Recovering Cases Using Single-Tooth Immediate Implants

by
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ABSTRACT

Loss of a key tooth after complex cosmetic rehabilitation can spell disaster for the case. This article discusses recovering from this predicament with the use of immediate implants. This method preserves tissue contour to set the stage for optimum clinical results. By using a fixed provisional beginning on the day of implant placement, patient satisfaction is maximized.

When the center tooth of a 10- or 20-unit cosmetic case fractures at the gum line, the cosmetic dentist must do some quick thinking.

INTRODUCTION

In the quest to create the optimum smile for patients, cosmetic dentists frequently must use compromised teeth as part of the treatment plan. Endodontically treated teeth often are badly broken down, and we generally choose to lengthen the upper teeth to enhance the overall esthetic outcome. This increases the crown-to-root ratio. When we start with a weak tooth, remove additional structure to allow for the restoration, and increase the potential forces on the tooth by lengthening the incisal edge, disaster can strike. When the center tooth of a 10- or 20-unit cosmetic case frac-
tures at the gum line, the cosmetic dentist must do some quick thinking to recover the case and take care of the patient.

Placement of single and/or multiple implants in the esthetic zone is challenging. The bone, soft tissue, and the implant position must be at the optimum for a successful case. This is most crucial when a patient has a high lip line or smile line. Immediate placement of implants can greatly improve cosmetic success by maintaining alveolar bone and gingival contour.

Case selection is the most important key to success. If there is an infection or facial bone loss, then a delayed approach is preferred. It is essential that the correct diagnostic assessments be done before attempting an immediate implant.

The three cases discussed below describe a protocol for esthetic immediate-load implants using the Nobel Perfect scalloped and tapered implant system (Nobel Biocare; Yorba Linda, CA). This system was selected due to it being the closest match to natural root anatomy. The principles outlined can be applied to other implant systems, as well.

Regardless of what implant system is used, a tapered implant should be placed. This is due to the fact that the anterior maxilla slants diagonally to the frontal plane of the facial skeleton. Straight implants may perforate the buccal plate and therefore should not be used. The goal of treatment is to maintain existing supporting structures and allow the patient to continue with an esthetic fixed restoration, even in the healing phase. In the authors’ view, atraumatic extraction and immediate placement with a provisional is the best way to achieve the goal.

Care was taken during surgery to section the crown from the residual root for later use as a provisional.

**Case 1**

The patient was a 44-year-old male in excellent health. Tooth #9 had been fractured near the gum line when he was 10. Root canal therapy had been performed when he was 17, and a post and crown were placed. Over the years, #9 has had three crowns, three posts, and crown-lengthening surgery. The last replacement of the crown was part of a 10-unit smile makeover using bonded Empress® veneers (Ivoclar Vivadent; Amherst, NY). Three years later, the post loosened again and the decision was made to plan for replacement of the compromised root with a dental implant (Figs 1 & 2).

Unfortunately, previous crown-lengthening surgery had removed some bone around the affected tooth, so orthodontic extrusion was performed to improve the gingival margin contours in anticipation of extraction and implant placement. After four months of orthodontic extrusion and stabilization, brackets were removed and the area was left to settle for three additional months.

A surgical guide and laboratory-created provisional restoration were fabricated and the patient was evaluated for the planned implant surgery. It was decided to use a Nobel Perfect scalloped 4.5-mm diameter x 16-mm long titanium implant. The 16-mm length would provide primary stabilization in the bone superior to the extraction socket. The laboratory-fabricated provisional restoration posed some problems due to the difficulty of predicting the exact
A 2-mm drill was used to accentuate the palatal groove from the initial round bur. A guide stent was utilized to show the emergence of this osteotomy. This should always be checked during the procedure (Fig 4). Next, a 3.5-mm internally cooled contra-drill was placed into the 2-mm osteotomy. The length utilized should be approximately 3 mm above the apex of the post-extraction socket. The top of the drill should be approximately 2.5 mm below the facial soft tissue height. The final drill used was 4.3 mm. The hole made by this drill should be very precise; it should not be any deeper than the planned placement of the implant. Overcontouring of this hole will cause the implant to be mobile.

After the osteotomy was finished, platelet-rich plasma was injected into the site and the tooth form implant was screwed into place. Regardless of implant size, there will be some gaps between the implant and the post-extraction socket. Utilization of platelet-rich plasma will create a bone clot to fill this space.7 The junction between polished and coated surface of the implant was placed 3 mm from the marginal gingiva and verified with a perio probe.

An abutment was placed onto the fixture and was tightened by hand). The laboratory-fabricated provisional was placed after relieving the interproximal areas to prevent binding. A laboratory-fabricated provisional is technique-sensitive due to the difficulty in predicting the rotational alignment of the Nobel Perfect implant fixture (A preferred method of provisionalization is discussed in the next two cases.) The shade of the provisional was modified by veneering it with composite (Renamel, Cosmedent; Chicago, IL) to decrease the value and increase the surface polish. The cervical area was formed using a brass analog. After cementation with a small ring of provisional cement (Temp Bond, Kerr; Orange, CA), the restoration was taken out of occlusion in centric and all excursions.

The implant was allowed to osseointegrate with the provisional crown in place over the next three months. Tissue contours were evaluated and it was decided to proceed with the case. After removal of the provisional, a full-arch impression was taken with transfer coping in...
place using Impregum (3M ESPE; St. Paul, MN). An opposing alginate impression, photograph, shade, and impression of the tissue side of the provisional were taken to provide the laboratory with the necessary information to fabricate a final restoration. A Procera (Nobel Biocare) restoration was chosen to comply with the implant manufacturer’s recommendation, and to yield a final restoration that would minimize any dark metal show-through in the facial gingival area (Fig 5).

**Final Restoration**

The provisional restoration was removed and the final abutment was manually tightened into place. The fixture/abutment was cleansed with a chlorohexidine rinse (Consepsis, Ultradent; South Jordan, UT) and the crown was seated. Some slight interproximal adjustment was needed to achieve complete seating. Evaluation of color and contour showed that the crown was too high in value and slightly full in the facial subgingival area, causing some excessive blanching of the tissue when seated.

The patient went to the laboratory for a custom shade, and so that the emergence profile could be adapted for proper tissue support without excess blanching. After the color and contour were improved, the abutment was tightened to 35 Newtons with a torque wrench, and the Procera crown was cemented using RelyX luting cement (3M ESPE). Photographs were taken at three months to show the tissue position (Fig 6).

**Case 2**

Two years after cosmetic enhancement of her maxillary dentition, this patient fractured endodontically treated #8 below the gum line (Figs 7 & 8). It was evident that the long-term prognosis of #8 was poor...
and that an immediate implant with provisional would be the best option to maintain the case. For the emergency appointment, the fractured segment was bonded on using Panavia 21 (Kuraray; New York, NY) and the patient was scheduled for evaluation by an oral surgeon.

The treatment plan would involve extraction of fractured tooth #8, implant placement, and use of the patient’s own crown as the provisional. A surgical guide and matrix were fabricated in the event they were needed. The surgical procedure was the same as that in Case 1. A 4.3-mm x 16-mm Nobel Perfect scalloped implant, filled with platelet-rich plasma, was placed into the socket.

**Great care must be used to ensure that all residual cement is removed to avoid an iatrogenic tissue reaction.**

**Provisional Restoration**

Care was taken during surgery to section the crown from the residual root for later use as a provisional. After surgery, an abutment was placed and existing hollow ground crown was approximated using a self-cure composite. Due to margin depth of approximately 2.5 mm, moisture, and residual platelet-rich plasma, the margin was not well captured, but the relationship to the adjacent teeth and abutment body was accurate. The abutment was then removed from the implant and placed on a brass analog. The margins and emergence profile of the provisional were refined extraorally (Fig 9). A microhybrid composite was used (Four Seasons, Ivoclar Vivadent), due to its strength and polishability.

The provisional restoration was checked to ensure that there was no contact in centric occlusion or any
excursions. Adjustments were polished and the provisional cemented with a small amount of provisional cement (Temp Bond, Kerr). The patient was then dismissed with instructions not to bite on the front teeth and return for evaluation in one week (Fig 10).

The postoperative period was generally uneventful. The provisional had to be recemented after two months; then, two months after that, we proceeded with an impression for final restoration as in Case 1. In this case, a porcelain-fused-to-metal (PFM) crown was selected as the small size of the abutment allows for ample space for porcelain to achieve required esthetics. To best communicate the desired shade and surface texture, the patient’s original crown was sent to the laboratory.

The laboratory fabricated a PFM crown onto a metal abutment. On insertion, we were pleased with tissue support color and contour and no adjustments were required. The patient was anesthetized and the crown cemented with RelyX. Anesthesia is advised due to the deep margins in the Nobel Perfect implant system. Great care must be used to ensure that all residual cement is removed to avoid an iatrogenic tissue reaction. The patient was dismissed and seen three weeks after surgery for a routine hygiene visit and to take photographs. Preoperative and postoperative photographs show a very successful outcome (Figs 11 & 12).

**Case 3**

This patient had had PFM crowns replaced four years earlier due to poor marginal fit, causing gingival inflammation. She went almost a year with laboratory-fabricated provisionals (Sinfony; 3M ESPE). During that time, she had periodontal

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*Figure 13: Before surgery, with gutta percha through perulis.*

*Figure 14: Before surgery; shows perulis, #8.*

*Figure 15: Crown removed for later use as provisional.*

*Figure 16: Sectioning of residual root.*
scaling and root-planing followed by crown-lengthening on teeth #7 and #8, to correct for a biological width problem we thought was responsible for continued inflammation in the area.

The provisionals were replaced by Empress crowns and the case proceeded uneventfully. However, the gingival area around #8 never looked quite right. Three years later, a small gingival fistula was noted in the papillae between #8 and #9 (Figs 13 & 14). This appeared shortly after the patient had reported feeling a “crack” when biting off a piece of French bread crust. After consultation with the periodontist, endodontist, and oral surgeon, it was thought that the tooth had a fracture at the junction of the coronal and middle thirds, and a poor prognosis. There was a sense of urgency because the crestal bone between #8 and #9 was barely visible on the radiograph. Only a small amount remained against the root of #9. We felt we had to act quickly if there was to be a chance of maintaining the critical interdental bone and papilla.

It was decided to remove the tooth, place a small amount of autogenous bone into any visible osseous defect in the interdental bone, and place an immediate-load implant. Impressions were taken to fabricate a surgical guide and provisional matrix in the event the existing crown could not be used. On the day of the appointment, the restorative dentist sectioned off the coronal part of the tooth in such a way as to facilitate its use as a provisional (Fig 15). This was accomplished by cutting from the lingual at the gingival margin to a level just above the osseous crest on the facial. Care was taken not to damage any gingival or osseous structures.

**Fracture of key endodontically treated teeth can occur any time before, during, or after cosmetic enhancement.**

The patient then went to the oral surgeon, who extracted tooth #8 as described in the previous two cases (Fig 16). The granulation tissue in the interdental osseous defect was excised and the area examined. It appeared that the defect did not affect the root surface of the adjacent tooth. The osteotomy was performed as in the other two cases and autogenous bone was placed in the small interdental defect. Platelet-rich plasma was injected into the osteotomy and the 4.3-mm x 16-mm Nobel Perfect tapered scalloped implant was placed and torqued to a position of 2.5 mm below the level of the gingival crest.

Immediately after surgery, the restorative dentist modified a provisional abutment (Figs 17 & 18), seated the existing hollow ground tooth/crown, and refined the margins on the analog. The provisional was cemented with Temp Bond. After a three-month healing phase, retreatment of the apicoectomy on #7 was performed by an endodontist prior to final impressions for the implant crown. At the time this article was written, the provisional was in place and serving well (Figs 19 & 20).

**Discussion**

The three cases demonstrate a common mishap with comprehensive cosmetic cases. Fracture of key endodontically treated teeth can occur any time before, during, or after cosmetic enhancement. Informed consent should be obtained and implant placement should be considered in advance for severely
compromised teeth. However, when a critical tooth fails, the case can be rescued using the described treatment protocol. The key points in the author’s opinion are as follows:

- Schedule removal of a hopeless tooth as soon as possible after it is identified. Avoid time-sensitive destruction to the periodontal structures that can be caused by a root fracture, or by periodontal or endodontic infection.
- Plan on using the patient’s existing crown or tooth as the provisional. This will be the best match for color and contour while healing takes place.
- Minimize trauma during tooth removal. Flapless removal of the tooth as described is recommended.
- Use a tapered implant. An implant that best approximates the natural anatomy of the tooth will make the outcome more predictable.
- The round implant should emerge in the facial portion of the oval socket. The apex of the implant should be directed slightly lingual to the apex of the natural tooth socket.
- Immediately place the implant and provisional crown; this will allow for preservation of papilla and patient comfort. Keep out of occlusion.
- Communicate with the laboratory using photographs and even the patient’s original crown to help match color, contour, and surface texture.

“Service after the sale” can be a yardstick to measure a dental practice. We all have failures; the authors have learned much from theirs. Accomplishing these cases takes skill and patience. It is hoped that sharing these cases with other quality- and service-minded dentists will allow them to turn failure into success.

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References