CASE REPORT OLGU SUNUMU

DOI: 10.5336/dentalsci.2024-105020

Rehabilitation of a Patient with Post-Traumatic Incisal Teeth Fractures with Immediate Implant and Fiber-Post

Travma Sonrası Kesici Diş Kırıkları Olan Bir Hastanın Acil İmplant ve Fiber-Post ile Rehabilitasyonu

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ABSTRACT Fractures of anterior teeth after trauma are frequently encountered in the clinic. In these cases, it can be difficult to achieve ideal function and aesthetics. If a traumatized tooth can be restored, keeping it in the mouth is often the best option, especially for young patients. In teeth that are too damaged to be kept in the mouth, immediate implantation is of great importance in preserving soft and hard tissues. This case report describes the dental rehabilitation of a patient who suffered intraoral trauma resulting in fracture of his lateral and canine incisors with emergency implant placement and splinting of his own crown with a fiber post.

Keywords: Tooth fractures; immediate dental implant loading; post and core technique

ÖZET Travma sonrası ön dişlerin kırılması klinikte sıklıkla karşılaşılan bir durumdur. Bu vakalarda ideal fonksiyon ve estetiği elde etmek zor olabilir. Travma geçirmiş bir diş restore edilebiliyorsa, özellikle genç hastalar için dişi ağızda tutmak genellikle en iyi seçenektir. Ağızda tutulamayacak kadar hasar görmüş dişlerde ise acil implant uygulanması yumuşak ve sert dokuların korunmasında büyük önem taşır. Bu vaka raporunda, ağız içi travma sonucu lateral ve kanin kesici dişleri kırılan bir hastanın acil implant yerleştirilmesi ve kendi kronunun fiber post ile splintlenmesi ile yapılan dental rehabilitasyonu anlatılmaktadır.

Anahtar Kelimeler: Diş kırıkları; acil dental implant yerleştirme; kök çivisi tekniği

Trauma to the dentoalveolar region is common and can result in fracture and displacement of teeth and/or bone fragments.[1] Disruption of tooth structure can result in long-term consequences, complicating the achievement of optimal function and aesthetics, especially in the maxillary aesthetic zone.[2,3] Options for therapy include straightforward monitoring and follow-ups, conservative care, and even intricate surgical treatments.[4]

Dental implants are a viable option for severely damaged, irreparable teeth.[4,5] Immediate single-tooth implants, which restore function and mimic the lost tooth structure without affecting adjacent teeth, represent a effective treatment option.[6] In contrast to delayed implants, immediate implant placement and loading provide better aesthetics and essential support for hard and soft tissues at the extraction site.[7]

TO CITE THIS ARTICLE:
Erdoğan MA, Saraç Atagün Ö, Hür Şahin Ö, Kalyoncuoğlu ÜT. Rehabilitation of a patient with post-traumatic incisal teeth fractures with immediate implant and fiber-post. Turkiye Klinikleri J Dental Sci. 2025;31(1):160-4.

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Peer review under responsibility of Turkiye Klinikleri Journal of Dental Sciences.

Received: 12 Aug 2024 ***Received in revised form:*** 07 Oct 2024 ***Accepted:*** 25 Oct 2024 ***Available online:*** 26 Dec 2024

The use of natural tooth crown as a pontic in the fabrication of prosthesis after cervical root fracture is a known method in the literature.[8,9] However, to our knowledge, there are few studies in the literature focusing on preserving tooth, alveolar and gingival contours by cementing the natural crown onto the post after trauma.[10] This case report describes the treatment of a patient with lateral and canine incisor fractures resulting from trauma, with immediate implant placement and natural crown splinting using a fiber post.

CASE REPORT

A 28-year-old male was admitted to Gülhane Faculty of Dentistry for treatment of teeth 22 and 23, fractured during a skiing accident a week prior. Clinical examination showed tooth 22 was highly mobile, while tooth 23 had a crown-root fracture. Vitality tests were negative, and radiographs indicated a mid-apical fracture of tooth 22, with the root of tooth 23 intact (Figure 1).

No oral pathology was observed in other parts of the mouth and the patient was found to have good periodontal health.

The treatment plan was to extract tooth 22 and replace it with an immediate implant and to perform root canal treatment on tooth 23 and cement its crown. The patient is informed about the benefits and harms of various treatment options for temporary and permanent prostheses and about implant options.

After local anesthesia, pulp tissue was removed under rubber dam isolation in the first session and calcium hydroxide ($CaOH_2$) was applied. A semi-rigid splint was made with 0.5 mm ligature wire and the patient was scheduled 10 days later. The split dam technique was used for isolation, and the tooth was prepared using a Reciproc 40 (VDW, Munich, Germany) rotary file. Irrigation was performed with 10 mL of 3% sodium hypochlorite (NaOCl) (Cermaked, Stalowa Wola, Poland). The final irrigation protocol was carried out in 3 cycles. In the first activation cycle, 1 mL of 3% NaOCl was applied to the root canal using a 30G needle. Then, the Satelec P5 Newtron XS ultrasonic device (Acteon, Merignac, France) was set to power level 5, and the Irrisafe (Acteon, Merignac, France) ultrasonic endodontic tip was placed in the root canal 1 mm short of the working length according to the manufacturer's instructions to activate the NaOCl solution. After 30 seconds of activation, 5 mL of NaOCl was applied to the root canal, completing the first activation cycle. The second activation cycle was performed using EDTA (Microvem, Ankara, Türkiye). The third activation cycle was carried out in the same manner as the first activation cycle. Final irrigation was performed with 5 mL distilled water. The root canal was filled with R40 gutta-percha (Diadent, Seoul, Korea) and resin-based sealer (Figure 2).

Under local anesthesia, flapless atraumatic extraction of tooth number 22 was performed. The implant site was prepared according to the manufacturer's surgical protocol and the implant was placed 2-3 mm subcrestal along the palatal wall of the removed socket in the optimal prosthetic position and primary stability was achieved [Straumann® BLX (Institut Straumann AG, Basel, Switzerland)]. The space between the implant and the extraction socket was filled with allograft and bovine-derived bone substitute (BioOss spongiosa granules, sized 0.25-1 mm; Geistlich, Wolhusen, Switzerland) bone graft materials. Finally, the implant was rehabilitated with a polymethylmethacrylate (PMMA) temporary abutment (Straumann®, Institut Straumann AG, Basel, Switzerland). Cone beam computed tomography (CBCT) images were obtained baseline and a peri-

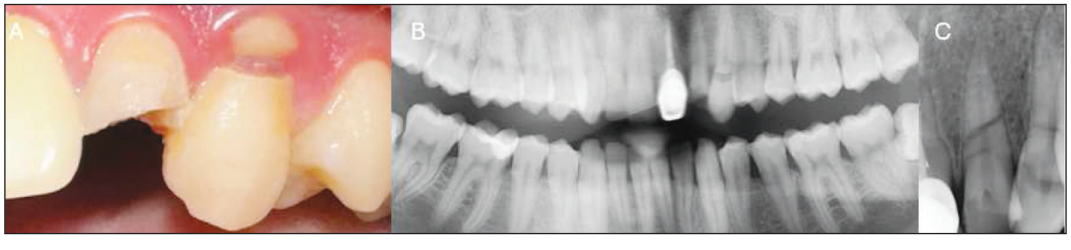

FIGURE 1: A) Intraoral view before treatment; **B)** Panoramic radiograph before treatment; **C)** Periapical radiograph before treatment.

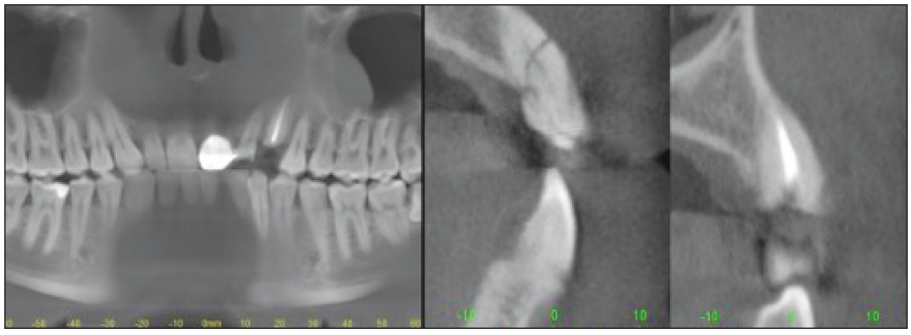

FIGURE 2: Preoperative cone beam computed tomography images after completion of endodontic treatment.

apical radiograph was taken after implant surgery (Figure 3A). The implant was evaluated three months after immediate loading using radiographic and intraoral examinations (Figure 3B).

After immediate implant placement, the PMMA temporary abutment with a titanium alloy inlay (Straumann®, Institut Straumann AG, Basel, Switzerland) was prepared intraorally for successful gingival contouring. Crown cementation for tooth 23 was carried. The canal space within the crown was expanded, and a fiber post was bonded to the crown using resin cement (G-CEM ONE, GC Dental; Tokyo, Japan). The crown was then reattached to the root with the fiber post (RelyX, 3M Oral Care), also utilizing resin cement. Tooth 23 was subsequently stabilized with a rigid splint to tooth 24 (Figure 4).

The digital impression was recorded with an intraoral scanner (Trios 5, 3Shape; Copenhagen, Denmark). The temporary crown of the implant was designed (3Shape; Copenhagen, Denmark) non-occlusal, and printed by a 3D printer (MAX UV DLP; Asiga, Sydney, Australia), using a commercial 3D printing resin material (Saremco Print, Crowntec, A2

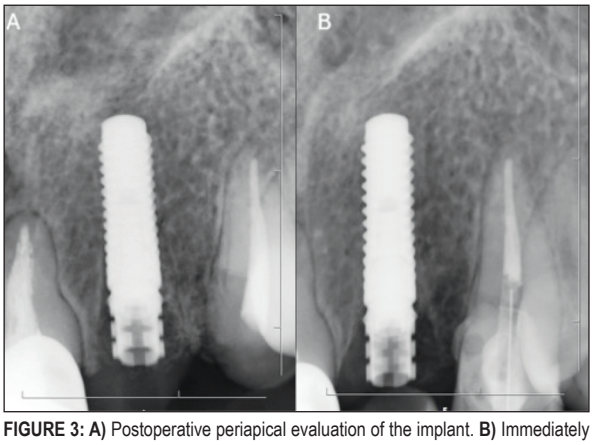

FIGURE 3: A) Postoperative periapical evaluation of the implant. **B)** Immediately implanted implant after 3 months and control periapical radiograph of tooth number 23 with fiber post.

shade; Switzerland). The printed restoration was controlled intraorally and luted with the temporary cement (Temp Bond, Kerr Corporation, Romulus, MI).

Since the implant was placed immediately, it was slightly over embedded to ensure primary stabilization. Therefore, the length of the ti-base was insufficient for a permanent restoration. Thus, it was decided to fabricate a custom abutment. Upon re-

FIGURE 4: A) Placement of the temporary abutment **B)** Preparation of the temporary abutment and adaptation of the crown of tooth number 23 **C)** Cementation of the temporary crown number 22 and splinting of tooth number 23.

FIGURE 5: A) Control of the exit profile **B)** Placement of the permanent abutment **C)** Cementation of the permanent crown.

moval of the temporary abutment and crown, the desired gingival aesthetics were achieved. Following conventional impression taking, a titanium custom abutment was fabricated, and the final monolithic zirconia restoration was completed (Figure 5).

Before the study, the patient was informed that the patient's data would be used for scientific purposes. Written informed consent was obtained from the patient.

DISCUSSION

Dental trauma leading to tooth loss or irreversible damage presents challenges, requiring individualized treatment planning planning that assessing the benefits and drawbacks of each procedure.

For Type I extraction sockets, immediate implantation of dental implants has been shown to be a safe and effective therapeutic option.[11] Due to benefits such as fewer surgeries, reduced patient stress, shorter treatment times, and improved soft tissue management, it has become a preferred strategy among clinicians.[12] In fact, a great deal of research has been done on the long-term stability of this treatment option, with survival rates ranging from 90% to 99%.[13] In our case, the rehabilitation of the patient with anterior tooth loss due to trauma using immediate implant placement and temporary restoration resulted in superior aesthetic and functional outcomes.

The best approach to preserving natural dentition is to maintain existing teeth and avoid trauma, as it offers a longer lifespan than dental implants.[14] When deciding on traumatic tooth extraction, preserving a restorable natural tooth is usually preferred over an implant, especially in younger patients.[3,15] In our case, successful root canal treatment and fiber-post application for tooth 23, fractured at the enamel-cementum level due to trauma, achieved desired aesthetic and patient satisfaction outcomes.

Immediate implant placement and restoration in single-tooth replacement cases yield reliable clinical outcomes, particularly in the anterior esthetic zone. However, it should not be forgotten that the restoration of the patient's own tooth without extraction remains crucial for cost-effectiveness, patient psychology, and ideal aesthetics.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Melek Almıla Erdoğan, Özlem Saraç Atagün;* ***Design:*** *Melek Almıla Erdoğan, Özlem Saraç Atagün;* ***Control/Supervision:*** *Ülkü Tuğba Kalyoncuoğlu;* ***Data Collection and/or Processing:*** *Melek Almıla Erdoğan, Özlem Saraç Atagün, Özge Hür Şahin;* ***Analysis and/or Interpretation:*** *Melek Almıla Erdoğan, Özlem Saraç Atagün;* ***Literature Review:*** *Melek Almıla Erdoğan, Özlem Saraç Atagün;* ***Writing the Article:*** *Melek Almıla Erdoğan, Özlem Saraç Atagün, Özge Hür Şahin;* ***Critical Review:*** *Ülkü Tuğba Kalyoncuoğlu;* ***References and Fundings:*** *elek Almıla Erdoğan, Özlem Saraç Atagün;* ***Materials:*** *Melek Almıla Erdoğan, Özlem Saraç Atagün, Özge Hür Şahin.*

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