and improve graft consolidation [6,7].

Recent advances in implant site preparation, such as osseodensification using magnetic mallet technology, allow for conservative bone manipulation while increasing bone density and primary stability. The magnetic mallet is an ergonomically designed magnetodynamic handpiece that generates controlled, repetitive micro impacts through an electromagnetic field [8]. Unlike conventional rotary instruments, it produces no heat and eliminates the need for irrigation, thereby preserving osteogenic elements and reducing surgical trauma [9]. This technology has been successfully applied in various procedures, including sinus elevation, bone expansion, and implant placement, offering shortened operative times, reduced postoperative discomfort, and enhanced implant stability [10,11]. This case report describes a staged approach combining cyst enucleation, sinus augmentation with PRF, and implant placement using magnetic mallet osteotomy to rehabilitate the right posterior maxilla.

2. CASE PRESENTATION

2.1. Initial Presentation (December 12, 2023)

A 43 year old systemically healthy female presented to the Department of Odonto Stomatology with a chief complaint of pain and suppuration in the right posterior maxilla. Clinical and radiographic examination revealed purulent cystic lesions involving the roots of teeth #16 and #17, with reactive changes in the adjacent maxillary sinus. The existing fixed bridge from #16 to #18 was sectioned, and teeth #16 and #17 were extracted under local anesthesia. Cyst enucleation was performed, followed by placement of Glassfontgel (a calcium phosphate bone graft material) into the defects. Post operative medication (amoxicillin and analgesics) was prescribed for three days. Ten months after extraction and enucleation, the surgical sites showed excellent soft tissue healing. However, the residual alveolar ridge was thin, with a remaining bone height of only 1–2 mm. The patient was

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scheduled for sinus augmentation to enable future implant placement. (Figure 1)

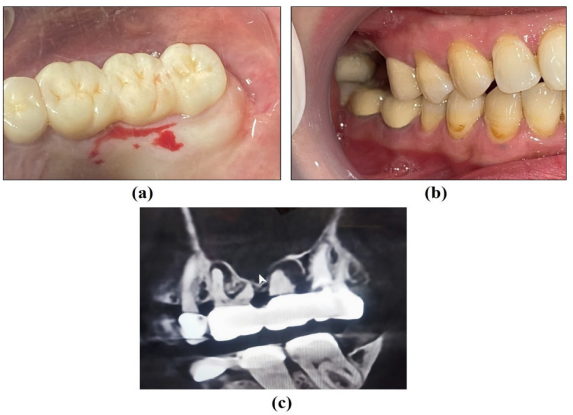


Figure 1. Initial situation of the patients. (a) Intra-oral pictures of the old ceramic restoration (bridge); (b) Intra-oral pictures of healing gingival tissue post extraction and cyst enucleation; (c) Conebeam CT image at sagittal plane shows large multiple periapical lesions at the Apice of #16 and #17, which were insufficiency of vertical alveolar bone for implant placement (< 5mm)

2.2. Sinus Augmentation (October 18, 2024)

Bilateral sinus floor elevation was performed for positions #16 and #17 using the lateral window technique. After careful elevation of the Schneiderian membrane, bone graft material was placed, and a platelet rich fibrin (PRF) membrane was applied over the graft to enhance healing. A Biosoft provisional prosthesis was fabricated for two units (shade A3). Post operative medication was given for three days (Figure 2).

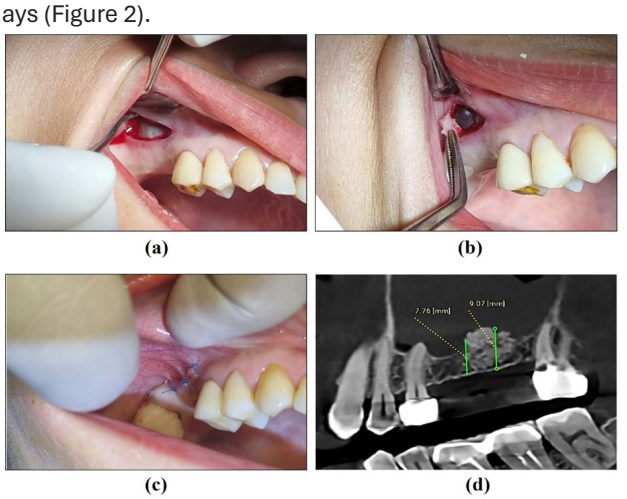


Figure 2. Lateral approach for the sinus elevation procedures. (a) Exposure of the lateral window of the maxillary sinus; (b) Extracting the lateral part of the lateral bone wall; (c) Performing the sinus elevation using xenograft + allograft, following by PRF covering and interrupt sutures to completly close the incision. (d) Conebeam CT image at sagittal plane shows elevated sinus floor with sufficient bone height and volume

2.3. Pre Implant Evaluation and Implant Placement Using Magnetic Mallet (February 13, 2025)

Cone beam computed tomography (CBCT) was performed to assess bone volume and quality. The grafted area showed sufficient bone for implant placement, with narrow ridge morphology. Bone dimensions were: tooth #16: 5.0 mm (width) × 7.0 mm (height); tooth #17: 5.0 mm (width) × 8.5 mm (height). (Table 1)

Under local anesthesia (2% lidocaine with 1:80,000 epinephrine), a midcrestal incision was made and a full thickness mucoperiosteal flap was elevated. The implant sites were prepared using the Osseotouch magnetic mallet system (Gallarate, Italy). Osteotomic inserts of increasing diameters were used in a sequential manner to condense the bone laterally without heat generation or the need for irrigation. Following site preparation, implants were placed using a surgical manual torque wrench. Implant dimensions and corresponding abutments are summarized in Table 1. Primary stability was achieved (insertion torque >35 Ncm). The flaps were approximated using 3 0 silk sutures. Post operative medication was given for three days (Figure 3).

Table 1. Implant specifications

Implant site	Implant dimensions (mm)	Abutment dimensions (mm)	Surgical technique
Tooth #16	5.0 × 7.0	6.0 × 2.0 × 5.5	Magnetic mallet (Osseotouch)
Tooth #17	6.0 × 8.5	6.0 ×2.0 × 5.5	Magnetic mallet (Osseotouch)

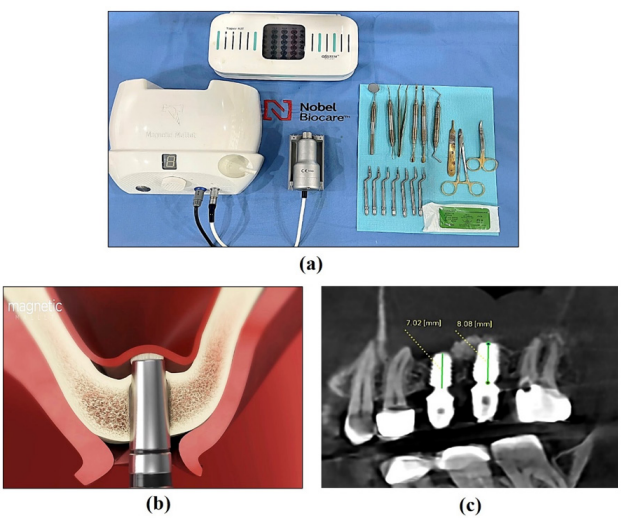


Figure 3. Implant placement with the application of a magnetic mallet (Osseotouch, Italy). (a) The Osseotouch machine's body and elevative instruments with different sizes and lengths; (b) Illustration of compressing bone, elevating the sinus floor and preparing the osteom-bed for the Implant placement. (c) Conebeam CT image at sagittal plane shows implants were placed in accurate position

2.4. Post operative Course and Follow up

The patient reported no significant pain or swelling postoperatively. Sutures were removed after one week, and the surgical sites healed uneventfully. Follow up at 1 and 3 months revealed stable peri implant soft tissues and no radiographic evidence of bone loss. The final restorations were all-ceramic crowns in shade A3, providing optimal aesthetics. (Figure 4)

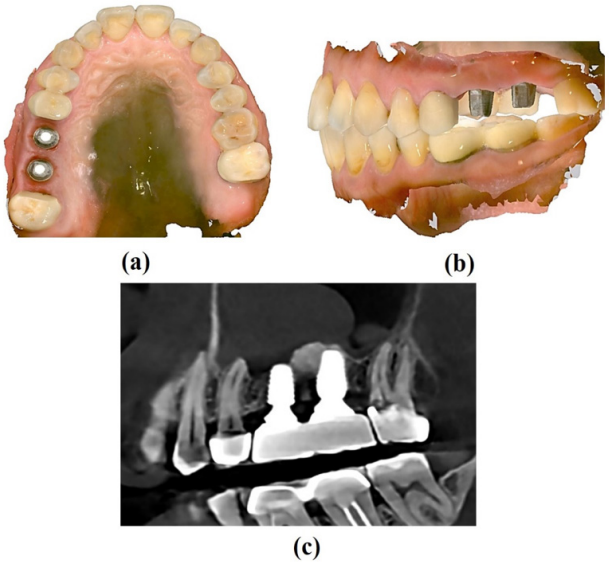


Figure 4. Final prosthesis. (a) Intra-oral scan images showing the healthy gingival emergence profile surrounding the abutments of the #16 and #17. (b) Conebeam CT image at sagittal plane shows the final all-ceramic post-cementation

3. DISCUSSION

This case illustrates a comprehensive, staged approach to managing a complex posterior maxillary defect, with a particular focus on the application of magnetic mallet technology for implant site preparation. The initial phase involved extraction and cyst enucleation, which is critical to eliminate any infectious or pathologic process before grafting or implant placement. The ten month healing interval allowed complete resolution of inflammation and soft tissue maturation, creating a favorable environment for subsequent sinus augmentation. With residual bone height of only 1–2 mm, a lateral window sinus lift was indicated. The use of a calcium phosphate graft material (Glassfontgel) provided osteoconductive properties for volume maintenance [12], while the PRF membrane served as a second generation platelet concentrate, releasing growth factors (PDGF, TGF β, VEGF) that enhance soft tissue healing and potentially accelerate graft consolidation [13].

The key innovation in this case was the use of the magnetic mallet (Osseotouch, Italy) for implant site preparation. Conventional drilling can generate excessive heat, leading to bone necrosis, and requires irrigation that may wash away osteogenic elements [14]. In contrast, the magnetic mallet employs controlled electromagnetic micro impacts to progressively condense bone laterally without heat production, thereby preserving bone vitality and increasing local bone density. This technique, often termed osseodensification, has been shown to improve implant primary stability, bone implant contact, and long term survival rates [15,16]. In the present case, the narrow ridge morphology (5 mm width) was ideally suited for magnetic mallet osteotomy, as the technique expands the ridge while maintaining the integrity of the crestal bone.

The magnetic mallet also offers ergonomic advantages. The handpiece is lightweight and allows precise control of impact force through adjustable power settings, reducing operator fatigue and minimizing patient discomfort. Unlike conventional surgical mallets, which can cause displacement of the auditory ossicles and vertigo, the magnetic mallet generates focused, localized impacts, thereby decreasing the risk of benign paroxysmal positional vertigo [17]. In this case, the patient reported minimal postoperative pain and swelling, and healing was uneventful, consistent with previous reports on magnetic mallet assisted implant surgery.

The provisional Biosoft prosthesis allowed soft tissue contouring during the healing phase, while the final metal free crowns eliminated the risk of metal allergy and provided superior aesthetics [18]. The overall timeline, including the extraction and enucleation (December 2023), sinus augmentation (October 2024), and implant placement (February 2025) was reflected a deliberate, evidence based approach. A waiting period of at least six months after cyst enucleation is often recommended to ensure complete bone healing. Similarly, a 4 month interval between sinus grafting and implant placement allowed for graft consolidation, consistent with literature suggesting 4–9 months for mature bone formation [19].

Although the immediate clinical and radiographic outcomes were favorable, this case report lacks long term follow up data. Future evaluations should assess peri implant marginal bone levels, prosthetic stability, and patient satisfaction. Additionally, the use of a single graft material and PRF may not be generalizable to all clinical scenarios; however, the principles of staged management and atraumatic site preparation with magnetic mallet technology remain broadly applicable.

4. CONCLUSION

Staged treatment of a posterior maxillary defect with cyst enucleation, sinus augmentation using a calcium phosphate graft and PRF membrane, followed by implant placement with magnetic mallet osteotomy (Osseotouch, Italy), resulted in successful functional and aesthetic restoration. The magnetic mallet facilitated conservative, heat free bone preparation and contributed to favorable primary stability and patient comfort. This case underscores the value of individualized treatment sequencing and the advantages of contemporary technologies in implant dentistry. Long term follow up is recommended to confirm the stability of the results.

Author Contributions

Anh Tuan DANG: conceptualization, investigation, data collection, analysis, writing the original manuscript, writing and editing the final manuscript.

Tuan Minh NGUYEN: investigation, data collection, writing and editing the final manuscript.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms including her images and other clinical information to be reported in the journal.

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Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

[1] Boyne PJ, James RA. Grafting of the maxillary sinus floor with autogenous marrow and bone. J Oral Surg. 1980;38(8):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:11–45.

[3] Summers RB. A new concept in maxillary implant surgery: the osteotome technique. Compendium. 1994;15(2):152, 154–156, 158 passim.

[4] Del Fabbro M, Wallace SS, Testori T. Long term implant survival in the grafted maxillary sinus: a systematic review. Int J Periodontics Restorative Dent. 2013;33(6):773–783. https://doi.org/10.11607/prd.1288

[5] Misch CE. Contemporary Implant Dentistry. 3rd ed. St. Louis: Mosby; 2008.

[6] Dohan DM, Choukroun J, Diss A, et al. Platelet rich fibrin (PRF): a second generation platelet concentrate. Part I: technological concepts and evolution. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;101(3):e37–e44. https://doi.org/10.1016/j.tripleo.2005.07.008

[7] Simonpieri A, Del Corso M, Sammartino G, Dohan Ehrenfest DM. The relevance of Choukroun's platelet rich fibrin and metronidazole during complex maxillary rehabilitations using bone allograft. Part II: implant surgery, prosthodontics, and survival. Implant Dent. 2009;18(3):220–229. https://doi.org/10.1097/ID.0b013e31819b5e3f

[8] Huwais S, Meyer EG. A novel osseous densification approach in implant osteotomy preparation to increase biomechanical primary stability, bone mineral density, and bone to implant contact. Int J Oral Maxillofac Implants. 2017;32(1):27–36. https://doi.org/10.11607/jomi.4817

[9] Visale K, Manimala V, Vidhyasankari N, Shanmugapriya SV. Magnetic mallets – A stroke of luck in implantology: A review. J Acad Dent Educ. 2021;7:6–9.

[10] Dolly AS, Saravanan AV, Ravishankar PL, Lochini S. Precision dental implant using magnetic mallets in the mandible. Contemp Clin Dent. 2025;16(1):53–55.

[11] Caccianiga G, Ferri L, Baldoni M, Bader AA, Caccianiga P. Magnetic mallet and laser for a minimally invasive implantology: A full arch case report. Appl Sci. 2022;12:9995.

[12] LeGeros RZ. Calcium phosphate-based osteoinductive materials. Chem Rev. 2008 Nov;108(11):4742-53. doi: 10.1021/cr800427g.

[13] Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, Gogly B. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part II: platelet-related biologic features. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006 Mar;101(3):e45-50. doi: 10.1016/j.tripleo.2005.07.009

[14] Rajkumar B, Bhasin A, Shukla P, Gupta V, Bhatt A, Tekriwal S, et al. Extraction followed by implant placement using magnetic mallet: A case report. Int J Med Res Rev. 2016;4:1046–1048. doi: 10.17511/ijmrr.2016.i06.31

[15] Lahens B, Neiva R, Tovar N, Alifarag AM, Jimbo R, Bonfante EA, Bowers MM, Cuppini M, Freitas H, Witek L, Coelho PG. Biomechanical and histologic basis of osseodensification drilling for endosteal implant placement in low density bone. An experimental study in sheep. J Mech Behav Biomed Mater. 2016 Oct;63:56-65. doi: 10.1016/j.jmbbm.2016.06.007.

[16] Hindi AR, Bede SY. The effect of osseodensification on implant stability and bone density: A prospective observational study. J Clin Exp Dent. 2020 May 1;12(5):e474-e478. doi: 10.4317/jced.56727.

[17] Desai A, Patil S, Mitra D, Shah R. Magnetic mallet-feel the future. J Indian Dent Assoc. 2020;14:26–30. doi: 10.33882/jida.13.25521

[18] Conrad HJ, Seong WJ, Pesun IJ. Current ceramic materials and systems with clinical recommendations: a systematic review. J Prosthet Dent. 2007 Nov;98(5):389-404. doi: 10.1016/S0022-3913(07)60124-3.

[19] Del Fabbro M, Testori T, Francetti L, Weinstein R. Systematic review of survival rates for implants placed in the grafted maxillary sinus. Int J Periodontics Restorative Dent. 2004;24(6):565–577. doi: 10.1016/j.prosdent.2005.04.024.