Flapless Extraction and Immediate Implant Placed Into a Mandibular Molar Site: A Clinical Case Report and 5-Year Follow-Up

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INTRODUCTION

In past studies, placing an immediate implant versus a staged implant has resulted in similar success/survival rates.\(^1\,^2\) It has been reported that the success/survival rate of immediate placement in posterior sites did not show any statistical significance compared with anterior sites.\(^3\) Several factors may contribute to implant failure in these sites, such as the amount of occlusal force,\(^4\) bone quality,\(^5\) presence of apical bone affecting the primary stability,\(^6\) vertical bone volume available,\(^7\) and surgeon experience regarding the accuracy, stability, sterilization, and surgical approach of implant placement.\(^2\) Despite the lack of statistical significance, immediate implants increase patient comfort and decrease the number of surgical steps, which reduces the cost and time of the procedure.\(^8\)

Moreover, flapless extraction is a technique aimed toward leaving the periosteum undisturbed and extracting a tooth with minimal trauma by using peristomes without flap reflection.\(^9,^{10}\) In 2008, Job et al\(^11\) reported less crestal bone loss around immediate implants placed in flapless extraction sockets compared with implants placed in flapped sockets due to greater blood supply and less postoperative swelling and pain. In addition, the success rate of this technique has not shown statistical differences compared with the conventional open-flap technique.\(^12,^{13}\)

Immediate placement of implants in molar sites is usually associated with large gaps between the fixture and adjacent socket. Several articles report histologic evidence of osseointegration into a fresh socket with a gap distance of 4 mm or more without any graft materials or barriers in nonmolar sites.\(^14–16\) However, few studies have evaluated the effect of immediate implant placement without any grafts in nonmolar sites.\(^16–18\) In a nonblinded randomized controlled trial, Bottini et al\(^8\) found that the use of bone graft with an immediate implant led to fewer changes in width at the crestal level compared with those without any bone graft at 90 days (1.2 mm difference), 110 days (1.3 mm), and 6 months (1.3 mm).

There have been few published studies on immediate implants in molar sites.\(^3,^{8,9,19,20}\) Moreover, the longevity of these studies is a concern due to a limited amount of long-term data. In this article, we are exploring immediate implantation as a possible long-term alternative to delayed immediate or delayed options in molar area. Thus, the purpose of this report is to clinically and radiographically evaluate the healing of an immediate implant placed in a fresh socket molar site using the flapless technique with bone graft and barrier membrane after 5 years of follow-up evaluation.

CASE DESCRIPTION

Patient information

The patient, a 28-year-old woman, was referred to the School of Dental Medicine, Department of Periodontology, at Tufts University for an implant placement on the mandibular left first molar. The tooth was deemed nonrestorable by the Prosthodontics Department, and extraction with implant placement was recommended. The patient's medical history was noncontributory. During her preliminary clinical and radiographic evaluation, periapical and panoramic x-rays with radiographic stent after a wax up showed a root canal treatment in said tooth with external root resorption in the apical root portion (Figure 1). Periodontal evaluation of the focused area illustrated 2–3 mm probing depths (PDs), bleeding on probing (BOP), and buccal/lingual marginal redness. There was no mobility associated with this tooth, and the prognosis was unfavorable due to difficulty of controlling local factors using the Kwok and Caton periodontal prognosis classification.\(^21\)

The patient's oral hygiene was fair overall and was subsequently diagnosed as a mild chronic periodontitis with BOP of 32%, PD of 2–4 mm, and clinical attachment levels of 3–4 mm. The treatment options presented to the patient were (1) extraction with immediate implant placement; (2) extraction and alveolar ridge preservation followed by implant placement after 4–6 months; (3) extraction only, possibly followed by guided bone regeneration (GBR) and then implant or simultaneous implant with GBR; (4) fixed partial denture; or (5) no treatment. The patient wanted the implant from the beginning, decided on extraction and immediate implant placement as the clinician recommended, and signed the consent form.
After a complete oral and periodontal examination, a treatment plan was established that included phase I therapy through adult prophylaxis and oral hygiene instructions. The PD measurements were evaluated and found to be between 2 and 3 mm (average 2.4 ± 0.5) with a BOP of 6%. The radiographic interproximal bone crest levels were 1–2 mm apical to the cementoenamel junction.

In the surgical phase, 2 carpules of septocaine with 1:100 000 epinephrine were used as a local anesthetic on both sides (lingual and buccal) of the mandibular left first molar. The design featured sulcular incisions, and atraumatic extraction was subsequently performed by sectioning buccolingually through the furcation. Both parts of the tooth were carefully removed to avoid any damage to the socket wall (Figure 2b and c). The socket was irrigated with saline and carefully debrided with a curette to remove any soft tissue.

All socket walls were intact with a buccal plate thickness of 1–1.5 mm and an interdental septum width of 3–4 mm measured with a periodontal probe. The interdental septum widened apically, which helped to stabilize the implant. The implant osteotomy was prepared in the septal wall with a round bur using a surgical guide, and twist drills were then used following the manufacturer’s instructions (Figure 3a).

A 5×13 mm Nobel Replace Select implant (Nobel Biocare AB, Gothenburg, Sweden) fixture was placed with 34 Ncm of torque, engaging mostly in the apical portion of the socket and interradicular septum. The threads were submerged in bone, and the polished collar was left at the supracrestal level. Then, a cover screw was placed (Figure 2d). The distances between the implant and socket wall were as follows: buccal, 5 mm; proximal (mesial and distal), 4 mm; and lingual, 3 mm measured with a periodontal probe. The total facial-lingual dimension of the ridge was about 13 mm. This gap was then filled with MinerOss (freeze dried bone allograft, Biohorizons, Birmingham, Ala) in the apical 2/3 and Bio-Oss (Geistlich Pharma, Wolhusen, Switzerland) in the coronal 1/3 (Figures 2e and 3b). The gap was then covered with a nonresorbable Cytoplast polytetrafluoroethylene (dense PTFE) membrane (Osteogenics Biomedical, Lubbock, Tex).

To place the membrane, soft tissues were undermined without any releasing incisions, and the membrane was trimmed and extended 2–3 mm below the socket margin. The membrane was stabilized and the wound edges were approximated with interrupted, horizontal, and x mattress sutures using a synthetic absorbable vicryl (Polyglactin 910, Ethicon, Somerville, NJ) after checking for adequate tension relief and flap stability (Figure 2f).

Postoperative instructions included (1) antibiotic (500 mg amoxicillin) tablets taken 3 times per day for 1 week, (2) analgesic (800 mg ibuprofen) as needed for pain, and (3) chlorhexidine mouth rinse (Peridex, Proctor & Gamble, Cincinnati, Ohio) to be used twice daily for 2 weeks. After 10 days, normal healing was noticed with minimal postoperative discomfort and no sign of infection (Figure 3a). One month after surgery, the membrane was removed; the marginal edges had migrated and contacted the implant and cover screw (Figure 3b). The cover screw was exposed by a soft tissue dehiscence. At the 6-month follow-up visit, the patient’s oral hygiene was still adequate and the radiograph showed evidence of radiographic fill in the previous socket (Figures 3c and 4c through e). No mobility of the implant was noted.
A second stage was performed and the healing abutment 6×3 mm was placed. This began the prosthetic phase: placing impression coping, impression, and bite registration were taken. After the metal try-in and all the required adjustments, the implant was restored with a cement-retained porcelain fused to a metal crown (Figure 3d). The patient was seen every 6 months for a follow-up evaluation, prophylaxis, and oral hygiene instructions. After 5 years, the overall PD measurements were between 2 and 3 mm (average 2.7±0.4), BOP was 13%, and radiographic interproximal bone levels were between 1 and 2 mm from adjacent bone levels. The peri-implant tissue appeared healthy, and the clinical attachment levels seemed to be stable with 2–3 mm PD and no signs of mobility or BOP (Figure 3e). The radiographic evaluation showed increased bone density and evidence of radiographic fill (Figure 4b through g). The bone density was homogeneous and similar to the adjacent bony structure (Figure 4f through g). The bone level from bone crest to adjacent teeth cementoenamel junction was about 1.5 mm mesially and 2.2 mm distally, compared with about 1.2 mm and 1.8 mm, respectively. However, there was distal bone remodeling, with slight bone loss and exposure of implant threads (Figure 4g).

**DISCUSSION**

Buccal plate thickness after extraction is an important factor to consider, especially when related to soft tissue biotype, bone remodeling, and esthetic outcomes. Regenerative procedures may limit dimensional changes of buccal plate bone following extraction and may maximize bone implant contact surface. In this patient, graft material was used to minimize the degree of ridge resorption due to a thin buccal plate.
Five studies have been published on immediate implants in molar sites with or without bone grafts (Table).\textsuperscript{3,8,9,19,20} These studies discussed different techniques and outcomes. Among these articles, 2 studies have used grafts with immediate implant placements in molar sites.\textsuperscript{3,8} Bottini et al\textsuperscript{8} recommended using bone graft with this procedure, while El Chaar and Castano\textsuperscript{3} reported a comparable outcome regarding buccolingual bone width and bone graft compared with implants placed in anterior areas. The majority of these studies included follow-up evaluations between 6 months and 2 years.\textsuperscript{3,8,9,19,20}

It is not applicable to compare this case with the previous published articles (Table). One case report focused on immediate mini-implants in molar sites as a final treatment, which is a different topic altogether.\textsuperscript{25} In addition, a modified sandwich bone augmentation technique was used to take advantage of the positive properties of each material.\textsuperscript{25} However, here we used only 2 materials—allograft and xenograft—without the autogenous bone as originally proposed, as the patient refused the use of any autogenous bone.

The graft material has another advantage: It will prevent soft tissue ingrowth into the socket.\textsuperscript{26} This is very important in any gap greater than a critical distance of 2 mm, which was previously the suggested gap distance to graft these areas.\textsuperscript{27,28}

Our graft material provided even better results when combined with an atraumatic tooth extraction to preserve hard and soft tissues, as we did in this case.\textsuperscript{29,30} However, placing any grafting material requires more time to complete the healing process.\textsuperscript{31} Although several studies have reported regular bone healing in gap distance with a 5-mm defect without any graft or membrane,\textsuperscript{14,16–18} patient selection is a very important factor. In addition, several studies showed that dense PTFE membrane reduces bacterial contamination due to high density/small porosity size, and primary closure is not required.\textsuperscript{32–34}

One of the important factors for any regeneration is the shape and size of the bony defect. Detecting the defect walls is very important for predictable regeneration, less attachment, and bone loss, while also making it easier to reconstruct the area.\textsuperscript{23,24} In addition, it is very important to evaluate the defect size. In this case, we had a contained defect, which gave us a higher chance of regeneration. In our case, the patient participated in follow-up evaluations, which allowed us to review and emphasize oral hygiene without any major concerns present in the oral cavity.

A modification of the sandwich bone augmentation technique was used to take advantage of the positive properties of each material.\textsuperscript{25} However, here we used only 2 materials—allograft and xenograft—without the autogenous bone as originally proposed, as the patient refused the use of any autogenous bone.

Moreover, the use of the flapless extraction approach will potentially minimize the amount of ridge resorption because the periosteum and blood supply are intact.\textsuperscript{9} This will reduce the osteoclastic activity in the area.\textsuperscript{35} However, a recent meta-analysis found no significant difference between flapless versus flapped techniques regarding postoperative infection or marginal bone loss.\textsuperscript{36}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|}
\hline
Study & Year & No. of Molar Implants & Implant Type & Bone Graft/Barrier & Adverse Effect Reported & Length of Study (mo) \\
\hline
El Chaar and Castano,\textsuperscript{3} retrospective study & 2017 & 42 patients (some had premolar implants) & Trabecular metal implants, Zimmer Biomet Dental (Palm Beach Gardens, Fla) Diameter = 3.7–4.7 mm; length = 10–13 mm & Allografts (Puros, Zimmer Biomet Dental) + resorbable bovine pericardium membranes (Zimmer Biomet Dental) & None & 25.0 ± 12.1 mo \\
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Gober and Fien,\textsuperscript{9} case report & 2016 & 1 patient & 4.5 × 9mm TX Astra Tech implant (OsseoSpeed TX, Astra Tech AB, Molndal, Sweden) & None & None & 26 mo \\
\hline
Narang et al,\textsuperscript{20} case report & 2014 & 4 implants & 3 bicortical screw implant and 1 corticalization of the spongy bone & None & None & 6 mo \\
\hline
Bottini et al,\textsuperscript{8} nonblinded randomized controlled trial & 2012 & 20 Patients (2 had premolar implants) & MIS Seven, MIS implants (Shlomi, Israel) Diameter = 3.75–4.2 mm; length = 10–13 mm & Test group: porcine xenograft (OsteoBiol, Gen-Os, Tecnost, Coazze, Italy) + equine collagen sponge (Antema, Molteni Dental, Milano, Italy) Control group: none & None & 6 mo \\
\hline
Bersani et al,\textsuperscript{19} case series & 2010 & 23 maxillary and mandibular & Minimum length 10 mm & None & None & 4–85 mo \\
\hline
\end{tabular}
\caption{Literature review of immediate molar implant placement with flapless technique}
\label{table1}
\end{table}
Another factor that plays a role in any immediate implant placement case is implant stability after apical bone engagement. In this case, we were able to engage the apical bone, and the apical external root resorption facilitated this anchorage. Insertion of a healing abutment at the time of implant placement has several advantages as well, as it reduces space for debris and plaque buildup. However, in this case, a cover screw was placed to stimulate the natural healing process and to encourage better adaptation of the membrane over the implant. In addition, this patient was able to maintain optimum oral health while following continuous oral hygiene instructions.

**Conclusion**

In documenting more than 5 years of follow-up, this report showed that placing an immediate implant in the molar area could be a potential alternative option. This has been demonstrated on an implant with minimal changes in bone levels using clinical and radiographic parameters. Although implant placements can be performed using different options, determining the best option is often case specific and based on the dentist’s preference. However, the goals of any treatment should be to restore the periodontium and ensure long-term teeth and/or implant survival.

**Abbreviations**

BOP: bleeding on probing  
GBR: guided bone regeneration  
PD: probing depth  
PTFE: polytetrafluoroethylene

**Note**

The author declares no conflict of interest.

**References**


28. Kan JY, Rungcharassaeng K, Lozada J. Immediate placement and


