Case Report

Precision Dental Implant Using Magnetic Mallets in the Mandible

Abstract

Modern dentistry increasingly relies on dental implants for single tooth replacements due to their superior benefits over conventional methods. Magnetic mallets, a recent development in the field of oral implantology, present a promising alternative to conventional manual or motor-driven instruments. This case report aims to document the successful placement of a dental implant in the mandibular posterior region using magnetic mallet technology highlighting its efficacy and advantages in implant dentistry. The use of magnetic mallet technology in this case demonstrated excellent clinical outcomes, including shortened operative times, reduced postoperative discomfort, and enhanced implant stability. Follow-up evaluations over 3 months showed stable healing and no significant bone loss, supporting the efficacy and reliability of magnetic mallets in implant dentistry.

Keywords: *Dental implants, magnetic mallets, osteotomes*

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Introduction

Among the most prevalent causes of tooth loss are periodontitis, dental cavities, trauma, developmental defects, and hereditary conditions. Modern dentistry aims to restore patients to normal health, function, and appearance, regardless of atrophy, disease, or stomatognathic system injury. In the past three decades, there has been an upsurge in the usage of dental implants to address tooth loss. Dentures and bridges, which may have a tendency to decrease oral hygiene ability and increase plaque retention, were previously employed. However, dental implants have become a highly popular solution due to their high success rate, predictability, and relatively few complications.[1]

Manual or motor-driven instruments are the traditionally used in conventional techniques. Despite being effective, they can pose issues involving necrosis owing to heat generation, bone trauma with numerous postoperative complications, including bleeding from the extraction site, dry socket, nerve paresthesia, and delayed healing.[2]

With the advent of several new technologies, the field of oral implantology has evolved over time. The introduction of "magnetic mallets" is one such innovation. Bonwill, 1873, introduced the magnetic mallet to dentistry with the objective of enhancing the effectiveness of hammered gold fillings. Crespi, 2012, first described the use of magnetic mallets in dental implant procedures. This mallet is an ergonomically designed magnetodynamic handpiece. The device comprises a central control with power adjustment, a pedal control, and a sterilizable handpiece with a variety of interchangeable tips. It contains an extensive array of instruments, such as bone expanders/osteotomes and cutters. Magnetic mallets are suitable for various procedures like crown and bridge removal, bone manipulation, sinus elevating, delayed implant placement, impacted tooth removal, and root apex resection, offering improved implant stability, reduced postoperative distress, and shorter operative times.[3] Magnetic mallets, while producing six to seven times more force in shorter time than regular osteotomes, are less intrusive and cause less discomfort for patients, whereas conventional mallets can cause displacement of the auditory ossicles and dizziness increasing the risk of benign paroxysmal positional vertigo.[4]

Literature review states that no previous case reports have been encountered in magnetic mallet in mandibular posterior region. Our case report meticulously documents a first successful dental implant placement in the

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mandibular posterior region facilitated by magnetic mallet technology. Through this clinical account, we endeavor to provide valuable insights that endorse the seamless incorporation of this innovative tool into routine practice.

Case Report

A 41-year-old systemically healthy female patient reported to the department of periodontology with a chief complaint of missing tooth in the left lower back tooth region for the past 7 years. On clinical examination, no abnormalities were noted extraorally. Intraorally, a missing first molar and a pathologically migrated second molar were observed in the lower left quadrant. Assessment of the edentulous area indicated adequate dimensions suitable for dental implant placement.

Radiographic evaluation, including periapical and panoramic radiographs, demonstrated sufficient bone support at the edentulous site of tooth 36. The patient was informed about treatment options, including implants and fixed partial dentures. Implant placement was planned, along with proximal stripping of tooth 37 for future prosthetic placement.

The surgery was performed under local anesthesia with 2% lignocaine and adrenaline at a concentration of 1:80,000. A midcrestal incision was made followed by the elevation of a full-thickness mucoperiosteal flap at the site of 36. The Osseotouch implant system (Gallarate, Italy) was used for the procedure [Figure 1]. The implant site was prepared using magnetic mallets with osteotomic inserts of increasing diameters, starting from 100 (apical diameter 1 mm) to 200 (apical diameter 2 mm) [Figure 2]. An implant fixture of 3.75 mm in diameter and 11.5 mm in length (Adin Dental Implant Systems LTD, Israel) was placed using a surgical manual torque wrench, ensuring the force did not exceed 45 Ncm. A primary stability of 35 Ncm was achieved. The flaps were then approximated using 3-0 silk sutures with simple interrupted stitches.

Postoperative radiograph was taken and the patient was provided with postoperative instructions and medications such as antibiotics and analgesics thrice daily for 3 days. The patient was advised to return for a follow-up review and suture removal after 1 week.

The patient reported no postoperative complications, specifically no pain or swelling and expressed satisfaction with the results. Follow-up reviews were conducted at 1 month and 3 months postsurgery [Figure 3].

Discussion

Osteotomes and magnetic mallets are essential tools for manipulating and compressing bone crucial for preserving the residual bone. It operates at four distinct functioning magnitudes, enabling the surgeon to adjust the force in accordance with the recipient bone and the type of operation, thereby achieving a higher level of precision and a larger safety margin. Control units are utilized to operate the handpiece by employs an electromagnetic field. The osteotome tip is subjected to the axial and radial movements generated by shock waves, which possess a greater potential than conventional mallets. A high-intensity impact is generated by a collision between two masses that is electronically operated. An inelastic shock wave is generated on the bone as a result of the elastic wave that is generated, which is subsequently followed by a specific measure of motion.[3]

The magnetic mallet aids in osteotome technique by compressing bone laterally without producing heat, eliminating irrigation which flushes away necessary bone

Figure 1: Implant System (Osseotouch)

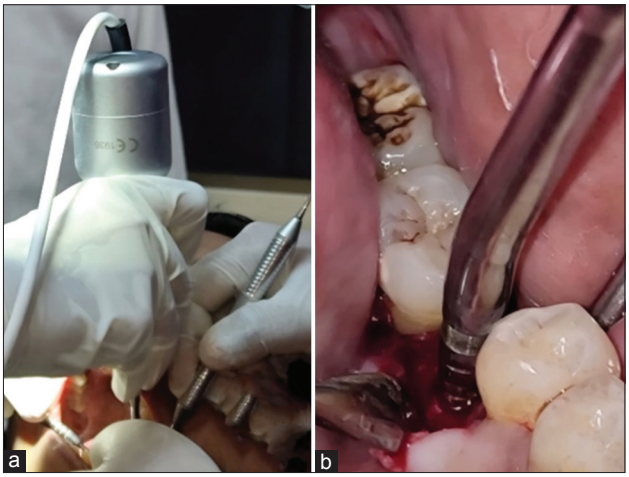

Figure 2: Surgical procedure: (a) Handle of a mallet from an external view and (b) Osteotome insert used for implant site preparation

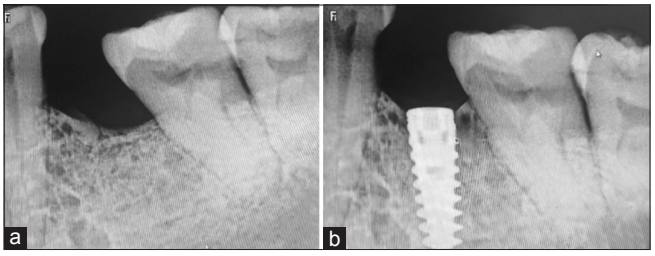

Figure 3: (a) Preoperative radiograph and (b) postoperative 3 months radiograph

minerals for ossification. Thus, there is significantly greater success rate of osseointegration when compared to traditional osteotomy. Furthermore, the surgeon can operate with increased visibility and control, ensuring the patient's best possible comfort and the preservation of the bone in both intricate implant surgeries and straightforward extractions.[5]

In the present case report, the patient reported no pain or discomfort postprocedure, no swelling, and faster healing. Follow-up appointments showed stable healing and no noticeable bone loss. The patient is scheduled for the placement of an implant crown prosthesis.

The magnetic mallet is a revolutionary dentistry technology that offers minimally invasive procedures, condensing bone, promoting a positive immune response, reducing postoperative issues, and enhancing precision, resulting in faster recovery times, improved bone quality, and better outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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