Immediate implantation and provisionalization: Single-tooth restoration in the esthetic zone

By Susan McMahon, DMD and Karinna Petruska

Anterior tooth loss and restoration in the esthetic zone is a common challenge in dentistry today. The prominent visibility of the area can be especially distressing to the patient and requires a timely and esthetically pleasing solution.

Immediate single-tooth implantation followed by immediate provisionalization is becoming an increasingly desirable treatment option. It offers numerous benefits over conventional delayed loading.

In the past, the non-restorable tooth was extracted and properly grafted for site preservation. In the current literature, immediate implantation and provisionalization are becoming increasingly desirable treatment options for a number of years. Approximately 15-20 years later, the tooth in each case failed due to internal resorption. The failing teeth were extracted and implants were inserted immediately and restored the same day with a non-functional provisional.

Dental root resorption involves the loss of hard tissues that compromise the tooth (dentin, cementum and enamel). In most cases, tooth resorption may occur as a result of injury, inflammation or chronic infection of the pulpar periapical area. Internal root resorption is typically asymptomatic and is discovered most frequently through radiographic examination. If internal root resorption is left to progress untreated, it may result in condition with the loss of the inner (periodontal) ligament through a crown or root perforation.

Case study 1: failing maxillary right central incisor

The patient is a 50-year-old healthy male who was examined in our office for a failing maxillary right central incisor. His history includes a soccer accident in 1995 that resulted in an elbow to the face with trauma to the right maxillary central incisor. Approximately one week subsequent to the accident, the patient’s tooth was treated endodontically. It eventually became discolored and grew increasingly out of alignment (Fig. 1). Radiographic examination revealed internal resorption. Clinically, all other maxillary and anterior teeth were in good condition. Periodontal examination revealed healthy gingival tissue. The patient was concerned that his anterior tooth would fracture unexpectedly and desired an immediate replacement.

Treatment options

Several treatment options were considered. The first was extraction of the maxillary right central incisor and fabrication and placement of a conventional fixed bridge of porcelain fused to metal or an all-ceramic system. The second option was extraction of the tooth followed by placement of a removable partial denture. The next option was extraction, provisionalization with a removable partial denture (flipper) followed by implant placement, healing while wearing the flipper, and finally, restoration of the implant. The best alternative was extraction and immediate replacement of the extracted tooth with an implant, followed by immediate loading with a nonfunctioning provisional. After adequate osseointegration, a final restoration would be fabricated. Advantages and disadvantages of all options were explained to the patient. He decided to continue treatment with an immediate implant restoration. The patient was then referred to a periodontist for further evaluation and implant consultation.

Implant evaluation

Implant examination revealed adequate bone height and width for implant placement immediately following extraction of the failing tooth. A surgical date was scheduled with the periodontist for extraction of the tooth and placement of the implant. An appointment was coordinated with our office for the patient directly after the surgical procedure for provisionalization of the implant.

Surgical protocol

The right central incisor was removed and a NobelReplace Tapered Groovy (internal connection) 5.0 mm x 15 mm implant was placed. An osseus graft of demineralized freeze-dried bone and a collagen membrane were utilized to augment the surgical site. The fixture received an emergence profile, healing abutment.

Provisionalization

The patient presented to our office after the implant placement with a healing abutment in place. The healing abutment was removed. A Nobel Procera immediate temporary abutment was placed and a provisional was fabricated. Care was taken to ensure the emergence of the provisional as to best support the gingival architecture. The plastic coping for the immediate temporary abutment was roughened with a 56 carbide bur to enhance adherence of the integrity provisional material used.

The provisional was polished and placed on the immediate temporary abutment with a small amount of flowable composite to enhance retention. The provisional crown was fabricated to be completely out of occlusion and non-functional to ensure the implant adequate osseointegration time undisturbed by occlusal forces. The provisional restoration was observed periodically during the six-month healing process to monitor gingival adaptation (Fig. 2).

Final restoration

Six months post surgery, the patient was scheduled for placement of the final restoration. After removing the provisional crown and the immediate temporary abutment, an implant impression post was replaced, radiographic verification was made to assure complete seating and a final impression was taken with a polyether system. Complex shade mapping was carefully performed to match the existing contraluminal natural
teeth. The provisional was then reinserted. A Procera zirconia custom implant abutment was chosen. Zirconium implant abutments have not only been noted for their tooth-like color and esthetic appeal but also for their ability to withstand high load strength and intraocular design enhancement. The extraordinary load strength of the zirconium is not compromised by high bending and tensile strength, and fracture and chemical resistance. Zirconium abutments are mechanically equivalent to their metal counterparts but boast greater biological compatibility.

Results of a recent study provided evidence that the ceramic oxide abutments can be safely utilized in the incisor region of both the maxilla and mandible as determined by maximal bite forces in the esthetic zone. Due to excellent restorative properties in terms of strength and color conformity, the zirconium implant-abutment is becoming increasingly favored by clinicians for esthetically pleasing anterior implant restorations.

A Procera zirconia crown was fabricated for this patient with Noritake CZR porcelain (Fig. 3).

At the time of the insert, the provisional crown and immediate temporary abutment were removed. The Procera zirconia custom one-piece abutment was seated, the screw was hand tightened and the screw was torqued to 55 Ncm with the manufacturer’s wrench. The abutment was placed with a small cotton pellet and topped with a thin layer of flowable composite. The Procera zirconia crown was then seated; margins, contacts and occlusion were confirmed; and the crown was cemented in place with 3M ESPE Re bond cement (Fig. 4).

Case study 2: Fractured maxillary right central incisor
This patient, a healthy male in his late 30s, was examined in my office for fracture of his maxillary right central incisor. The patient had Feldspathic porcelain restorations on his upper central and upper lateral incisors that were placed several years ago. He had a history of trauma to the anterior teeth from a sports injury and subsequent endodontic treatment. Recent periapical radiographs showed internal resorption in the upper incisors (Fig. 5). The patient sustained additional trauma to the maxillary right central incisor through a fall, which resulted in complete fracture of the crown (Fig. 6). The tooth was nonrestorable and nonrestorable.

After reviewing the different treatment options, the patient decided on a new maxillary right central incisor restoration. Although the maxillary left central incisor also exhibited signs of internal resorption, it was decided that treatment of that tooth would be performed at a later date. Consideration was given to the poor gingival architecture that results from placing adjacent implants in the esthetic zone. He was then evaluated by the periodontist for the surgical placement of the immediate implant for the maxillary right central incisor. The patient’s treatment was similar to that of the patient in

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About the Authors

Susan McMahon, DMD, is in private practice in Pittsburgh. She is accredited by the American Academy of Cosmetic Dentistry and is a six-time award winner in the AADC annual awards competition. She has served as a clinical professor in prosthodontics and operative dentistry at the University of Pittsburgh, School of Dental Medicine. Dr. McMahon has a basic and advanced cosmetic dentistry program at West Virginia School of Dental Dentistry and lectures internationally in Europe. You may contact Dr. McMahon at smcmanon@wowinsmile.com.

Karthi Petruska is a graduate of the University of Wisconsin-Madison. She is in the dental implant program, post-baccalaureate prosthodontic program and master of health management systems at Duquesne University.