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

By Susan McMahon, DMD and Karrah Petruska

A nterior tooth loss and restora-

tion in the esthetic zone is a common challenge in dentistry today. The prominent visibility of the area can be espe-
cially distressing to the patient and requires a timely and estheti-
cally pleasing solution.

Immediate single-tooth implantation followed by immediate provisionalization is becoming an increasingly desirable treat-
ment option. This article discusses the indications, techniques, and disadvantages of this treatment approach.

Indications

1. Immediate implantation and provisionalization is used in a protected occlusal scheme.

2. The placement of the non-occlusal restoration must occur within an adequate healing period, an im-
plant was placed and buried un-
der the gingiva, and the patient con-
tinued to wear the flipper until the implant had osseointegrated and was ready to be uncovered and restored. The patient would therefore wear the removable partial denture for upwards of six to eight months.

3. This course of treatment often results in a more natural gingival architecture surrounding the final restoration. There are also clear indications that partial removable dentures are an im-
portant causative factor in the al-
veolar bone resorption process.

4. Today, immediate treatment of-
fers a better solution. Immediate

5. Implantation and same-day provisional replacement of single anterior teeth minimizes treatment time and cost while enhanc-
ing esthetic quality.

6. In addition to alleviating patient trauma, this technique decreases resorption of hard and soft tissue and results in better function. Overall, this leads to greater patient satisfac-
tion.

7. In this process, the implant is placed and provisional is quickly loaded. A nonfunctioning, also known as non-occluding, provi-
sional is used in a protected oc-
cusal scheme.

8. The placement of the non-occlud-
ing restoration must occur within 48 hours to be considered im-
mediate loading. Both of the fol-
lowing cases received same day provisionalization.

9. The clinician faces several chal-
lenge when restoring teeth in the esthetic zone. Major cosmetic concerns in the fabrication of the immediately placed provisional are the retention of the interdental papilla and prevention of al-
veolar bone collapse. Research has suggested that immediate provisionalization following implantation allows for greater clinical control over the regeneration of tissue surrounding the site of extraction.

10. Unfavorable alterations to the al-
veolar bone structure must be avoided using ridge preserva-
tion techniques and precautions in terms of osseous exposure.

11. Immediate placement of the im-
plant into fresh extraction sockets prevents the post-extraction re-
sorption that occurs commonly with alternative forms of treatment, preserving the integrity of the al-
veolar ridge.

12. A compromised implantation site is also a concern when dealing with tooth loss. Bone resorption may leave insufficient bone for implantation. Furthermore, a de-
terminated extraction socket archi-
tecture produces an inferior esthetic.

13. Immediate implantation into the fresh extraction socket allows the clinician to maintain the gingival tissue and create a more estheti-
cally pleasing restoration.

14. Minimum criteria for implant placement have been established for successful immediate loading. Rough quantitative values for in-
sertion torque and implant stabili-
ty quotient (IQ) as well as surgi-
cal assessment play a role. Values as low as 15Ncm for insertion torque and 50 IQ both resulted in successful provisionalization.

15. Additionally, the surgeon must assess where there is adequate bone support at the apex, at least 5 mm of circumferential bone, and primary stability of the im-
plant. Research has shown that “early loading of dental implants does not appear to interfere with osseous modeling of a develop-
ing osseointegration as long as suf-
ficent micromovement does not occur”.

16. In addition to providing both esthet-
ic and functional benefits, immediate, immediate loading, and loading of a nonfunctioning pro-
visional has also been found to result in comparable implant survival outcomes to more tradi-
tional techniques.

17. A recent study measuring clinical success, survival, and satisfaction found the immediate implant “not less favorable than conventional loading”.

18. In consideration of this, current literature is now purport-
ing immediate implantation and non-occlusal loading to be the “treatment of choice” in cases of single anterior tooth restoration.

19. The following are two case stud-
ies involving immediate provision-
alization. In both cases, the maxillary right central incisors had sustained trauma, were endodontically treated and func-
tioned for a number of years. Ap-
proximately 15-20 years later, the teeth in each case failed due to internal resorption. The fail-
ting teeth were extracted and im-
plants were inserted immediately and restored the same day with a non-functional provisional.

Dental root resorption involves the loss of hard tissues that com-
municate with the tooth (dentin, cementum and enamel). In most cases, tooth resorption is the result of trauma or irritation to the periodontal lig-
ament and/or tooth pulp. These conditions may occur as a result of injury, inflammation or chronic infection of the pulp, periodontal disease, and trauma to the root or tooth eruption. Internal resorption is generally asymp-
tomatic and is discovered most frequently through radiographic examination.

If internal root resorption is left to progress untreated, it may result in damage to the periodontal ligament and bone support. Partial or complete extraction of the root will occur.

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 maxil-

lary right central incisor. His his-
tory involves a soccer accident in 1995 that resulted in an elbow to the face with trauma to the right maxillary central incisor. Approximately one week subse-
quent 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 mandibular teeth were in good condition. Periodontal examina-
tion revealed healthy gingival tis-
sue. The patient was concerned that his anterior tooth would frac-
ture unexpectedly and desired an immediate replacement.

Treatment options

Several treatment options were considered. The first was extrac-
tion of the maxillary right cen-
tral incisor and fabrication and placement of a conventional fixed bridge of porcelain fused to metal or an all-ceramic system. The sec-
ond option was extraction of the tooth followed by placement of a removable partial denture. The next option was extraction, pro-
visionalization 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 extrac-
tion and immediate replacement of the extracted tooth with an implant, followed by immediate loading with a nonfunctioning provisional. After adequate os-
seointegration, 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 res-
toration. The patient was then referred to a periodontist for fur-
ther evaluation and implant con-
sultation.

Implant examination

Implant examination revealed adequate bone height and width for implant placement immedi-
ately 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 ap-
pointment was coordinated with our office for the patient directly following the surgical procedure for provisionalization of the im-
plant.

Surgical protocol

The right central incisor was re-
moved and a NobelReplace Ta-
pered Groovy (internal connec-
tion) 5.0 mm x 15 mm implant was placed. An osseous graft of demineralized freeze-dried bone and a collagen membrane were utilized to augment the surgically

cal site. The fixture received an emergence profile, healing abut-
ment.

Provisionalization

The patient presented in our office after the implant placement with a healing abutment in place. The healing abutment was removed. A Nobel BioCare immediate tem-
porary abutment was placed and a provisional was fabricated.

Care was taken to contour the emergence of the provisional as to best support the gingival architec-
ture. The plastic coping for the immediate temporary abutment was roughened with a 56 car-
hide burn to enhance adherence of the integrity provisional material used.

The provisional was polished and placed on the immediate tem-
porary abutment with a small amount of flowable composite to enhance retention. The pro-
visional crown was fabricated to be completely out of occlusion and non-functional to ensure the implant adequate osseointegra-
tion time undisturbed by occlusal forces. The provisional restora-
tion was observed periodically during the six-month healing process to monitor gingival adap-
tation (Fig. 2).

Final restoration

Six months post surgery, the pa-
tient was scheduled for place-
ment of the final restoration. After removing the provisional crown and the immediate temporary abutment, an implant impression post was replaced, radiographic ver-
fication was made to assure com-
plete seating and a final impres-
sion was taken with a polyether system. Complex shade-mapping was carefully performed to match the existing contralateral natural
Case study 2: fractured maxil-
lar right central incisor

This patient, a healthy male in his late 30s, was examined in our office for a maxillary right central incisor. The patient had a history of trauma to the anterior teeth from a sports injury and subsequent endodontic treatment. The Procera zirconia crown was then seated; margins, contacts and occlusion were con-
formed; and the crown was cemented in place with 5m ESPE RelyX luting cement (Fig. 4).

Prosthetic Treatment

After the six-month heal-
ing period the final restoration was fabricated. In this case, a one-piece screw-through abutment made from a Nobel bioceramic Goldklopf Engag-
ing NobelReplEx (Fig. 7) was fabricated in order to obtain a correct emergence profile of the restoration due to the slightly lingual placement of the implant (Fig. 8).

The restoration was seated, and the screw was hand tightened and then torqued to 55 Ncm with the manual torque wrench. The lingual screw access was filled with a cotton pellet and composite resin to a depth of 2 mm.

Final Restoration

After the six-month healing period the final restoration was fabricated. In this case, a one-piece screw-through abutment made from a Nobel bioceramic Goldklopf Engag-
ing NobelReplEx (Fig. 7) was fabricated in order to obtain a correct emergence profile of the restoration due to the slightly lingual placement of the implant (Fig. 8).

The restoration was seated, and the screw was hand tightened and then torqued to 55 Ncm with the manual torque wrench. The lingual screw access was filled with a cotton pellet and composite resin to a depth of 2 mm.

Final restoration

After the six-month healing period the final restoration was fabricated. In this case, a one-piece screw-through abutment made from a Nobel bioceramic Goldklopf Engag-
ing NobelReplEx (Fig. 7) was fabricated in order to obtain a correct emergence profile of the restoration due to the slightly lingual placement of the implant (Fig. 8).

The restoration was seated, and the screw was hand tightened and then torqued to 55 Ncm with the manual torque wrench. The lingual screw access was filled with a cotton pellet and composite resin to a depth of 2 mm.

Final restoration

After the six-month healing period the final restoration was fabricated. In this case, a one-piece screw-through abutment made from a Nobel bioceramic Goldklopf Engag-
ing NobelReplEx (Fig. 7) was fabricated in order to obtain a correct emergence profile of the restoration due to the slightly lingual placement of the implant (Fig. 8).

The restoration was seated, and the screw was hand tightened and then torqued to 55 Ncm with the manual torque wrench. The lingual screw access was filled with a cotton pellet and composite resin to a depth of 2 mm.

Final restoration

After the six-month healing period the final restoration was fabricated. In this case, a one-piece screw-through abutment made from a Nobel bioceramic Goldklopf Engag-
ing NobelReplEx (Fig. 7) was fabricated in order to obtain a correct emergence profile of the restoration due to the slightly lingual placement of the implant (Fig. 8).

The restoration was seated, and the screw was hand tightened and then torqued to 55 Ncm with the manual torque wrench. The lingual screw access was filled with a cotton pellet and composite resin to a depth of 2 mm.