CASE REPORT

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Implant fixture displacement into focal osteoporotic bone marrow defects in the posterior mandible: Case reports

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ABSTRACT

Focal osteoporotic bone marrow defect is an asymptomatic condition characterized by localized areas of decreased trabecular bone density within the jaw and is often detected incidentally on radiographic examination. Although it generally does not require treatment, it may increase the risk of complications during dental implant placement due to insufficient primary stability in areas of low bone density. This report describes three clinical cases of implant fixture displacement into focal osteoporotic bone marrow defects in the posterior mandible. Radiographic examinations revealed ill-defined radiolucent lesions without cortical expansion at the implant sites. One patient experienced inferior alveolar nerve injury following displacement, whereas no postoperative complications were observed in the remaining cases. These findings indicate that focal osteoporotic bone marrow defects may represent an underrecognized risk factor for implant displacement, and highlight the importance of careful preoperative radiographic assessment and cautious surgical planning in areas of suspected low bone density.*(J Korean Dent Assoc 2026; 64(5): 157-162)*

Key words : Dental Implants; Mandible; Cone-Beam Computed Tomography; Bone Density

Introduction

Dental implants are widely regarded as an effective modality for restoring both function and esthetics in partially or fully edentulous patients. Predictable outcomes depend on adequate bone volume, bone quality, and precise surgical planning. When bone density is insufficient, achieving primary stability becomes difficult, thereby increasing the risk of intraoperative complications.

Implant fixture displacement is an uncommon but clinically significant complication. It has been most frequently reported in the posterior maxilla, where implants may be displaced into the maxillary sinus. In contrast, displacement in the mandible is relatively rare and is generally associated with lingual cortical perforation or localized low-density bone conditions[1,2].

Focal osteoporotic bone marrow defect (FOBMD) is a benign condition characterized by localized areas of hematopoietic marrow within the jawbone. Radiographically, it typically presents as an ill-defined radiolucent lesion without cortical expansion and is often detected incidentally during routine radiographic examination[3-6]. These lesions are most commonly found in edentulous

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regions of the posterior mandible[7].

Because FOBMD may reduce trabecular resistance, implant placement in affected areas can compromise primary stability and increase the risk of unintended fixture displacement during insertion. However, clinical reports describing implant displacement associated with FOBMD remain limited. Therefore, this report presents three cases of implant fixture displacement into focal osteoporotic bone marrow defects in the posterior mandible and discusses relevant clinical considerations.

Case Report

Radiographic and clinical photographs used in this report were taken for research purposes, and the study was conducted in compliance with the research ethics guidelines of the Institutional Review Board (IRB No.: P01-202503-01-047).

Case 1

A 63-year-old female patient was referred to the Department of Oral and Maxillofacial Surgery, Daejeon Dental Hospital, Wonkwang University, from a local dental clinic after an implant fixture became displaced during placement in the mandibular left second premolar and first molar region, where a FOBMD was suspected. According to the referral note, displacement occurred while insertion torque was being applied to the fixture at the first molar site using a torque wrench. The patient had no relevant medical history or underlying systemic conditions, including osteoporosis.

Panoramic radiography and cone-beam computed tomography (CBCT) revealed that the displaced implant fixture had migrated toward the lingual aspect of the inferior border of the mandible in the left first molar region (Fig. 1). In addition, an ill-defined radiolucent area without cortical bone expansion was observed at the displacement site. CBCT demonstrated a region of decreased and sparse trabecular bone pattern compared with the surrounding cancellous bone, while the cortical boundaries remained intact without expansion. The lesion was located in an edentulous posterior mandibular region and showed no associated clinical symptoms. There were no radiographic findings suggestive of generalized osteoporosis. Based on clinical and radiographic features, the lesion was considered to be consistent with a focal osteoporotic bone marrow defect.

The fixture was removed under local anesthesia via a crestal approach. The original osteotomy site was enlarged using a round bur to improve access, and the displaced implant was retrieved using suction and long forceps. No cystic lining or fluid content suggestive of a true cystic lesion was identified intraoperatively. Postop-

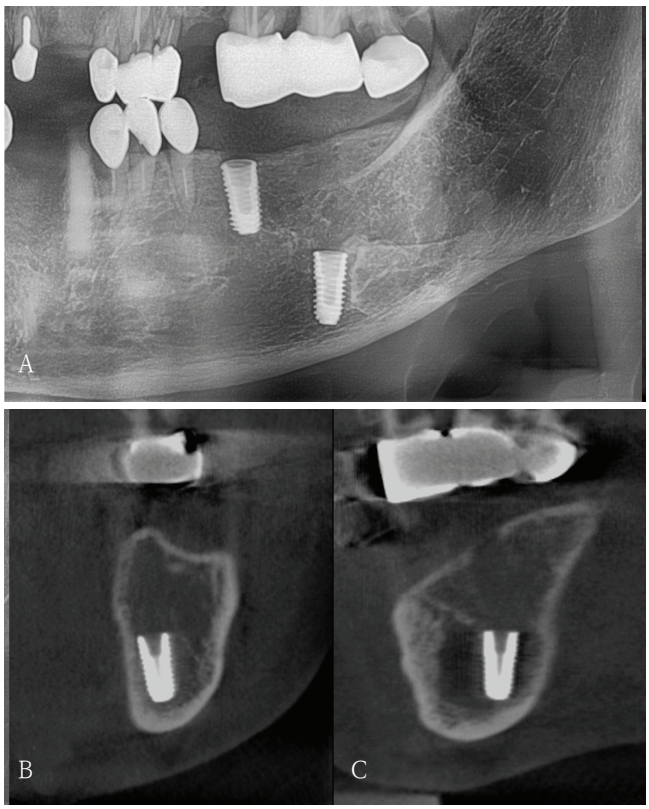

Fig. 1. A. Panoramic radiograph obtained at the first visit shows a displaced implant fixture in the left mandibular first molar region. Coronal (B) and sagittal (C) cone-beam computed tomography images demonstrate the fixture positioned lingual to the inferior border of the mandible. An ill-defined radiolucent lesion with reduced trabecular density is observed in the edentulous posterior mandible without cortical expansion.

eratively, the patient reported altered sensation in the left lower lip and chin. She was diagnosed with injury to the left inferior alveolar nerve, classified as Sunderland grade IV (Seddon's neurotmesis).

Case 2

A 44-year-old male was referred to our department for management of implant displacement that occurred during placement in the left mandibular first molar area, where a FOBMD was suspected. The patient was otherwise healthy, with no relevant medical history, including osteoporosis.

Radiographic imaging demonstrated an ill-defined, irregular radiolucent lesion at the left mandibular first molar site without evidence of cortical expansion. The displaced implant fixture was located near the inferior border of the mandible (Fig. 2). CBCT revealed an ill-defined radiolucent area with reduced trabecular density and a relatively homogeneous low-density appearance, without cortical expansion or destruction. The lesion was confined to an edentulous posterior mandibular region and was asymptomatic. No radiographic signs suggestive of generalized osteoporosis were observed. Based on these findings, the lesion was considered to be consistent with a focal osteoporotic bone marrow defect.

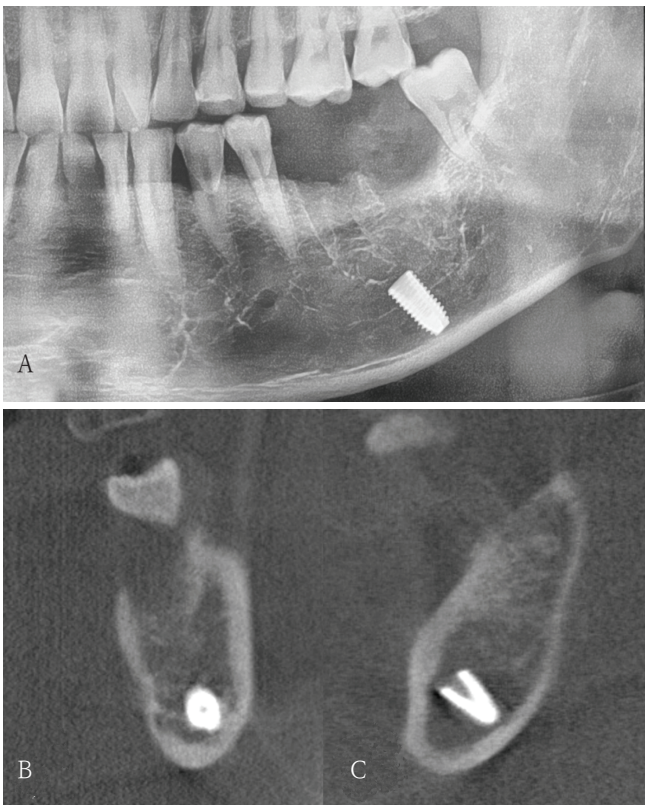

Fig. 2. A. Panoramic radiograph shows a displaced implant fixture in the left mandibular first molar region. Coronal (B) and sagittal (C) cone-beam computed tomography images reveal the fixture located near the inferior border of the mandible. An ill-defined radiolucent area with decreased trabecular bone pattern and no cortical expansion is observed at the displacement site

Removal was performed under local anesthesia using a crestal approach. The original osteotomy site was expanded, and the fixture was retrieved using suction and long forceps. No cystic lining or fluid content suggestive of a true cystic lesion was identified intraoperatively. The patient experienced no postoperative complications, and follow-up was uneventful.

Case 3

An 84-year-old female was referred to our department following implant displacement during placement at the right mandibular first molar site, where a FOBMD was suspected. The displacement occurred while insertion torque was applied using a torque wrench. The patient had no systemic medical conditions, including osteoporosis.

An initial removal attempt at the referring clinic involved creating a buccal cortical window, but the procedure was unsuccessful. Upon presentation, the patient complained of numbness in the right lower lip, chin, and gingiva.

Panoramic radiography and CBCT revealed the displaced implant fixture located near the inferior border of the right mandibular first molar region (Figs. 3A-C). An ill-defined radiolucent lesion without cortical expansion was observed at the site. CBCT showed a relatively extensive low-density area with markedly reduced trabecular structure, while the cortical bone remained intact with-

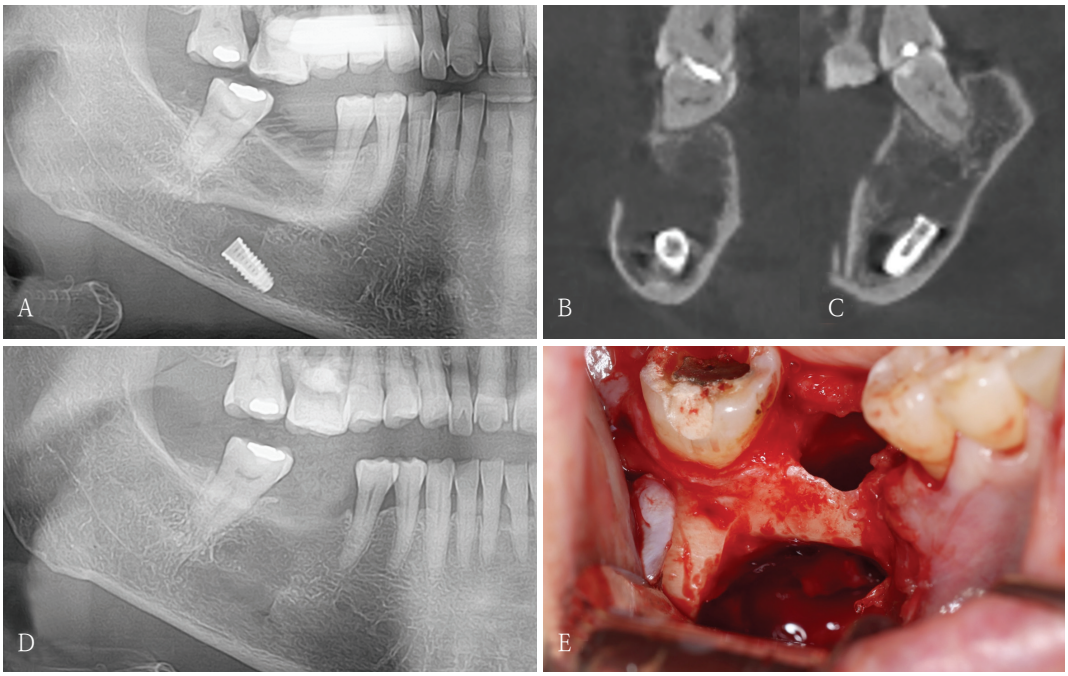

Fig. 3. A. Panoramic radiograph shows a displaced implant fixture in the right mandibular first molar region. Coronal (B) and sagittal (C) cone-beam computed tomography images demonstrate the fixture near the inferior border of the mandible with a buccal cortical window from a previous surgical attempt. A relatively extensive low-density radiolucent area with markedly reduced trabecular structure and no cortical expansion is observed in the edentulous posterior mandible. D. Postoperative panoramic radiograph after removal of the displaced implant. E. Intraoperative photograph shows successful retrieval through the buccal cortical window.

out evidence of expansion. The lesion was located in an edentulous posterior mandibular region and was asymptomatic. No radiographic evidence of generalized osteoporosis was identified. Based on these radiographic and clinical findings, the lesion was considered to be consistent with a FOBMD.

The implant was successfully removed under local anesthesia via the previously created buccal cortical window (Figs.3D and E). The displaced fixture was exposed and retrieved after careful access through the buccal cortical bone. The surgical site exhibited soft, marrow-like tissue with mild bleeding rather than a true cystic cavity.

Discussion

In the present cases, FOBMD was considered a significant contributing factor to implant fixture displacement. Reduced trabecular resistance within the defect compromises primary stability and may permit excessive advancement of the fixture during insertion torque application. Similar mechanisms have been described in previous reports of implant instability and displacement in low-density bone[1-2].

From a diagnostic perspective, FOBMD should be included in the differential diagnosis when ill-defined radiolucent lesions are observed in edentulous posterior mandibular regions. Such findings should not be misinterpreted as residual bone defects or cystic lesions[7]. Preoperative radiographic evaluation is essential, and cone-beam computed tomography (CBCT) is particularly useful for assessing trabecular structure and cortical integrity[8].

From a preventive surgical standpoint, careful surgical planning is required in suspected FOBMD areas. Excessive insertion torque should be avoided, and modification

of osteotomy preparation, such as undersized drilling, may enhance primary stability. In addition, appropriate implant length selection and maintenance of a safe distance from the inferior alveolar canal and mandibular inferior border are recommended. In selected cases, a staged approach with preliminary bone grafting prior to implant placement may be considered. These preventive strategies may reduce the risk of implant displacement associated with insufficient trabecular resistance[9,10].

When implant fixture displacement occurs, the retrieval approach should be determined according to the depth and location of the displaced implant. Crestal or buccal cortical window approaches may be selected depending on clinical conditions[11,12].

Displacement toward the inferior border of the mandible may increase the risk of inferior alveolar nerve injury, as observed in one of the present cases[13]. Therefore, meticulous surgical planning and careful manipulation during retrieval procedures are essential to minimize neurosensory complications.

This report has several limitations, including the lack of histopathological confirmation and long-term follow-up. Despite these limitations, the present cases suggest that FOBMD may act as a potential risk factor for implant fixture displacement in the posterior mandible.

Focal osteoporotic bone marrow defects may compromise primary implant stability and increase the risk of implant fixture displacement in the posterior mandible. Thorough preoperative radiographic evaluation and careful surgical techniques are essential when implant placement is planned in suspected low-density bone areas. Awareness of this condition may help prevent complications and improve clinical outcomes.

Conflicts of Interest: None

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