Natural Tooth as the Permanent Reconstruction After Immediate Implantation in the Esthetic Zone of Periodontally Compromised Patients

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This case series describes a treatment method in which the natural tooth was used as the temporary and permanent reconstruction after immediate implantation in the esthetic zone of periodontally compromised patients. Five patients with a hopeless tooth in the esthetic zone due to periodontal causes were included. The tooth was extracted, and immediate implantation protocol was followed. The extracted tooth was adapted over a temporary abutment during the osseointegration period, and the same tooth served as the final prosthetic reconstruction with a customized zirconia abutment. Esthetic outcome was satisfactory to the patients, and no biologic or prosthetic complications were observed up to 3 years. The technique could be recommended, especially in the esthetic area of periodontally compromised patients who have intact clinical crowns. Int J Periodontics Restorative Dent 2018;38:887–893. doi: 10.11607/prd.2977

Immediate implantation with immediate loading is a widely accepted treatment option after the extraction of periodontally hopeless teeth in the maxillary anterior area. However, such an approach might be challenging for esthetic reasons. The major goal of immediate implantation in the esthetic zone is to provide a natural appearance and preserve the periodontal architecture. To obtain a successful and predictable esthetic outcome, individual factors (eg, periodontal biotype, tooth shape, the remaining hard and soft tissue after the extraction), surgical technique (eg, atraumatic extraction, incision, implant positioning), and prosthetic approach (eg, morphology of the reconstruction, temporization, materials of choice) need to be evaluated before the intervention.

Preservation of the peri-implant soft tissues, especially the papillae between the adjacent teeth, is crucial for obtaining good esthetic results in periodontally healthy individuals. However, soft tissue parameters might be of secondary importance in periodontally compromised patients due to soft tissue loss around many teeth. Since clinical crowns are much more visible than the soft tissues in such cases, fabricating a prosthetic reconstruction mimicking the neighboring teeth might be more important to

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providing a natural look than the appearance of soft tissues. Both the temporary and the permanent prostheses are expected to have an emergence profile, shape, and color similar to that of neighboring teeth.

To preserve the gingival architecture, form an optimal emergence profile, and provide a temporary reconstruction in the esthetic zone, customized abutments and healing caps are often preferred. To provide an esthetic appearance, temporary crowns are fabricated using distinct prosthetic materials. Since an extracted tooth with an intact crown is generally similar in shape and color to the contralateral tooth, this tooth was used previously as a temporary prosthesis after immediate implantation. The natural tooth was also used as the permanent reconstruction in a case report by Castelnuovo and Sönmez, who adapted the tooth on the abutment using acrylic resin material. However, this chairside technique might have some disadvantages, such as prolonged surgical time and difficulty in positioning the tooth and polishing the resin material. Indirect treatment methods eliminating these disadvantages have not yet been reported. Information is also lacking on how to proceed in periodontally compromised patients. Therefore, the aim of this case series was to demonstrate a treatment strategy in which the natural tooth of the patient was used as the temporary and permanent prosthetic reconstruction after immediate implantation in the esthetic zone of periodontally compromised patients.

**Materials and Methods**

The patients in the current study were referred to the Ege University Department of Periodontology between March 2012 and October 2014 complaining of periodontal problems in the esthetic zone. Five systemically healthy nonsmoking men (age range: 51 to 65 years) having a hopeless tooth because of periodontal problems in the maxillary anterior area were included in the study. The hopeless teeth were intact and had no tissue loss in the vestibular aspect of the clinical crowns (Fig 1).

The treatment plan was to extract the hopeless tooth, place an immediate implant simultaneously with soft/hard tissue augmentation if needed, and use the extracted tooth as both the provisional and permanent reconstruction. The advantages and disadvantages of the treatment protocol and other treatment options were explained in detail, and an informed consent statement was received from each patient before the intervention.

**Preoperative Procedures**

All the patients were carefully examined to assess their dental and periodontal status. The patients received oral hygiene instructions and, when it was necessary, nonsurgical periodontal treatment was performed. At least 4 weeks after the completion of all dental and/or periodontal treatments, the patients were reevaluated and surgical procedures were followed only when an adequate and complete oral hygiene was maintained. The total plaque and bleeding scores were less than 15% before surgical intervention.

**Surgical Procedures**

The surgical site was anesthetized with 2% lidocaine with 1:100,000 epinephrine, and the hopeless tooth was atraumatically extracted using periotomes. The granulation tissue in the extraction site was carefully removed, and the presence of dehiscence and fenestrations in the remaining hard tissues were evaluated. The extraction socket was thoroughly rinsed with saline solution, and immediate implantation protocol was followed. Briefly, the implant osteotomy was prepared slightly palatal to the extraction socket in line with the manufacturer’s instructions. An appropriately sized bone-level implant (Institut Straumann) was placed 3 to 4 mm below the gingival margin. A full-thickness flap was elevated on the buccal aspect to visualize the vestibular bony wall. The papillae were kept intact on
both sides, and the gap between the implant and vestibular bony wall was filled with bone substitute (Bio-Oss, Geistlich). When dehiscences/fenestrations existed or the bony wall thickness was < 1 mm, a resorbable collagen membrane (BioGide R, Geistlich) was used to cover the defect and the buccal bone. After the stability of the implant was confirmed (−8 to +9) by periotest measures (Periotest M, Medizintechnik Gulden) a temporary abutment was adjusted to fit the anatomy of the supra-alveolar soft tissue walls. The soft tissue margins were marked over the temporary abutment, the shoulders were prepared at the level of the gingival margin, and the width of the abutment over the shoulders was formed as narrow as possible (Fig 2). The clinical crown length was measured, and the root of the extracted tooth was resected slightly apical to that level. A hole was then prepared through the long axis of the tooth using a round diamond bur and enlarged using a parallel-sided bur (Fig 3). The tooth was adapted over the temporary abutment using light-body silicon impression material as the marker (Figs 4 and 5). The grinding was generally made on the abutment surface instead of the tooth, and during that procedure maximum care was taken to preserve as much hard tissue as possible on the tooth. The minimum hard tissue thickness was at the level of abutment shoulders and was > 1 mm for all cases at all sites. After the adaptation, the temporary abutment was tightened (15 Ncm²) and the tooth was cemented using a temporary resin material out of occlusal function (Fig 6). When the gingival biotype was thin, vestibular soft tissue was augmented either during implantation or before permanent prosthetic reconstruction.

Antibiotic prophylaxis was used in all cases 1 hour before the surgery (2 g amoxicillin and clavulanic acid) and prescribed for use for 6 days (1 g amoxicillin and clavulanic acid, bid) postoperatively. Patients were instructed to clean the surgical area with a postoperative dental brush (GUM Delicate Post-Surgical Toothbrush, Sunstar Americas) and to avoid flossing at that area. Any sutures (Prolyne 4-5.0, Medipac) were removed after the first week, and the patients were evaluated weekly until the end of the first month and every second month thereafter. After a healing period of 4 to 6 months (Fig 7), the prosthetic stage was initiated.
Initial Prosthetic Procedures

Impressions were taken from both jaws using silicone impression material (Optosil/Xantopren, Heraeus Kulzer), and the tooth was gently removed from the abutment using a gauze and forceps and applying slight vertical force. A chemically cured resin material (Temdent Classic, Schütz Dental) was placed in the impression of the natural tooth, and afterward it was seated back in the mouth. After the setting, the replica of the tooth was gently removed from the impression (Figs 8 and 9), placed on the temporary abutment, and splinted to the incisal edges of the neighboring teeth using light-cured composite resin (Fig 10). The replica together with the composite resin material was removed, the polyether ether ketone (PEEK) abutment was replaced with an impression post, and the impression of the implant was taken. The temporary abutment and the natural tooth were replaced, and the initial prosthetic stage was finalized.

Laboratory Procedures

The model was cast in the laboratory, and an abutment (1 mm gingival height) was placed on the implant analog (Fig 11a). The replica was placed on the cast using the composite material as the index to secure its correct position (Fig 11b). A zirconia core fitting the abutment and the replica tooth was fabricated using computer-aided design/computer-assisted manufacture technology (Fig 12). The zirconia core was cemented over the abutment using dual-cured composite resin material. To provide the proper positioning of the zirconia, the replica was correctly placed over the dental cast and the curing was finalized thereafter.

Final Prosthetic Stage

In the final prosthetic stage, the natural tooth and the PEEK abutment was removed and the position of the natural tooth was checked on the cast (Fig 13). The definitive abutment carrying the zirconia core was inserted (30 Ncm²), and the natural tooth was cemented over the zirconia using dual-cured composite resin (Panavia F 2.0, Kuraray) as described by the manufacturer. The occlusion was checked, and periapical radiographs were taken before finalizing the prosthetic stage. If the tooth was out of occlusal function, composite resin material was used to restore the occlusion. If soft tissue deficiency was evident, peri-implant soft tissue was augmented using a connective tissue graft (Fig 14). The patients were seen at 1 and 3 months and every...
6 months thereafter up to 3 years. Peri-implant radiologic changes were evaluated by taking periapical radiographs on an annual basis (Fig 15).

Results

Three patients received bone graft and connective tissue graft, and one patient had bone graft, resorbable collagen membrane, and connective tissue graft at immediate implantation. One other patient received bone graft during implant placement and a connective tissue graft during the final prosthetic stage. Early soft tissue healing was uneventful, and osseointegration was achieved for all patients. Periotest values were in the negative range for all the implants.

The follow-up period was between 1 and 3 years. One tooth was decemented in the first year and recemented using the same material. No other prosthetic or biologic complications were observed. The peri-implant soft tissue was healthy, without any sign of peri-implant inflammation. Radiographic evaluation revealed that peri-implant hard tissues were healthy and no pathologic bone loss was detectable.

The color of the natural tooth remained unchanged, and the final esthetic and functional outcome was satisfactory (Figs 16 and 17).

All the patients reported satisfaction with preserving their natural tooth in function through the treatment.
Discussion

The present case series describe a technique for using the extracted natural tooth as provisional and permanent prosthesis after immediate implantation in the esthetic zone. Rehabilitation of the maxillary anterior area has high esthetic and phonetic requirements. It is necessary to obtain a three-dimensional structure that mimics the natural appearance of the site. Since the extracted natural tooth may perfectly meet these requirements, the technique described in the current case series might be of primary importance in maxillary anterior area.

The most common tooth replacement options for a single tooth gap include a fixed partial denture and an implant-borne restoration. Implants are used to replace a missing tooth in the esthetic zone in regards to preserving un-restored adjacent teeth, preventing resorption of alveolar bone, and providing support. However, prolonged chair time, complicated procedures, compromised appearance of the site during wound healing, and the need for provisional and permanent prosthetic reconstructions are disadvantages. The use of the natural tooth together with immediate implantation may eliminate these disadvantages by reducing the total treatment time, immediately providing a natural appearance, and eliminating the need for a temporary and permanent crown fabrication.

It is well known that a certain amount of soft and hard tissue loss occurs in patients with periodontitis. The roots of the teeth may be exposed to the oral environment, and discoloration in tooth structures and the presence of diastemas between teeth are generally observed. When the tooth is extracted because of periodontal disease, fabrication of a fixed prosthetic reconstruction mimicking the neighboring teeth in shape and color is difficult. Moreover, the diastemas may further complicate the treatment protocol. The natural tooth, however, is similar to the contralateral tooth and can be placed in a desired position to decrease the diastema depending on the patients’ needs and preferences. Hence, rehabilitation with the natural tooth after immediate implantation seems to be practical.

The natural tooth previously was used as the permanent reconstruction by Castelnuovo and Sönnmez. The tooth was adapted over an abutment using acrylic resin. Even though successful clinical outcomes were reported, the material might be irritant to soft tissues if placed subgingivally, chairside polishing of the material can be insufficient, and appropriate tooth positioning in the dental arch may be difficult. The currently described technique might eliminate these disadvantages; however, the need for a laboratory phase increases the total treatment time.

The teeth used in the present study were intact, with no restoration on the vestibular aspect. During the tooth preparation steps, the maximum possible amount of tissue was preserved and adhesive cementation protocols were followed. It could be important to use adhesive cements to secure the integrity between abutment and natural tooth interface. Adhesive cements might decrease the risk of tooth fracture and discoloration in such cases. Even though the follow-up period was complication free, the highest risk seems to be the fracture of the natural tooth. If the tooth is lost during follow-up for any reason, the remaining custom abutment could still be easily used with a new prosthetic reconstruction.

From a psychologic point of view, patients with periodontitis are generally anxious about the possibility of tooth loss. However, no recent evidence proves that treatment strategies to preserve the tooth positively affect their psychologic compliance. Although a questionnaire was not used in the current series, all the patients reported being grateful to have the original tooth in function and to avoid compromised esthetics.

Conclusions

Within the limits of the present case series, it is concluded that single tooth gaps in periodontally compromised patients could be reconstructed using an implant-supported natural tooth with clinically successful results in a reproducible fashion. A larger patient sample and longer follow-up period is needed to evaluate the predictability and technical benefits and to establish a protocol for the restoration of implants with natural teeth, especially for this patient population.
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References


