Immediate Dental Implant Placement: Technique, Part 2

Authored by
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Immediate Dental Implant Placement: Technique, Part 2

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LEARNING OBJECTIVES
After participating in this CE activity, the individual will learn:
• Indications and contraindications for immediate implant placement.
• Technique variations that are employed when placing immediate implants in different areas of the mouth.

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Disclosure: Dr. Greenstein reports no disclosures.

INTRODUCTION
Immediate dental implant placement, whereby the implant is inserted directly after a tooth is extracted, has gained widespread acceptance based on a high survival rate. However, placement of immediate implants in different regions of the mouth and under diverse conditions can be challenging. Part one of this 2-part article addressed important clinical issues relevant to immediate implants. Part 2 provides practical clinical information for positioning immediate implants in different sections of the mouth, with a focus on Type 1 extraction sockets.

POSITIONING IMMEDIATE IMPLANTS BY REGIONS OF THE MOUTH
Jumping Distance
The jumping distance is a term that refers to the gap between an immediately placed implant and the bone’s ability to bridge the gap. Usually, if the gap is less than 2.0 mm, it will fill with bone without bone grafting. Others suggest that an even greater distance can heal without any osseous augmentation.

Maxillary Anterior Teeth—An osteotomy is created on the palatal aspect of the socket (Figures 1a to 1e). It is advisable to take a side cutting (Lindemann) drill and create a ledge in the palatal bone two thirds the distance from the crest of bone to the apex. This ledge is used as a purchase point to place twist drills. It may be useful to enter the bone at an angle with a twist drill and then straighten it up as the osteotomy is created. Ideally, the implant will be positioned so that incisal edges of the mandibular teeth are aiming at the cingulum of the future anterior restoration. Maxillary teeth protrude at about 110°; thus it is necessary to drill the osteotomy in a manner that positions the implant to restore the desired tooth position and contour. It is advisable to keep the implant slightly lingual in the socket and it should not touch the buccal plate of bone. The horizontal biologic influence of the implant should be respected to avoid inducing buccal alveolar bone loss. As previously indicated, implants should be placed one mm subcrestally as viewed from the labial osseous crest. In addition, to avoid an implant being pushed buccally upon insertion, it is a good idea to reshape (remove) a small amount of palatal bone at the crest prior to implant placement.

Maxillary Bicuspids—In the first bicuspid site, if the furcation bone interferes with selecting an ideal osteotomy location, it should be removed. If the furcation bone is thick, then the osteotomy can be initiated there. Usually, the buccal socket of a 2-rooted bicuspid is not a good location for an implant. It is too far to the buccal, and often there is a labial concavity of the alveolus. Thus, this location should be avoided because it will provide poor esthetics, and drilling an osteotomy in this site can result in labial plate perforation. The osteotomy should be drilled relatively
straight and the implant should be directed at the buccal aspect of the lingual cusp of the opposing arch. Occasionally, the palatal root of a 2-rooted premolar is in a favorable location (relative to adjacent teeth) to be used as a site for osteotomy preparation and implant insertion (Figures 2a to 2c). The clinician must recall that as the position (mesiodistal and buccolingual location that the implant’s platform occupies within the bone) deviates from the center of the tooth to be restored, then additional sink depth to provide for running room to create a proper emergence profile of the restoration must be created.

**Maxillary Molars**—The osteotomy should be drilled in the furcation bone, and when inserted, the implant may be totally or partially surrounded by bone. As long as primary stability is attained, the socket will fill with bone and the implant will integrate circumferentially. Sometimes it is necessary to use a large-diameter implant to attain mechanical retention against the buccal—palatal or mesial—distal aspects of the alveolus. Other times, the furcation bone is not adequate in subantral height for a dental implant, and a transcrestal sinus floor elevation needs to be performed. In unusual situations when there is minimal bone,
but the palatal root alveolus is adequate in height to retain an implant, it can be used. However, caution must be exercised not to perforate through the alveolus. If the palatal root is used, tilt the implant to the center of the osteotomy. Furthermore, if the palatal root is too far lingual, it should not be employed because it will create poor positioning of the implant and result in an unsatisfactory prosthesis. Keep in mind that the alveolar bone in a healthy situation is 2 mm apical to the cemento-enamel junction (CEJ). Therefore, it is probable that the furcation bone is apical to the buccal and lingual osseous crest. This usually does not present a problem because the buccal and palatal walls resorb to a small degree. However, if the walls are very thin, they may resorb several millimeters. If the furcation bone is many millimeters apical to the buccal and lingual crests of bone, the implant platform can be placed several millimeters supracrestally with respect to the level of the furcation bone.

Mandibular Incisors—The osteotomy can be drilled straight down the alveolus and the implant should tilt toward the cingulum of the maxillary opposing tooth. Alternatively, the cingula of the adjacent teeth can provide a visual cue, or surgical guides can be employed. Note that due to the shape of the mandible in the incisor area, despite loss of bone around the roots of teeth, the mandibular bone actually becomes thicker toward the buccal as drilling proceeds apically (Figures 3a to 3d).

Mandibular Bicuspids—The length of immediate implants needs to be carefully assessed due to the location of the mental foramen. It is coronal to the apex of the first and second bicuspids, respectively, 38% and 25% of the time. Therefore, it cannot be assumed that an implant can be placed that is as long as a bicuspid root.11

Mandibular Molars—After a mandibular molar is extracted, an implant can be placed in the furcation bone. Usually, the bone is not thick enough to encompass the implant circumferentially. Often only the buccal and lingual aspect of the furcation bone stabilizes the implant. Alternately, the implant can also be placed into the mesial or distal alveolus, but the implant should be directed to the center of the edentate area and aimed at the buccal aspect of the lingual maxillary cusp. Similar to maxillary molar implants, when the implant is placed into the furcation bone, it may be several millimeters apical to the buccal and lingual osseous crest. The gaps around the implant can be allowed to fill with a clot or the areas can be bone grafted. When furcation bone is not available to provide primary stability, there are implants that are referred to as “rescue implants” that are very wide and can be used in the mandibular alveolus (Figure 4). These implants achieve primary stability by engaging the buccal and lingual plates of bone. As always, implant placement must be restoratively appropriate, or a delayed protocol should be used.

Figure 3a. CB cross section of planned immediate implant in the mandibular lateral incisor position. Note that the abutment tool depicts the trajectory of the implant passing through the cingulum area of the existing tooth.

Figure 3b. Clinical view of 2 implants placed into the fresh extraction sockets of Nos. 23 and 26. They are inserted slightly to the lingual of center buccolingually, but within the confines of the cingula of the adjacent teeth.

Figure 3c. Definitive PFM restoration Nos. 23 to 26.

Figure 3d. Periapical radiographs of the definitive prosthesis (Nos. 23 to 26) supported by immediately placed, immediately restored implants at 5 years after completion (nonocclusally loaded immediate provisionalization). Note excellent bone levels.
**ISSUES RELEVANT TO IMPLANT PLACEMENT**

**Bone Grafting**

Various graft materials including autogenous bone, demineralized freeze dried bone, and hydroxyapatite have been used in gaps around immediately placed dental implants with and without barriers, and have achieved defect resolution. At present there is no one graft material that appears to be superior to all others. If a biomaterial is placed in the gap, some collagen material (e.g., CollaCote [Zimmer Dental]) can be placed on top of the material to inhibit exfoliation of the material before a fibrin clot forms.

As indicated, gaps < 2 mm heal spontaneously without graft material. Deproteinized bovine bone mineral (DBBM) is the most commonly used biofiller in recent studies, and it was employed alone and in conjunction with resorbable and nonresorbable barriers. However, a possible explanation for the high use of DBBM is that in Europe, human allograft material is not allowed to be used in humans. Additionally, a biomaterial may be placed to preserve soft-tissue contour even if it provides no enhancement to osseointegration of the implant.

**Prior Position of Roots May Be Poor Guide for Implant Placement**

If possible, implants should be placed in their ideal locations to enhance prosthetic reconstructions. Pertinently, if roots of extracted teeth are not in the best position for a future prosthesis, the root socket should not be used as a guide to create osteotomies. If using the socket as a guide will create a nonoptimally positioned implant, either start a new osteotomy or use a side cutting drill to extend the root socket to the correct position for implant placement.

**Technique for Placing Implants When Dilacerated Roots Are Present**

If dilacerated roots are present, it is difficult to initiate an osteotomy along a sloping bony wall. Instead, take a pilot drill and approach the socket in the appropriate place (often just prior to the dilacerations) at a 90° angle. Enter the bone and then create a purchase point for subsequent drills.

**Immediate Placement if There Is a High Smile-Line**

In the esthetic zone, if there is a high smile-line, immediate placement should only be attempted if the following criteria are present: periodontal health, no recession, thick biotype, keratinized gingiva, and an intact buccal bony plate of bone. The most critical facet is the buccal plate of bone. The CEJ is normally 2 mm apical to the gingival margin. If the bone is 3 or 4 mm from the gingival margin, it increases the risk of potential recession. Immediate placement when there is a defective bony plate runs the possible complication of recession that may expose implant threads.

**Concerns About Recession**

**Extrusion of Teeth**—If a tooth needs to be removed and replaced with an immediate implant, consideration needs to be given to the amount of soft-tissue recession and bone loss that occurred. In this regard, a hopeless tooth may not be a useless tooth. It can be used via orthodontic extrusion to help correct soft- and hard-tissue deformities. Orthodontic extrusion can coronally advance the tissue approximately one mm per month. If there is 3 mm or more of recession, consider orthodontic extrusion.

**Biotype**—Lee et al concluded that a thin biotype predisposes individuals to recession and loss of papillae. In this regard, Kan et al reported that a thin biotype (probe is visible when placed in the sulcus) in the esthetic zone demonstrates 0.7 mm more recession post-healing than a thick biotype (probe not visible when placed in the sulcus) after implant placement. In the esthetic zone, if the biotype is thin, place the implant more palatally and a little more apically.

**Recession at Implant Site**—If it is noticed that the buccal gingiva is several millimeters more apical than the gingival margin of adjacent teeth, there are several techniques that can be used to augment the gingiva at the time of immediate implant placement: (1) place a short healing abutment on the implant and advance the flap to cover the abutment, and (2) place a cover screw in the implant and cover it with a...
connective tissue graft or other soft-tissue biomaterial and advance a flap over it. If a clinician is in doubt about the potential effectiveness of these procedures in a given situation, then a delayed protocol should be selected.

**Provisionalization for Immediately Placed Dental Implants**

It is recommended that an insertion torque of 30 to 40 Ncm be attained when placing an implant if an abutment and a provisional crown are to be inserted. The provisional prosthesis should not be in occlusion for single tooth replacements. If multiple implants are placed or the prosthesis turns the corner of the arch, or if it is a full arch provisional, then occlusion can be restored. If a permanent abutment is inserted, it may not have to be subsequently removed (avoids disrupting the junctional epithelium), and this may help decrease recession.

<table>
<thead>
<tr>
<th>Table. Conclusions and Guidelines for Treating the Buccal Gap After Immediate Implant Placement²⁰-⁳⁰</th>
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<tbody>
<tr>
<td>1. Avoid elevating a labial flap when placing implants in the esthetic zone, thus decreasing the risk of recession.²⁰-²³ Raise a lingual flap if additional access for visualization is needed.</td>
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<td>2. Gaps &lt; 2 mm wide will usually heal spontaneously without placing a biomaterial.²⁴ If a biomaterial is inserted in the gap which is less than 2 mm, the data indicate that there will be crestal bone loss, but the horizontal width (contour) will be maintained better.²⁵-²⁷ In the esthetic zone, it may be advantageous to graft the buccal gap; at a minimum it will help support the soft tissue.</td>
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<td>3. It has been suggested that it is better to leave the gap uncovered, thereby retarding the connective tissue and epithelium from interfering with initial population of the site with bone progenitor cells.²⁸</td>
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<td>4. The implant should be inserted 2 mm from the buccal plate to circumvent encroaching on the buccal bony plate, thereby contributing to resorption.²⁹</td>
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<td>5. Insert implants one mm below the crest of bone to account for crestal bone loss.²⁵,³⁰</td>
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<td>6. Biomaterials can be inserted without a barrier, thus avoiding flap elevation. But, if there is a bone dehiscence, it may be useful to place a barrier, and this would necessitate elevating a flap in order to achieve wound closure.</td>
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<td>7. With a flapless approach, it was suggested that overfill of the gap with deproteinated bone helps support the soft tissue and reduces recession when it is done in conjunction with an abutment and temporary crown.²⁸ This statement is based upon a recently completed study.</td>
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**CONCLUDING REMARKS**

Placement of immediate implants is a predictable procedure, and attention to detail is essential to ensure success. The Table²⁰-³⁰ lists guidelines to enhance successful placement of immediate implants in Type I sockets. Management of atypical situations outlined in this paper should enhance results and help avoid esthetic problems.

Often, sockets, adjacent or opposing teeth can provide adequate visual cues for implant placement. However, surgical guides can be used to facilitate precise placement of implants. This is particularly true if multiple implants are placed or deviations from optimal anatomy are apparent. In this regard, contemporary implant planning/anatomy software can greatly simplify these surgical interventions.
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POST EXAMINATION QUESTIONS

1. If the jumping distance is _____, usually it will fill with bone without bone grafting.
   a. < 2 mm.
   b. 2 to 3 mm.
   c. 3 to 4 mm.
   d. 4 to 5 mm.

2. The buccal socket of a 2-rooted maxillary bicuspid is usually not a good location for an implant. It is too far to the buccal.
   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.

3. With respect to maxillary molars, alveolar bone in a healthy situation is:
   a. At the level of the cemento-enamel junction (CEJ).
   b. 2 mm apical to the CEJ.
   c. 4 mm apical to the CEJ.
   d. 6 mm apical to the CEJ.

4. With respect to mandibular bicuspids, the mental foramen is coronal to the apex of the first bicuspid:
   a. 25% of the time.
   b. 30% of the time.
   c. 38% of the time.
   d. 45% of the time.

5. To account for crestal bone loss, implants should be inserted:
   a. Level with the crest of bone.
   b. One mm below the crest of bone.
   c. 2 mm below the crest of bone.
   d. 3 mm below the crest of bone.

6. After a mandibular molar is extracted, an implant can be placed in the furcation bone. Usually the bone has adequate thickness to encompass the implant circumferentially.
   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.
7. 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. Place bone grafts to a crestal level.
   d. Remove abutments and replace several times.

8. Orthodontic extrusion of a tooth can coronally advance the tissue approximately____:
   a. One mm a week.
   b. One mm a month.
   c. 2 mm a month.
   d. 3 mm a month.

9. In the esthetic zone, if the biotype is thin, place the immediate implant:
   a. More buccally and more apically.
   b. More palatally and less apically.
   c. More buccally and a little less apically.
   d. More palatally and a little more apically.

10. It is recommended that an insertion torque of____ be attained when placing an implant if an abutment and provisional crown are to be inserted.
    a. 20 to 30 Ncm.
    b. 30 to 40 Ncm.
    c. 40 to 45 Ncm.
    d. 45 to 50 Ncm.
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