Immediate Dental Implant Placement: Technique, Part 1

Authored by
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Immediate Dental Implant Placement: Technique, Part 1

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LEARNING OBJECTIVES
After participating in this CE activity, the individual will learn:
• Indications and contraindications for immediate implant placement.
• Practical suggestions for immediate implant placement.

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INTRODUCTION
Immediate dental implant placement refers to insertion of an implant directly after a tooth is extracted, whereas delayed positioning occurs at some later time. The concept of placing implants immediately after tooth removal was introduced in the 1970s.1 Currently, widespread acceptance of this procedure is due to its high survival rate.2,3 However, placement of immediate implants in different regions of the mouth and under diverse conditions can be challenging. This 2-part article addresses issues relevant to immediate implants (part 1), and provides practical clinical information for positioning immediate implants in different sections of the mouth (part 2).

BACKGROUND INFORMATION
Classification of Extraction Sockets
The following classification system identifies clinical scenarios related to immediate implant placement4 (classification of socket type is dependent on information obtained with a periodontal probe, visual, and radiographic assessments):
• Type I: The bony socket is intact, and the soft-tissue form is undisturbed.
• Type II: The bony socket is intact in the coronal aspect of the socket, but a fenestration is present in the apical area. The soft tissue remains intact and undisturbed.
• Type III: Bone loss is present in the coronal aspect of the socket. The soft tissue remains intact and undisturbed.
• Type IV: Bony defects exist in conjunction with soft-tissue deformity.

Indications and Contraindications for Immediate Implant Placement
There are a series of decisions that need to be made prior to proceeding with immediate implant placement. First, the socket type needs to be assessed and categorized as shown above. Type I and usually Type II (depending on extent of the defect) sockets are candidates for immediate implant placement and require preservation of adjacent tissues around an immediate implant. Types III and IV sockets frequently warrant delayed placement and soft- or hard-tissue augmentation prior to implant insertion. This paper mainly focuses on surgical management of Type I cases.

Management of cases (immediate versus delayed implant placement) requires both a surgical and prosthetic perspective. Prior to initiating therapy, a patient should be defined as having a high or low risk of attaining an excellent esthetic result, especially in the esthetic zone. Table 1 outlines critical determinants for evaluating patients.5

The main advantages of immediate implant placement are that they save time and there are fewer patient visits. There are numerous indications for tooth replacement with an immediate implant when an adequate amount of bone...
and soft tissue are available to support it: deciduous tooth, endodontic failure, caries, deep probing depths due to periodontitis, vertical root fracture, and idiopathic root resorption. Contraindications to inserting immediate implants include inadequate height or width of bone, lack of soft tissue, adverse location of nerves, proximity of adjacent teeth, failure to achieve primary stability, and inability to attain a restoratively reasonable position, angulation or sink depth of the implant.

Immediate Implant Survival Rates
Implants immediately placed into fresh extraction sockets and healed ridges have similar survival rates (97.3% to 99%). Furthermore, immediate implants inserted into infected sites or locations with periapical lesions have comparable survival rates to implants placed into healthy ridges. However, these studies did not delineate the amount of bone grafting that was performed or extent of infections that were present.

Healing Phase and Bone Loss
Typical Healing of an Extraction Socket—Six months after tooth removal, which includes flap elevation, the extraction sockets manifest a mean 1.24 mm vertical bone loss (range 0.9 to 3.6 mm). Usually there is approximately 3.79 mm horizontal bone decrease (range 2.46 to 4.56 mm).

In contrast, extractions of teeth with no flap demonstrate a reduced amount of horizontal and vertical bone loss. However, others suggest there is no difference in the amount of vertical osseous resorption if procedures are done flapless or with a flap when placing implants, but these studies did not necessarily address immediate implants. Bone reduction after flapless extractions may be due to elimination of the blood supply from the periodontal ligament (PDL). Differences in osseous resorption rates in the above studies may also be attributed to buccal plate thickness (thicker plates resorb less). Nevertheless, especially in the esthetic zone, it is suggested that immediate implants be placed without elevating a buccal flap to preserve bone and avoid soft-tissue recession.

Socket Healing After Immediate Placement—Many studies verified that immediate implant placement is accompanied by bone loss. This was corroborated in dogs and human clinical trials. Commonly, there is a reduction of vertical bone height and even a greater amount of horizontal bone loss. The quantity of bone resorption is larger on the buccal than the lingual side of an implant, since the buccal plate is usually thinner.

Immediate Implants Help Preserve Vertical Bone Height—Among patients who receive immediate implants, the amount of bone resorption during the first year after tooth extraction appears to be less than when teeth are removed and no implants are placed. This is based on investigations that did not directly compare patients that had both therapies. For instance, 1.0 to 1.5 mm vertical bone height is usually lost after an extraction; however, vertical bone loss noted the first year after immediate placement was 0.6 mm with Tioblast fixtures, 0.4 mm for Astra Tech (DENTSPLY Implants), 0.37 for NanoTite Prevail (Biomat 3i), and 1.1 mm of bone loss occurred after nonocclusal and early loading with Osseotite (Biomat 3i) implants.

Other data also support the contention that immediately placed implants preserve bone. When the amount of osseous resorption that occurs after immediate and delayed implant placement is compared, the data demonstrate that there are no differences in the quantity of bone lost.
However, these investigations made evaluations with respect to the amount of bone reduction several months after immediate or delayed placement. The baseline for evaluating the preliminary bone height was assessed on the day of implant insertion. Researchers did not consider that with delayed placement, bone loss occurred postextraction and before delayed insertion of an implant. Therefore, it can be deduced that delayed placement resulted in a larger degree of bone loss than immediate implant insertion.

**PRACTICAL SUGGESTIONS FOR IMMEDIATE IMPLANT PLACEMENT**

**Atraumatic Tooth Removal Prior to Implant Insertion**

Teeth need to be removed atraumatically to preserve the maximum amount of bone before immediate implant placement. The clinical situation will dictate if the tooth should be removed flaplessly (e.g., if it is broken subgingi-
granulomatous tissue should be removed. At present, no studies have compared the healing response of bone around immediately placed implants with respect to bone fill related to the absence or presence of the PDL.

**Width and Length of an Implant to Attain Primary Stability**

Depending on the size of the extracted tooth and the implant to be placed, somewhere along the root surface, the implant will usually exceed the diameter of the root and provide mechanical retention of the implant. This retention and/or extension of the osteotomy and placement of the implant beyond the apex of the extracted tooth provide primary implant stability. It is advisable to place an implant a minimum of 3 to 5 mm into bone to attain primary stability if mechanical retention cannot be achieved laterally (Figures 2a and 2b). Occasionally, it is possible to place a tapered implant into an extraction socket with minimal to no osteotomy preparation, thereby relying on the threads’ engagement of the bone lateral to the socket walls.

**Apicocoronal and Horizontal Placement of Immediate Dental Implants**

In general, immediate implants should be placed one mm subcrestally as viewed from the midpoint of the labial plate to account for vertical bone height resorption (the implant often will be deeper interproximally). If the buccal or lingual plates of bone are thin, the implants should be placed more subcrestally, since there may be an increased amount of bone resorption. The amount of vertical bone loss can be decreased with platform switching. Atieh et al reported that bone loss with versus without platform switching after immediate implant placement was respectively, 0.05 mm to 0.99 mm versus 0.19 mm to 1.67 mm.

As a general rule, platforms of immediate implants should be placed 2 to 3 mm below the gingival margin (Figures 3a to 3e). This may or may not correlate with being 2 to 3 mm below the cemento-enamel junction (CEJ) of the adjacent teeth. Therefore, if recession occurred on the adjoining teeth, using the CEJ as a guide will provide a poor esthetic result.

Horizontally, implants should not touch the buccal plate of bone because there is a horizontal zone of influence, and if
an implant encroaches upon the buccal plate of bone, it will induce resorption (Figure 4). This is particularly true in the esthetic zone. In this regard, when large implants are placed in molar sites and engage the buccal or lingual plate of bone, they may induce some bone loss.

**Maxillary Canine Tilt**

Always check the radiograph to assess angulations of adjacent teeth and possible dilacerations of roots before drilling an osteotomy. This is particularly critical when placing a maxillary first premolar implant, because maxillary canines are often angled 11° distally and the root curves distally 32% of the time. When necessary, place the implant in the first bicuspid alveolus parallel to the canine, not parallel to the second premolar. Minor parallelism discrepancies can be

<table>
<thead>
<tr>
<th>Table 4. Possible Therapies Available to Treat the Buccal Gap After Immediate Implant Placement: With and Without Flap Elevation</th>
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<tbody>
<tr>
<td><strong>A. WITH FLAP ELEVATION</strong></td>
</tr>
<tr>
<td>1. NO ADDITIONAL TREATMENT (NO BONE GRAFT OR BARRIER USED)</td>
</tr>
<tr>
<td>a. Flap placed over the defect</td>
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<tr>
<td>b. Flap positioned at bone crest leaving the gap exposed</td>
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<td>2. BONE GRAFT PLACED INTO THE DEFECT WITH OR WITHOUT GROWTH FACTORS</td>
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<tr>
<td>a. Flap placed over the defect</td>
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<tr>
<td>b. Flap positioned at bone crest, leaving the gap exposed</td>
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<tr>
<td>3. BARRIER PLACED OVER DEFECT</td>
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<tr>
<td>a. Flap advancement is usually necessary to attain primary closure</td>
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<tr>
<td>b. No flap advancement and use of nonresorbable or resorbable barrier or connective tissue graft</td>
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<tr>
<td>4. BARRIER PLACED OVER BONE GRAFT</td>
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<tr>
<td>a. Flap advancement is usually necessary to attain primary closure</td>
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<tr>
<td>5. TEMPORIZATION OF IMPLANT AND ABUTMENT</td>
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<td><strong>B. NO FLAP ELEVATION (FLAPLESS IMPLANT INSERTION)</strong></td>
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<tr>
<td>1. THE GAP IS LEFT OPEN WITH NO ADDITIONAL THERAPY</td>
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<td>Easier</td>
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<td>2. BONE IS PLACED WITHIN THE GAP</td>
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<td>Bone particles may be displaced</td>
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<tr>
<td>3. TEMPORIZATION OF IMPLANT AND ABUTMENT WITH EITHER OF THE ABOVE</td>
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<tr>
<td>Supports soft tissue</td>
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</tbody>
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**Figure 4.** Intraoral occlusal view of an immediately placed implant at site No. 5. It is positioned to remain distant from the labial plate of bone. Primary stability is achieved apically and interproximally.
reconciled at the abutment level by utilizing angulated abutments (Figures 5a to 5d).

**Flap Versus Flapless Implant Insertion**

A clinician has multiple therapeutic options regarding immediate implant placement: flap versus flapless surgery, bone grafting, and barrier utilization (Table 4).56 Comments in Table 4 relate to circumstances where the bony plate is undamaged and does not need a regenerative procedure to restore bone contour. If implant insertion is performed flaplessly, a cover screw or short healing abutment can be placed and the implant can be submerged, but this usually entails flap advancement if only one tooth was removed. Sometimes submersion is desirable if the implant is placed under a provisional partial or full denture, or if the implant was a spinner, or if it was inserted in soft quality bone and it is questionable how well initial stability would withstand occlusal stresses. Alternately, a healing, interim, or definitive abutment can be placed with or without a provisional crown that is not in occlusal function. Recent data indicate that when an immediate implant was placed flaplessly in the esthetic zone in conjunction with an abutment, a provisional crown, and a bone graft placed in the buccal gap that extended coronally from the crest of the bone to the gingival margin (referred to as dual-zone therapy), the amount of bone loss and recession were minimal.57,58

**CONCLUDING REMARKS**

Placement of immediate implants is a predictable procedure and attention to detail is essential to ensure success when placing these implants. Type 1 and usually Type 2 sockets are candidates for immediate implant placement and require preservation of adjacent tissues around the implant. Part 1 of this article has discussed indications/contraindications for immediate implant placement, healing phase and bone loss after extraction, and practical suggestions for immediate implant placement. Part 2 will provide practical information for positioning immediate implants in different sections of the mouth.
REFERENCES


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1. According to Evian et al, Type I sockets require which of the following?
   a. Soft-tissue augmentation.
   b. Hard-tissue augmentation.
   d. Soft-tissue preservation and hard-tissue augmentation.

2. When the bony socket is intact in the coronal aspect but a fenestration is present apically, what is the socket classification according to Evian et al?
   a. Type I.
   b. Type II.
   c. Type III.
   d. Type IV.

3. After an extraction, the average amount of vertical bone height that is lost if a flap is elevated is:
   a. 1.24 mm.
   b. 3.79 mm.
   c. 2.46 mm.
   d. 3.56 mm.

4. When a tooth is extracted, which is usually the thinnest plate of bone?
   a. Buccal.
   b. Lingual.
   c. Proximal.
   d. Buccal and lingual are the same thickness.

5. After removing a tooth with a healthy periodontium it is not necessary to curette the periodontal ligament. If pathosis exists, then all granulomatous tissue should be removed.
   a. The first statement is true, the second is false.
   b. The first statement is false, the second is true.
   c. Both statements are false.
   d. Both statements are true.
6. After tooth extraction, it is advisable to place the immediate implant _____ into bone to attain primary stability if mechanical retention cannot be achieved laterally.
   a. 1 to 3 mm.
   b. 3 to 5 mm.
   c. 5 to 7 mm.
   d. 7 to 9 mm.

7. Atieh et al reported that bone loss using platform switching after immediate implant placement was:
   a. 0.05 mm to 0.99 mm.
   b. 0.19 mm to 1.67 mm.
   c. 0.37 mm to 2.66 mm.
   d. 0.77 mm to 3.56 mm.

8. To avoid inducing recession in the maxillary esthetic zone, it is preferable to do the following:
   a. Avoid raising a buccal flap.
   b. Extrude teeth.
   c. Bone grafts should be placed to a crestal level.
   d. Abutments should be removed and replaced several times.

9. As a general rule, platforms of immediate implants should be placed ____ below the gingival margin.
   a. 1 mm to 2 mm.
   b. 2 mm to 3 mm.
   c. 3 mm to 4 mm.
   d. 4 mm to 5 mm.

10. Maxillary canine teeth are often angled 11° distally. The roots of maxillary canine teeth curve distally 32% of the time.
   a. The first statement is true, the second is false.
   b. The first statement is false, the second is true.
   c. Both statements are true.
   d. Both statements are false.
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5. ☐ a   ☐ b   ☐ c   ☐ d
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