Use of the natural tooth as a provisional after immediate implant placement

By Robert Margeas, DDS

Provisionalization for immediately-placed implants using the patient’s existing tooth can enhance the final aesthetic outcome if certain steps are followed. If the natural tooth is intact and can be used as a provisional, the emergence profile can be very similar to the preoperative condition. This will allow the gingival tissue and papilla to be supported and help prevent collapse of the tissue. The patient’s preoperative condition plays a key role in understanding and predicting the final aesthetic outcome. This article outlines a technique to use the patient’s natural tooth after extraction to provisionalize an implant.

The loss of a tooth in the anterior aesthetic region as a result of periodontal disease, trauma, endodontic failure, or root resorption can be a traumatic experience for a patient. Traditional implant therapy often required 2 to 3 months of alveolar ridge remodeling after tooth extraction and an additional 6 months of non-loaded healing for implant osseointegration to be successful. Aesthetic single-tooth implant placement using a traditional two-stage surgery has been well-documented in the literature. Many complications can occur during the healing phase, such as loss of papilla as a result of flap elevation or blunting of the papilla caused by provisionalization with a removable appliance that is not stable. Bone and gingival tissue loss after maxillary anterior tooth extraction and implant surgery may present additional aesthetic challenges. Clinical and histologic studies have demonstrated that non-submerged implants osseointegrate as well as submerged implants and function comparably under load over extended periods.

Immediate implant placement using a single-stage surgical approach can reduce the duration of treatment, preserve papilla, and limit apical migration of the free gingival margin. Several studies have shown successful bone regeneration in extraction sites around immediately placed implants with clinical results similar to two-stage procedures.
Extraction, implant placement, and provisionalization combine surgical and restorative principles for tooth replacement. The advantages to this approach include patient comfort, increased aesthetics, and better patient acceptance. When using a fixed provisional, the patient’s phonetics is much better than using a removable appliance. Immobile immediate provisionalization can enhance soft tissue management as well.\(^6\)-\(^8\)

When using a flapless, one-stage approach, soft tissue healing and maturation can occur simultaneously with implant integration. In addition, implant placement into a fresh extraction site provides an adequate blood supply to the wound and allows sufficient bone maintenance since resorption and remodeling will not yet have occurred. Raising a surgical flap compromises the bone vascularization and may result in marginal bone loss\(^9\) and soft tissue recession with collapse of the interdental papillae, particularly in the presence of thin, scalloped gingiva.\(^20\)
As with traditional implant treatment, approximately 1 mm of gingival recession may occur at the free gingival margin after placement of the definitive restoration. This may be attributed to the biologic width formation after repeated removal and replacement of the implant components during impression making, try-in, and fitting of the restoration.

If a failing tooth has a free gingival margin positioned more incisally compared to the adjacent tooth, it will allow the final free gingival margin to be similar following apical migration of 1 mm after implant placement. A hopeless tooth with the free gingival margin positioned ideally or more apical would benefit from orthodontic extrusion before extraction. The periodontium plays an important part in the final aesthetics of the implant restoration. The three categories of gingival scallop are high, normal, and flat. Based on a clinical survey of 100 patients, the average or normal gingival scallop is positioned 4 mm to 5 mm more incisally than the free gingival margin. The high or long gingival scallop will have a much higher risk for gingival loss or flattened papilla after extraction vs the normal or flat scallop. The flat scallop has less volume of papilla in the interproximal area; therefore, it is much more predictable and maintainable after extraction. One of the principal advantages of the immediate technique is the prevention of post-extraction bone resorption. Bone loss may affect approximately 23% of the anterior alveolar crests during the 6 months after extraction.

Infection affecting the tooth being extracted may be a contraindication to the immediate technique, as it is most often accompanied by apical or lateral bone loss that can impair primary stability. Primary stability after implant placement is important when provisionalizing immediately. Drilling 3 mm to 5 mm beyond the apical limit (in a palatal direction) can ensure sufficient primary stability. The success rates being achieved using this single-stage approach contradicts the basic tenets of the original Bränemark technique, which was to allow the implants to be covered and to protect the implant against early loading. It appears that it is not early loading that creates the effect of fibrous encapsulation, but rather a certain degree of micro-movements at the bone/implant interface resulting from inadequate primary stability. Various experimental studies indicate that the range of tolerance of these micromovements is approximately 50 µm to 150 µm for rough surfaces and about 100 µm for smooth, machined surfaces. Thus, the implant surface is not an indifferent factor in the process of bone healing. Rough surfaces appear to tolerate greater micro-movements and, therefore, could be placed under load at an earlier time.

Research on the preservation of the tissue architecture, reduction of surgical sequences, augmentation of patient comfort during provisionalization, and greater aesthetic requirements have led many practitioners to consider immediate replacement of the missing or freshly extracted tooth. Care must be taken when an immediate single-tooth implant restoration is planned in the anterior region. Successful aesthetic results may ultimately be determined by the patient’s presenting anatomy rather than the clinician’s ability to manage state-of-the-art procedures.

Case presentation
An 18-year-old female patient presented with root resorption of the maxillary right central incisor (Figure 1). Available restorative options were presented to the patient and included a removable partial denture, a fixed bridge or an implant-supported restoration. The adjacent teeth had not been previously restored, so the patient chose to have an implant-supported restoration to avoid preparation of the adjacent teeth. The patient also did not want to wear a removable appliance during the implant healing phase. There was no active infection present and no apical pathology was seen radiographically. Periodontal evaluation revealed a thick, normal-scalloped periodontal biotype. Approximately 85% of the population present with thick, flat periodontal forms, whereas the periodontal architecture of the remaining population is thin and scalloped. Though the amount of postoperative soft tissue modifications is generally minimal for patients with thick and flat gingiva, significant changes have been observed in those with thin and scalloped biotypes.

The projected interproximal tissue height depends on the interproximal bone height of the adjacent teeth. Bone sounding of the teeth adjacent to the failing tooth can ascertain predictable interproximal tissue height. In this patient, a normal osseous crest was revealed after bone sounding. Gingival tissue was approximately 3 mm from the osseous crest facially and 5 mm interproximally. The risks and benefits of treatment were presented to the patient and an implant was selected for immediate placement and fixed provisionalization using the patient’s natural tooth on the abutment. Using the natural tooth as a provisional will allow tissue support and create an emergence profile similar to the pre-extraction condition. This will support the peri-implant mucosa and maintain the papilla height, gingival outline and tissue form throughout the osseointegration phase. Wohrle has described several reports with simultaneous provisionalization on an implant placed into an extraction socket.

Maintenance of gingival tissues and papillae can be a demanding task when using a full periosteal flap reflection. Several reports have proposed implant placement without flap elevation to minimize bone loss. Although initial results appear promising, the lack of direct visibility in flapless surgery may present limitations that require careful evaluation of the osseous topography as well as meticulous surgical execution.

Surgical procedure
Before extraction of the tooth, stone models were made and a putty index was formed over the teeth. This would act as a guide to placing the tooth in the proper orientation after surgery. Local anaesthetic was administered and periotomes were used to loosen the periodontal ligament. The tooth was extractedatraumatically, without flap reflection. A periodontal probe was used to verify the integrity of the facial plate, and the socket was thoroughly debrided.

Primary stability was achieved by engaging the palatal wall and bone approximately 4 mm beyond the apex to the extraction socket with a 13-mm Straumann standard diameter 4.1-mm implant with a 4.8-mm collar. Nobel Biocare’s Replace Select® implants would also have been an acceptable choice. The top of the implant was placed approximately 3 mm from the final proposed free gingival margin in the midfacial area. Ideally, the 1-mm polished collar should be above the bone level. With a flapless surgical approach, this is sometimes difficult to visualize. The implant diameter was within the confines of the
tooth socket, without engaging the facial plate to prevent possible perforation. A minimal distance of approximately 1.5 mm to 2 mm between the implant and adjacent teeth is recommended to minimize marginal bone loss resulting from encroachment. Although not necessary with a horizontal distance less than 2 mm from the implant to the facial bone, synthetic bone was placed around the implant and a healing cap (Figure 2) was lightly tightened. Immediate provisionalization was then begun; the healing cap was removed and a Straumann 5.5-mm solid abutment was placed on the implant and hand tightened (Figure 3). No preparation was necessary as this is a stock component and the occlusion did not interfere.

Restorative procedure
The coronal portion of the patient’s tooth was to be used as the provisional restoration. The extraction was necessary because of the resorption of the root (Figure 4). The root of the tooth was sectioned horizontally with a diamond bur approximately 3 mm from the cemento-enamel junction (Figure 5). The tooth was
then hollowed out so that it would fit over
the abutment (Figure 6). Before relining
the tooth, it was placed on the solid abut-
ment to make sure it would fit and that
there would be no occlusal contact on the
final provisional (Figure 7). After con-
firming an accurate fit, the tooth was
etched for 30 seconds (Figure 8), then
rinsed and air-dried. A bonding agent
(D/E resin) was applied and light-cured
for 20 seconds (Figure 9). A bis-acryl
material was injected into the tooth
(Figure 10) and then placed intraorally
onto the abutment and allowed to self-cure
for 2 minutes.

It is difficult to achieve an accurate
margin when relining a provisional,
(Figure 11) so it is necessary to reline the
margins out of the mouth with a flowable
resin (Figure 12). It is very important
when relining the restoration extraorally
that an analog is used that is exactly the
same as intraorally. Do not use a labora-
tory implant abutment analog for this
purpose. It is important to get an accurate
fit of the restoration. The final provisional
should be refined and contoured flat or
slightly under-contoured (Figure 13) on
the facial so as not to put too much pres-
sure on the free gingival margin, which
can cause apical migration of the tissue. This
is done with finishing disks and polishing
points to create a smooth surface. The inter-
proximal tissue should be supported by the
natural emergence profile of the tooth. It is
impossible to create too much interproximal
pressure, as it is the exact emergence profile
that existed before the extraction. One of the
possible complications from immediate
placement and provisionalization using a
cement-retained restoration is the possibility
of leaving excess cement subgingivally. If
the implant is placed too deeply and it is
impossible to remove all of the cement, it is
better to use a screw-retained provisional.
A technique first described by Higginbottom allows the majority of the provisional cement to be removed extraorally using the same analog as that used for the fabrication of the temporary. A temporary cement is placed in the crown and then placed on the abutment extraorally (Figure 14). The excess cement is then removed before placing the temporary introrally. This allows minimal clean-up introrally and prevents possible gingival irritation. Do not be fooled into placing more cement into the restoration after cleaning. There is adequate cement to hold the restoration on. Place the restoration on the abutment and allow the cement to fully set. Clean off any excess cement.

Figure 15 shows the restoration on the day of surgery. The tooth was taken out of occlusion and the patient was advised against using the surgical site and instructed not to have any contact on that tooth while eating. It is very important for the patient to understand the importance of their part in the success of the restoration. If the patient is not willing to accept some responsibility in the immediate final restoration may be contraindicated. Patients with deep bites, bruxers, or who have active infection present are not good candidates for this type of treatment.

The patient presented 2 weeks post-surgery for clinical evaluation. The area was healing well and was a good candidate for this type of treatment. The patient’s presenting anatomy can ultimately dictate the final aesthetic outcome.

Conclusion
Immediate provisional restorations placed on immediate implants in extraction sockets enhance the preservation of the soft and hard tissue contour. Use of the natural tooth on the abutment will provide an emergence profile similar to the preexisting condition. This is particularly advantageous for the thin periodontium, where there is greater chance for bone and tissue recession. It is important to evaluate the patient thoroughly before attempting this technically demanding procedure. The patient’s presenting anatomy can ultimately dictate the final aesthetic outcome.

References


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