

Immediate Implant Solution to Improve Long-Term Esthetics, Enhance Patient Satisfaction

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Abstract: Fixed prostheses offer various advantages over conventional removable devices for immediate restoration of a fractured tooth in the esthetic zone. In this case report, a fixed solution is employed through the use of a same-day provisional restoration attached to an immediately placed dental implant. Utilizing biologics and an implant system that allows for excellent primary stability, this treatment modality offers a predictable method for achieving immediate implant placement and provisionalization. The minimally invasive technique facilitates the development and maintenance of soft- and hard-tissue contours to enable an optimal result in the final restoration.

Fractured teeth are a common problem throughout the adult population. Bader et al reported an incidence of five fractured teeth per 100 adults.¹ This can be a particularly disconcerting dilemma for patients when an anterior tooth in the esthetic zone is involved. Several possible solutions are available when these situations present.

The most common options for an immediate resolution in the esthetic zone involve removable devices, such as Essix retainers and temporary removable partial dentures. While these devices can provide an immediate esthetic solution, their removable nature is often perceived by patients as less than ideal. A fixed solution is usually preferred and offers significant advantages over conventional removable alternatives. Fixed partial dentures (FPDs) remain an option for single tooth replacement; however, they rely on the support of adjacent teeth. In a study by Walton et al, it was determined that the 10-year survival rate for these prostheses was 50% with the most common cause of failure being recurrent caries.² A more recent retrospective cohort study concluded that the estimated 10-year success rate for FPDs was 81.1%.³

The purpose of this case report is to demonstrate the viability and predictability of a fixed solution utilizing a same-day provisional restoration attached to an immediately placed dental implant. This treatment modality not

only offers improved patient satisfaction through the use of a fixed restoration at the time of extraction, but equally important, facilitates the development and maintenance of soft- and hard-tissue contours to allow for an optimal result in the final restoration.⁴⁻⁶ While this technique has been available and well documented for several years, recent advances in digital technology have allowed for a seamless workflow and unparalleled predictability and results when compared with previous methods for managing these types of cases. This technique requires an understanding of sound surgical principles and the use of biologics to enhance soft-tissue healing. In most cases, the procedure is minimally invasive and can be performed using a flapless approach. In cases where the buccal plate is compromised, immediate implant placement and provisionalization can still be achieved with advanced grafting/augmentation techniques.

Case Report

The patient initially presented to the author's periodontics and implant practice in 2015. The nature of the referral was to evaluate failing, endodontically treated teeth Nos. 7 and 8. Examination revealed root perforations with chronic infection associated with both teeth. A comprehensive evaluation showed excessive wear resulting from both acid erosion and parafunction (Figure 1).

At the time, the patient was only 33 years old. He was, thus, advised that the extent of his dental deterioration was significant and would eventually result in complete loss of esthetics and function. The patient was referred to a gastroenterologist to rule out Barrett's esophagitis, and a restorative plan was developed to include restoration of the severe wear throughout the maxillary and mandibular dentition. While a left side posterior crossbite existed, the orthodontic specialist was not optimistic that treatment short of orthognathic surgery would result in significant improvement of this relationship. A comprehensive plan was devised with staged treatment due to financial considerations.

The plan consisted of definitive restoration of the maxillary arch, with temporary reconstruction of the mandibular arch to restore vertical dimension of occlusion (VDO) and provide restorations to prevent further occlusal wear and deterioration. The patient saw a gastroenterologist, who was able to rule out esophageal disease. The initial treatment consisted of reconstruction of the maxillary arch along with extraction of teeth Nos. 7 and 8 with immediate implant placement and custom healing abutments at the time of extraction for the purpose of maintaining soft and hard-tissue contours. Following this treatment, the patient was stabilized with a complete reconstruction of the maxillary arch and a staged approach to re-establish VDO through temporary restoration of the mandibular arch using composite buildups. (Restorative treatment by Charles Horning, DDS.)

The patient recently returned following the fracture of tooth No. 10 (Figure 2 and Figure 3). Given the extent of the fracture, the tooth was given a hopeless long-term prognosis. After reviewing long-term replacement options, the patient elected to proceed with a single-tooth implant to replace this tooth. Case selection, including multiple criteria, is critical when considering candidates for this treatment protocol. Patient compliance, occlusion, and parafunction are key factors. The clinician reviewed the patient's status with respect to these considerations and determined that he was an acceptable candidate.

Atraumatic extraction was accomplished with periostomes and forceps (A.Titan™, atitan.com). In this case, preservation of all bony walls was crucial to allow for a completely flapless approach. Following debridement of the socket, a 4 mm x 14 mm Straumann® BLX implant (Straumann, straumann.com) was placed with a palatal orientation to allow for a screw-retained restoration (Figure 4). In preparing the osteotomy, the apical portion should be redirected and should not follow the trajectory of the natural root. Also, if an immediate provisional restoration is being considered, underpreparation of the site is necessary to allow the implant to achieve high primary stability. Screw access through the cingulum is the goal for both the provisional and final restorations.

The Straumann BLX implant was chosen in this case for its ability to achieve high insertion torque and stability in a variety of bone types; the reduced diameter neck is designed to minimize stress on the crestal bone. The implant was torqued to 45 Ncm. As a general guideline, 32 Ncm is a minimum



Fig 1. Initial presentation in 2015. **Fig 2 and Fig 3.** Fractured tooth No. 10. **Fig 4.** Immediate implant inserted at 45 Ncm. Note facial gap that was subsequently filled with mineralized bone allograft hydrated with autologous growth factors.

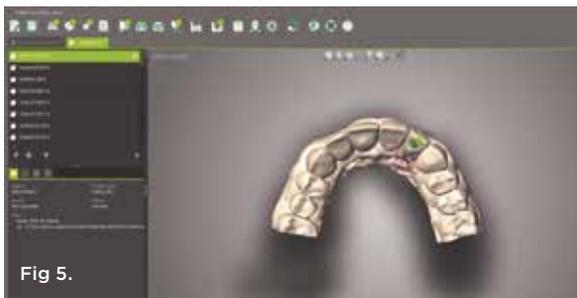


Fig 5.

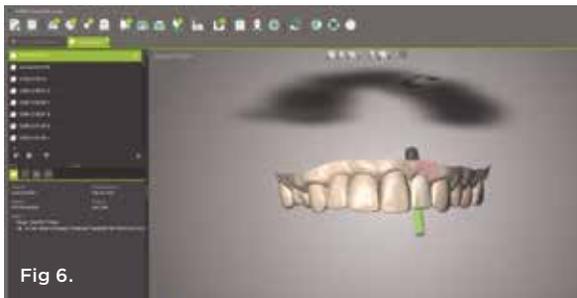


Fig 6.



Fig 7.

Fig 5 through Fig 7. In-house laboratory design of PMMA provisional crown.

requirement to allow for the attachment of an immediate provisional.⁷ Although the restoration would be left out of function, it was still necessary to achieve this stability to prevent micromovement during healing that could lead to implant failure.

Following placement, the gap between the facial aspect of the implant and the buccal plate was filled using mineralized bone allograft hydrated with platelet-rich fibrin. A scanbody was inserted onto the implant, and an intraoral scan was performed to capture the implant position. This allowed for a fully accurate scan relative to the implant position. Following completion of the scan, the file was sent to the clinician's in-house laboratory (Collaborative Dental Laboratory Services, collaborativedentallab.com). Pamela Vincent, CDT, designed and fabricated a polymethyl methacrylate (PMMA) provisional crown to be cemented to a Variobase[®] abutment (Straumann) (Figure 5 through Figure 7). Once completed, the PMMA/Variobase abutment complex was tried in, adjusted, and attached to the implant (Figure 8 and Figure 9). The restoration design is critical to maintaining the desired tissue contours.⁸ The restoration

was torqued to 30 Ncm, and the screw access was filled with Teflon tape and a light-cured universal material.

The patient returned for follow-up 1 week later for assessment of healing and to verify that the restoration was out of occlusion (Figure 10). Then, after 3 months of healing, the patient returned to have the provisional crown removed and a digital impression taken for the final restoration (Figure 11 and Figure 12). Excellent maintenance and development of the soft tissues was evident at the time of the final impression, which allowed for ideal tissue form and architecture.

The development of the tissue contours at the time of surgery facilitates a much improved patient experience at the final crown delivery, as the tissues do not need to be expanded with the final restoration, unlike if a stock healing abutment had been used. The final restoration can be delivered with minimal stress and relative ease for both the clinician and patient (Figure 13 and Figure 14).

This technique offers a predictable method for achieving immediate implant placement and provisionalization to optimize treatment outcome. While initial implant stability is not always achievable, the author's experience is that acceptable primary stability can often be attained to allow for implant placement and provisionalization in the anterior region of both arches. When stability cannot be achieved, but the implant can be placed, a custom healing abutment may be utilized to attain the same results relative to soft- and hard-tissue maintenance and development of ideal tissue form (Figure 15 and Figure 16).

Conclusion

Utilization of implant systems that allow for excellent primary stability, such as Straumann BLX, provides clinicians the opportunity to expedite immediate implant solutions to improve patient satisfaction and long-term esthetic outcomes. This technology requires precision with respect to implant placement and an understanding of appropriate tissue contours to properly develop the peri-implant soft tissues. Appropriate case planning as well as excellent team members, including the dental technician, enable cases such as the one presented here to be completed in a predictable and streamlined fashion.

While this approach works well in a setting with an in-house laboratory, it also can be easily accomplished using a local laboratory with milling capabilities if prearranged. The utilization of a complete digital workflow is also an option where the provisional restoration is prefabricated prior to surgery through the Straumann digital workflow by incorporating DWOS Synergy[™] with CoDiagnostiX[®] planning software (Dental Wings, dentalwings.com), but the author prefers the flexibility of using a combined analog/digital approach.

DISCLOSURE

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Fig 8. Screw-retained laboratory-milled PMMA crown on abutment, delivered on the same day of the extraction and immediate implant placement. Note flapless approach. **Fig 9.** Implant No. 10 with abutment and PMMA screw-retained crown. **Fig 10.** Provisional No. 10 at 1-week postoperative visit. Note excellent soft-tissue healing and papilla maintenance. **Fig 11.** Soft-tissue healing at 3 months. **Fig 12.** Final digital impression at 3 months utilizing scanbody. **Fig 13.** Final restoration No. 10 at 4 months post-placement. **Fig 14.** Final screw-retained crown No. 10 at 4 months post-placement. **Fig 15 and Fig 16.** As an example separate from the case presented, these two images show a custom healing abutment at the time of extraction and immediate implant placement.