Traumatic tooth injuries are common in children. Researchers in several countries have reported the prevalence of these injuries ranging from 6% to 37%.\(^1\text{-}^3\) More than 30% of accidents occur at home and about 25% in school.\(^4\) They may be a result of sports injuries, automobile accidents, etc., although falls are the most frequent cause.\(^5\text{-}^6\) When the permanent teeth are involved, it can be a challenge for the child, the parents and the dentist to save these teeth. Maxillary incisors are most commonly involved in dental trauma and dental crowns are frequently damaged because of their exposed position in the dental arch.\(^7\text{-}^8\) Traumatic injuries are next most frequent in the upper and lower lateral incisors and the upper canines.\(^9\)

Traumatized anterior teeth require quick functional and esthetic repair, and composite materials are commonly used for esthetic restorations.\(^10\) Because of the poor mechanical resistance of these materials, attempts to strengthen them have included reinforcing their resinous matrix with fibres or glass-fibre posts.\(^11\) Interlaced glass filaments improve the impact strength of composite materials.\(^10\text{-}12\) They have appreciable esthetic properties, but do not easily stick to a resinous matrix.\(^12\) In the case of a complex crown fracture, with the necessity for endodontic treatment and periodontal surgery, fibres were used to create a central support stump to restore the dental morphology.
Case Report

A 10-year-old girl presented to the department of pediatric dentistry with a complex crown fracture and luxation of her right maxillary incisor. She had no known allergies or systemic problems. The trauma, which was caused by a cycling accident, had occurred about one month earlier. An extraoral examination revealed swelling of the upper lip. Intraoral examination showed no lacerations or evidence of alveolar bone fracture or gingival inflammation at the gingival margin of the right maxillary incisor (Fig. 1). The right maxillary central incisor was luxated, showing minor mobility and slight sensitivity to heat. It responded to the electric pulp test and vitality test as nonvital. Radiology showed completed root development in the maxillary right central incisor and no other fracture or injury in the adjacent teeth. However, a deep vertical periodontal defect with an acute periodontal abscess was noted. The patient was referred to the department of periodontology where examination revealed a probing depth of 9 mm with pus formation. The treatment plan included endodontic treatment followed by periodontal regenerative surgery involving both the departments of pediatric dentistry and periodontology.

The parents were given detailed information about the whole procedure. The child was given local anesthesia, and the root canal was instrumented and filled with calcium hydroxide paste (Calcium Hydroxide Dressing, Produits Dentaires SA, Vevey, Switzerland). Immediately afterward, a periodontal flap was reflected and the defect was debrided (Fig. 2). The surgical area was filled with bioglass bone substitute (PerioGlas, Nova Bone Products, Alachua, Fla.) and a resorbable collagen membrane (BioMend, Zimmer Dental, Carlsbad, Calif.) covered the surgical area. The flaps were closed using 4.0 sling sutures. The patient was prescribed oral antibiotics (amoxicillin) and 0.12% chlorhexidine gluconate for 7 days.

Ten days after surgery, the sutures were removed and uneventful healing was observed. The intracanal dressing was changed every 30 days for 4 months until tooth symptoms were negative. After cleaning and shaping, the root canal was filled with calcium hydroxide-based sealer.
The potential of fibre-reinforced materials in restorative dentistry has been appreciated for some time. Interlaced glass filaments improve the impact strength of composite materials and have appreciable esthetic properties, but do not easily stick to the resinous matrix. Various changes have been made to glass-fibre post composition, radiopacity and shape. The manufacturers have recently developed posts that are radiopaque, thus easily seen on radiographs. Modifications in post configuration have been made to achieve better adaptation to root canal shape. For example, for translucent glass-fibre posts, light transmission through the post permits the use of a light-cured adhesive or dual-cure resin cement. The translucent glass-fibre post has a modulus of elasticity similar to that of dentin and offers adequate mechanical properties. Transmission of light through the post also makes it possible to light-cure the resin cement and the bonding system in only one clinical step, thus simplifying and shortening the clinical procedure.

In the current case, we used an adhesive, dual-cure luting composite system and a glass-fibre-reinforced composite root canal post. This technique can reinforce the restored parts and, probably, increase durability and survival. The results of in vitro and in vivo studies indicate that nonmetal posts can be used when coronal dentin remains and the crown is well supported by the remaining tooth structure. With a modulus of elasticity similar to dentin, the fibre post can reduce the concentration of stress and, thus, the rate of catastrophic root fracture compared with cast posts.

During follow-up examinations, the efficiency of the combined technique of glass-fibre-reinforced composite root canal post and composite resin was confirmed. In fact, no restoration fractures or dimensional changes were found during follow-up examinations. In this case, a bonding system and a light-cured resin were used to bond the post and restore the crown. The bonding of a post to the tooth structure should improve the prognosis of the restored tooth by increasing post retention and by reinforcing the tooth structure.

Compared with alternative techniques, such as a composite resin restoration, screw-post, cast-metal posts and dentin pins, reattachment using a fibre post offers several advantages. It provides immediate esthetic and functional rehabilitation of the fractured tooth. Minimal patient cooperation is required, and the treatment takes little time and is, thus, readily accepted by the patient. Patient cooperation is one of the most important criteria in tooth conservation. In our case, our patient’s cooperation was excellent and the endodontic treatment with periodontal therapy was successful.

As well as endodontic treatment, periodontal therapy, including regenerative methods, has a pivotal place in multidisciplinary treatments. In the present case, periodontal regenerative procedures were used as described previously. Hong and others describe a case in which the distal part of a gminated maxillary lateral incisor was resected, root canal treatment was performed and the distal vertical defect was filled with a bone regenerative material to achieve bone and periodontal attachment. The authors report reduced periodontal probing depth. Naaman and others recommend the
Conclusion
We describe multidisciplinary management of a dental trauma, leading to conservation of the tooth and its permanent restoration. We suggest that using glass-fibre-reinforced composite root canal posts and composite materials can be a simple and efficient procedure for the treatment of anterior traumatized teeth with excellent esthetic and functional results. Further, traumatized teeth with periodontal vertical defects can be successfully treated by guided bone regeneration during long-term follow-up.

THE AUTHORS

Dr. Altun is an assistant professor in the department of pediatric dentistry, Center of Dental Sciences, Gülhane Medical Academy, Ankara, Turkey.

Dr. Tüzüm is an associate professor in the department of periodontology, faculty of dentistry, Hacettepe University, Ankara, Turkey.

Dr. Güven is an assistant professor in the department of pediatric dentistry, Center of Dental Sciences, Gülhane Medical Academy, Ankara, Turkey.

Correspondence to: Dr. Ceyhan Altun, GATA Dis Hekimligi Bilimleri Merkezi, Pedodonti Ana Bilim Dali, Ethlik/Ankara, Turkey.

The authors have no declared financial interests in any company manufacturing the types of products mentioned in this article.

This article has been peer reviewed.

References