

Dental Extractions and Preservation of Space for Implant Placement in Molar Sites



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KEYWORDS

• Dental implants • Extraction sites • Mandibular molars

KEY POINTS

- The algorithm for implant placement, either immediately after tooth removal or delayed, works well with excellent long-term crestal bone width maintenance.
- Clinicians can use tissue health as 1 factor to form their treatment strategy for the timing of implant placement into molar sites.
- Bone resorption is common after tooth extraction; the use of graft material may be necessary to provide ideal bone for implant placement and reconstruction of the patient with an esthetic and functional restoration.

INTRODUCTION

The clinician is often asked to remove a tooth and place an implant into the site. The implant must be placed with appropriate stability to allow for integration to occur, which requires bone presence. Bone is also necessary to allow for ideal implant positioning within the alveolus for functional and esthetic concerns. The purpose of this article is to discuss the changes in socket dimensions over time and how to promote space maintenance, with an algorithm for treatment based on evidence.

SOCKET HEALING

Socket healing approximates 40 days, beginning with clot formation and culminating in a bone-filled socket with a connective and epithelial tissue covering.^{1,2} An extraction site may heal with bone formation to preserve the original dimensions of the bone. Unfortunately, bone resorption is common after tooth extraction. The use of graft material may be necessary to provide ideal bone for

implant placement and reconstruction of the patient with an esthetic and functional restoration.

Bone resorption usually is greater in the horizontal plane than in the vertical plane.^{3,4} Horizontal bone loss may be enhanced by thin facial cortical bone over the roots or bone loss from extension of local infection, such as caries or periodontal disease. Ideal placement of a dental implant centers the implant over the crest in a line connecting the fossae of the adjacent posterior teeth, or for anterior teeth, palatal to the emergence profile of the planned restoration. Unless the horizontal bone dimension is reconstructed or preserved after tooth extraction, implant placement is compromised, and in the esthetic zone, flattening of the ridge will occur, which results in a compromised restoration appearance. In the posterior mandible, these changes may be less dramatic, presumably because of the thickness of the buccal bone. The thin bundle bone, which was/is adjacent to the tooth roots, lies within the corpus of thick buccal cortical bone, and thus its remodeling may not result in rapid loss of ridge width.

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With regard to the esthetic zone of the maxilla, which includes the premolars, canines, and incisors, patients often present with teeth in need of extraction. Reasons for extraction of a single-rooted maxillary tooth in an adult include internal or external resorption after trauma, a breakdown of post and cores that were placed because of trauma, caries, root canal failure, and periodontal disease. Traditional protocols for restoring these sites rely on bone deposition to fill the extraction site before the implant is placed.^{5,6} Hard and soft tissue grafting often is necessary to provide an ideal functional and esthetic restoration. Grafts compensate for the bone resorption that accompanies the natural healing process in an extraction socket.⁷⁻¹⁰ When implants are placed 8-16 weeks after tooth extraction, the clinician must compensate for the loss of labial bone that occurs during the early phase of extraction site healing.^{3,11,12} To prevent the need for hard or soft tissue grafting when implant placement is delayed, it is recommended to place an osteoconductive graft material within the extraction site to promote bone fill, to limit labial bone collapse, and to maintain bone for optimal implant placement.¹³

TREATMENT PLANNING

When a patient presents with a molar tooth in need of removal, 3 situations are common:

1. The tooth is nonrestorable but has intact surrounding bone and relatively healthy gingiva, with minimal pain (**Fig. 1**).
2. The tooth is nonrestorable and has intact surrounding bone. However, the tooth is acutely painful and may have purulent exudate and nonhealthy gingiva.
3. The tooth is nonrestorable but has lost a portion of the buccal bone (**Fig. 2**).

Preoperative imaging can determine the presence of the surrounding bone, the presence of interseptal bone, and the location of the inferior alveolar nerve canal in relation to the tooth. Sufficient space is necessary for placement of an implant of sufficient length to maintain a single molar implant tooth.

The molar tooth has roots that diverge and are separated by an isthmus of bone. The thickness of the bone between the roots may not be sufficient by itself for immediate implant placement. The labial and lingual cortical bone plates narrow in the apical regions and can be engaged to stabilize an implant in the molar site. The bone surrounding the molar tooth may be completely intact, or chronic infection may have caused large areas of bone loss, which if not grafted, result in inadequate bone available for implant placement. If the treatment plan includes placement of an implant into a posterior tooth site, cone-beam cross-sections

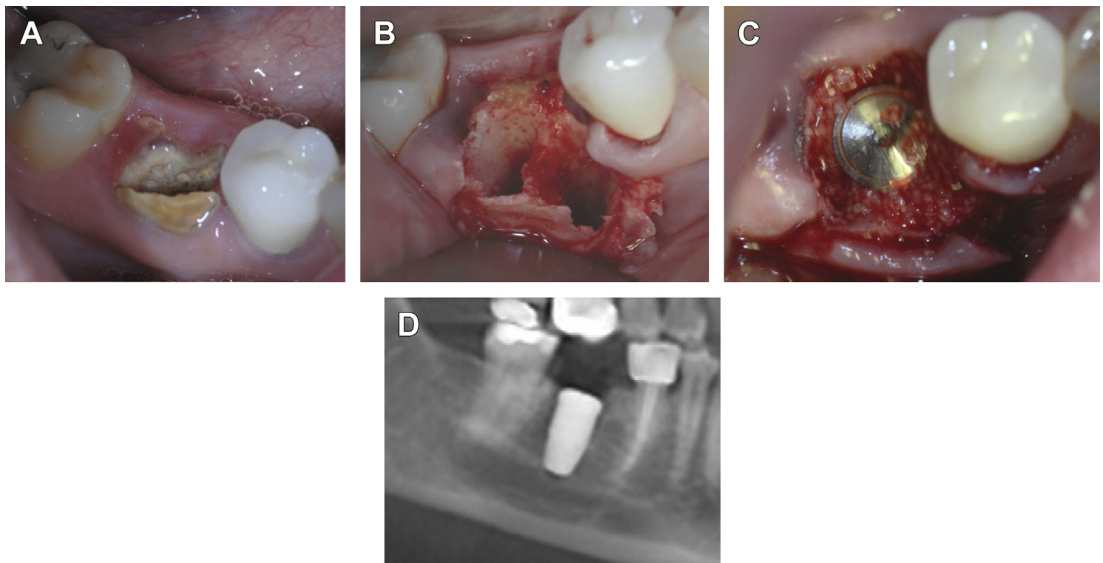


Fig. 1. (A) This patient required removal of a lower right first molar. The tooth was in cross bite. (B) A sulcular incision was made with vertical release sparing the papilla and a flap developed. The tooth was removed. (C) The implant was placed on the lingual aspect of the extraction site to correct the cross bite. The initial drill was placed without regard to interseptal bone, since the implant position needed to be different than the tooth's position due to the cross bite tendency. Allograft was placed into the defects from the root sockets. (D) A postoperative radiograph shows good implant positioning.

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