



CASE REPORT

Immediate Dental Implant Placement After Atraumatic Extraction of a Mandibular First Molar: A Case Report

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ABSTRACT

Immediate implant placement in the posterior mandible presents anatomical and technical challenges due to proximity to the inferior alveolar nerve (IAN) and complex socket morphology. This case report describes a 25-year-old female nonsmoker who underwent immediate implant placement after atraumatic extraction of a non-restorable mandibular first molar (36) with an inadequate ferrule (<2 mm). Preoperative cone-beam computed tomography (CBCT) revealed sufficient bone volume (16.5 mm vertical height, 6.0 mm buccolingual width) and a 3 mm safety distance from the IAN. A mid-root separation technique preserved socket integrity, and osteotomy preparation engaged basal bone 2.5 mm apical to the socket floor. A 4.6 × 11.5 mm bone-level tapered implant achieved primary stability (40 Ncm torque, ISQ 50) and was restored with a transmucosal healing abutment. The case demonstrates that CBCT-guided planning and atraumatic extraction can facilitate safe and predictable immediate implant placement in posterior mandibular sites without the need for socket grafting.

Keywords. dental implant, cone-beam computed tomography, immediate dental implant loading, mandible, osseointegration, tooth extraction

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INTRODUCTION

Dental implants are endosseous titanium fixtures that achieve direct osseointegration with the surrounding bone, providing a stable and long-term foundation for prosthetic rehabilitation of missing teeth. Loss of posterior teeth, particularly the mandibular first molar, significantly affects masticatory efficiency, occlusal stability, and overall oral function.^{1,2} Conventional tooth replacement options such as fixed or removable partial dentures often involve preparation of adjacent teeth and extended treatment duration, which may not align with patient preferences for minimally invasive and efficient care.³ When endodontically treated teeth fail due to inadequate remaining structure or insufficient ferrule, clinicians face the challenge of restoring function while preserving biological integrity.⁴

Immediate implant placement has become an attractive alternative, offering reduced treatment time, preservation of alveolar bone, and improved patient satisfaction.⁵ However, its application in the posterior mandible remains demanding because of limited interradicular space and proximity to the IAN.⁶ Advances in CBCT imaging have significantly improved preoperative evaluation, allowing clinicians to safely plan implant placement near vital structures.⁸

This case report illustrates a CBCT-guided, minimally invasive approach for immediate implant placement following atraumatic extraction of a non-restorable mandibular molar. It emphasizes the rationale for avoiding grafting when socket walls are intact, the importance of basal bone engagement for stability, and the safety considerations near the IAN offering an educational reference for clinicians managing similar posterior cases.

Case report

A 25-year-old female nonsmoker presented with discomfort and recurrent soft tissue trauma associated with a fractured mandibular left first molar (36). The tooth had undergone root canal therapy seven years earlier. Intraoral examination (Figure 1) revealed a non-restorable tooth with less than 2 mm of residual coronal structure. The

surrounding soft tissues were healthy, and no periodontal pockets or occlusal interferences were observed. The patient's medical history was non-contributory.

Investigations

Periapical radiographs (Figure 2) and CBCT (Figure 3) confirmed adequate bone height (16.5 mm) and width (6.0 mm), with a 3 mm clearance from the IAN. Based on these findings, atraumatic extraction with immediate implant placement was planned to minimize bone loss and treatment duration. The patient provided written informed consent after discussing all treatment options.

Surgical procedure

Under local anesthesia, atraumatic extraction was performed using a mid-root separation technique with a #2 round bur (Mani Inc., Japan) to divide the mesial and distal roots, preserving the interradicular septum (Figure 4). Periodontal ligament fibers were severed using periotomes (Piezotome®), followed by gentle elevation with narrow luxators (HuFriedyGroup, USA). The socket was thoroughly debrided and irrigated with sterile saline.

A pilot osteotomy was initiated 2.5 mm apical to the socket floor to engage dense basal bone. Sequential drilling was performed up to 3.5 mm diameter, intentionally under-prepared for a 4.6 mm implant to enhance primary stability. Bone tapping was not required. A 4.6 × 11.5 mm bone-level tapered implant (IZEN Implant Co., Ltd., South Korea) was placed subcrestally (1.5 mm) with an insertion torque of 40 Ncm and an ISQ value of 50 (Figure 5). Given this borderline stability, a delayed loading protocol was adopted. A transmucosal healing abutment was attached for soft tissue shaping during osseointegration.

Postoperative care included amoxicillin 500 mg three times daily for 5 days and Naproxen sodium 550 mg as needed. Sutures were removed after 10 days, and soft tissue healing was uneventful. The patient was followed for three months, during which no mobility or radiographic bone loss was observed.

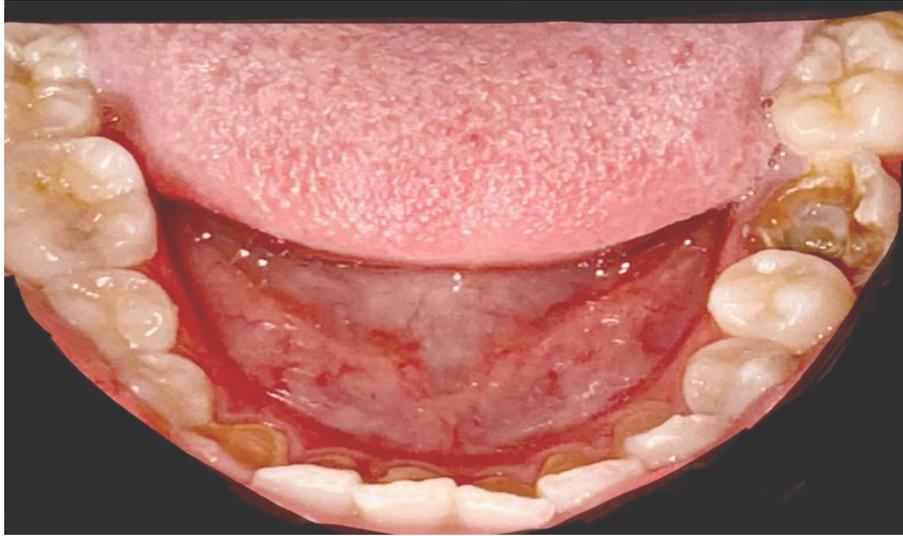


Figure 1: Intraoral Image showing a grossly decayed and fractured crown of tooth 36



Figure 2: Periapical X-ray showing broken down crown

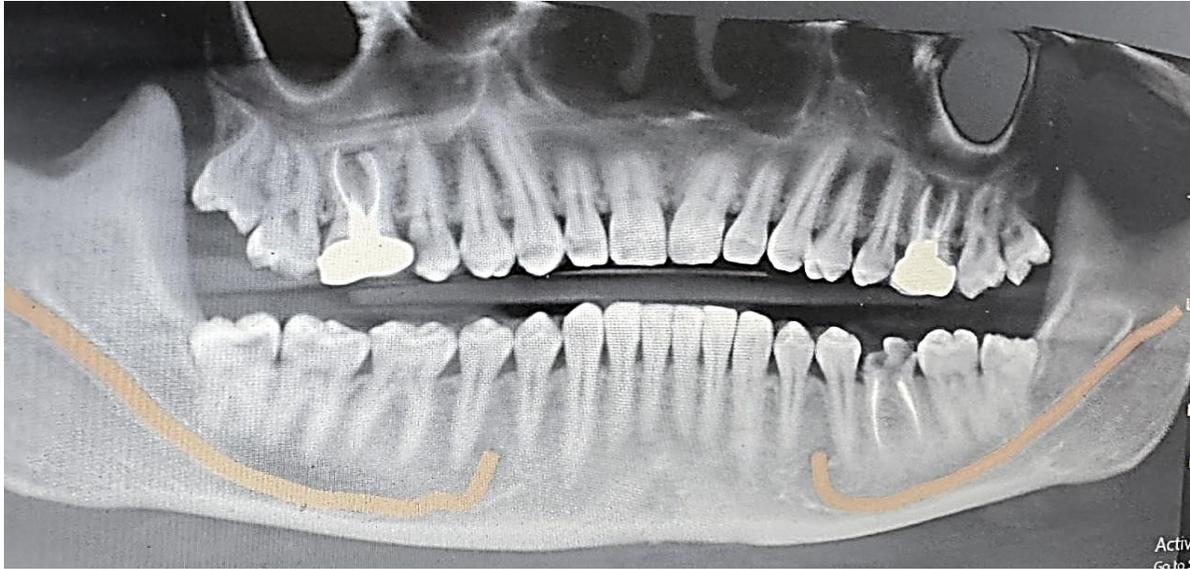


Figure 3: Panoramic radiograph



Figure 4: Periapical X-ray showing a pilot drill positioned in the interradicular bone between the mesial and distal roots of a mandibular molar



Figure 5: Periapical X-ray of a dental implant placement with a depth of 1.5 mm subcrestal into the alveolar bone

DISCUSSION

This case demonstrates that immediate implant placement in the mandibular molar region can be predictable when guided by CBCT and executed with minimally invasive techniques. Preoperative CBCT was crucial for visualizing the IAN and confirming adequate bone volume, ensuring safe positioning with a 3 mm safety margin, as recommended by Pozzi et al.⁸

Atraumatic extraction using root separation preserved socket architecture and the interradicular septum essential for primary stability. Tan et al.⁹ and Elian et al.¹⁰ have shown that minimally invasive extraction significantly reduces buccal bone loss and enhances implant anchorage in basal bone. In this case, engaging 2.5 mm of native bone below the socket floor provided mechanical retention and stability (40 Ncm, ISQ 50),

supporting a delayed loading approach consistent with Atieh et al.⁷

Socket grafting was intentionally omitted, as all socket walls remained intact and primary stability was achieved. Literature supports this decision, indicating comparable outcomes for immediate implants placed in intact sockets without grafting when stability exceeds 35–40 Ncm.^{9,10}

While short-term outcomes were favorable, limitations include the single-patient nature of the report and limited three-month follow-up. Continued observation is required to confirm long-term bone and soft tissue stability. Nevertheless, the case contributes educational value by illustrating a structured, evidence-based protocol for managing immediate implants in proximity to critical anatomy.

C-8 Socket grafting was intentionally omitted because the extraction socket was intact and primary stability was achieved. Literature supports that immediate implants in intact sockets can succeed without grafting when stability exceeds 35–40 Ncm, making grafting unnecessary in this scenario. This justification clarifies the rationale and addresses the reviewer's concern.

CONCLUSION

This case report demonstrates that immediate implant placement in the mandibular molar region can be a reliable option when guided by CBCT-based assessment and minimally invasive extraction techniques. Engaging basal bone to achieve primary stability and preserving socket anatomy may eliminate the need for grafting in selected cases. Clinicians should ensure adequate bone height and nerve clearance before attempting immediate placement in posterior sites. This case underscores that precise imaging, atraumatic surgery, and evidence-based stability criteria are key to achieving predictable outcomes in complex posterior regions and Long-term follow-up is recommended to confirm maintenance of bone and soft tissue stability.

Author Contributions

HB, SAK and ABA: Conceptualization, Performed surgical procedure. HB and SAK: Investigation, Methodology. SAK, SAK and ABA: Methodology, Writing review and editing. HB and ABA: Validation, Supervision, Writing review and editing.

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Conflict of Interest

Authors declare no conflict of interest.

Institutional ethical board approval

Not applicable

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None

Patient Consent

The patient's consent was taken before conducting the procedure.

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