

# Replantation after traumatic avulsion

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## ABSTRACT

The aim of this report is to present the case of an accidentally avulsed maxillary central incisor kept in saline solution from the moment of trauma until its replantation 3 h later in a 13-year-old girl. The avulsed tooth was replanted back into the alveolar socket and splinted with composite resin. Calcium hydroxide intracanal dressing was used to prevent inflammatory root resorption. Radiographic and clinical examinations were performed during 27 months follow-up. During the 15 months follow-up period, the tooth remained in a stable functional position and did not reveal replacement resorption. But mild infraocclusion and root resorption were developed 21 months after replantation. The amount of damage to tooth and supporting structures, emergency treatment and follow-up period play a role in the prognosis of the avulsed tooth. It can be recommended to keep the avulsed tooth in saline solution at least when more appropriate storage media are not on hand immediately.

**Key words:** Avulsion, follow up, replantation, root resorption, saline solution

## INTRODUCTION

When the tooth is removed from its socket consequence of a trauma, and the surrounding structures as periodontal ligament and neurovascular bundle injure, the situation is named as 'tooth avulsion' in the World Health Organization's classification system modified by Andreasen.<sup>[1]</sup> Tooth avulsion is one of the most seen case of all traumatic injuries with 0.5% to 16% range in permanent dentition in conjunction with dental injuries can exist frequently at any time of life.<sup>[1]</sup>

Dental practitioners encounter problems relative to the management of the avulsion. Esthetic appearance and chewing function of avulsed tooth can be restored by replantation, which is defined as a rapid treatment method. Immediate replantation of the avulsed tooth is the best management, but the replantation in 20-30 min after the injury or keeping the tooth in an appropriate storage media until the patient can be seen by a dentist is also feasible.<sup>[2,3]</sup> The optimal replantation time for the best prognosis has been declared as 5 min in clinical studies.<sup>[3-7]</sup>

The healthy cell survival rate of pulp and periodontal ligament fibers begin to decrease by lack of blood supply, dryness and possible bacterial contamination when the tooth is removed from its socket.<sup>[8]</sup> Innermost cell layers of the root surface should be vital for the proper regeneration of the periodontal ligament. Although pH, osmolality, and temperature of the storage medium is important for the survival of periodontal ligament cells, wet storage is the main environment to save the avulsed tooth.<sup>[3,9]</sup>

The aim of this report is to present the case of an accidentally avulsed maxillary central incisor kept in saline solution from the moment of trauma until its replantation 3 h later in a 13-year-old girl.

## CASE REPORT

A 13-year-old female patient with an avulsed right central incisor was referred to Ege University, School of Dentistry, Department of Restorative Dentistry

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and Endodontics after a motorcycle accident [Figures 1a and 2a]. Avulsed maxillary central incisor had been kept in saline solution from the moment of trauma until its replantation 3 h later. The crown of the avulsed tooth was intact and the root had a closed apex. The intraoral and radiographic examination also revealed complicated crown fracture of the left central incisor [Figure 2b]. No other oral injury was detected clinically. The left central and lateral incisors showed negative response to vitality test.

The patient was immediately anaesthetized, the alveolar socket was washed with saline solution to remove the blood clot and the avulsed maxillary right central incisor was replanted back into the alveolar socket with the help of finger pressure [Figure 1b]. The tooth then splinted to the adjacent teeth with composite resin and the gingival lacerations were also repaired with sutures [Figures 1c and d and 2c]. The patient was instructed about her biting habits and oral hygiene implement. A 7-day course of systemic penicillin was prescribed, and the patient was referred to the medical practitioner for an antitetanus booster.

The sutures were removed one week later the replantation. The splinting was removed 10 days later and the root canal of the replanted tooth was mechanically prepared. Calcium hydroxide paste was used as an intracanal dressing during the endodontic treatment (6 months) to prevent inflammatory root resorption [Figure 2d]. The intracanal dressing was renewed by one month intervals. Maxillary left central incisor with complicated crown fracture and left lateral incisor were also treated endodontically due to pulp necrosis [Figures 3a and 3b and 4a] and the

teeth were restored with composite resin after root canal treatment [Figures 3c and 3d].

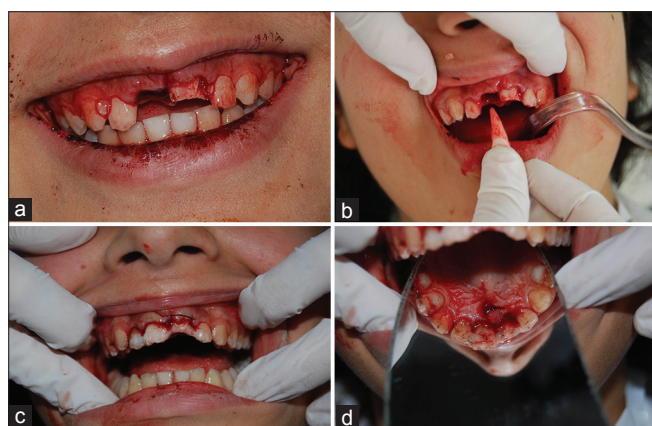
Radiographic and clinical examinations were performed during 27 months follow-up period. During the 15 months follow-up period, the tooth remained in a stable functional position and did not reveal clinical ankylosis or replacement resorption [Figures 4b and 5a].

The replanted incisor developed mild infraocclusion (of about 1 mm) and replacement root resorption 21 months after the replantation [Figures 5b and 4c]. Nevertheless, it remained functional stability and was aesthetically acceptable after adjusting the left central incisor with polishing discs [Figure 5c]. Twenty-seven months after the replantation, the tooth still remained in a stable functional position. Infra-occlusion was about 0.5 mm [Figure 5d] and the radiographic image was not considerably different from the previous control radiography [Figure 4d].

Both the patient and her parents were satisfied with the treatment outcome and wanted to avoid complicated treatments, so it was decided to follow-up the case and keep the replanted incisor as long as possible. The patient and her parents were informed about the fact that infra-occlusion could become more severe as the patient grew and the complicated treatment (e.g., prosthetic solutions, implant) would be necessary if the root was totally resorbed.

## DISCUSSION

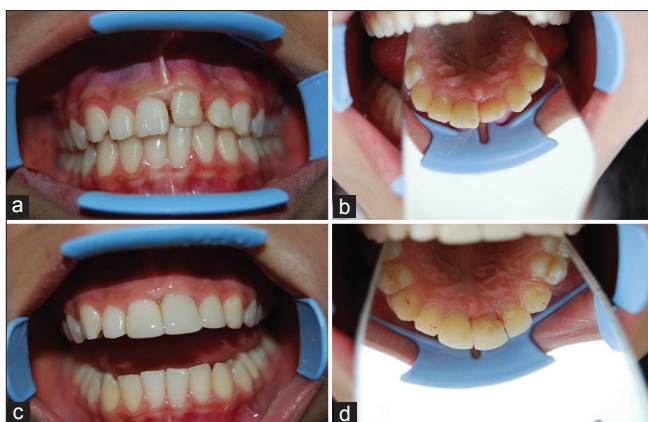
The best healing potential of the avulsed tooth is possible if the replantation is performed



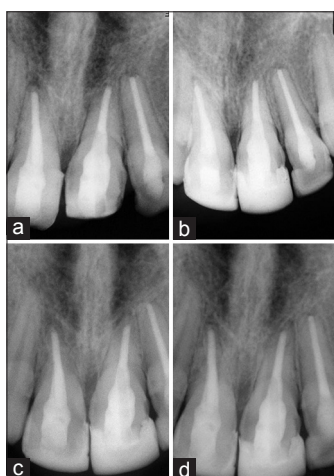
**Figure 1:** Intraoral photographs in initial. (a) The first view of the patient just as she applied to our clinic. (b) Replanting of the avulsed right central incisor back into the alveolar socket with the help of finger pressure. (c) Anterior view of the replanted and splinted tooth. (d) Incisal view of the replanted and splinted tooth. The sutures can also be seen.



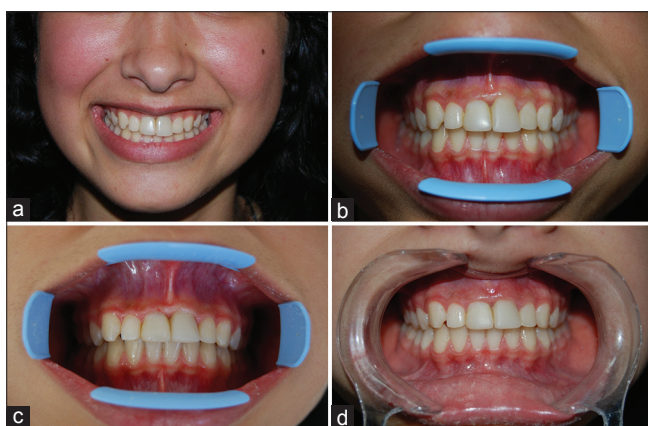
**Figure 2:** Radiographic views in initial. (a) Radiographic image after trauma. (b) Radiographic image of the adjacent teeth. (c) The radiographic image after the replantation and splinting. (d) Intracanal dressing with calcium hydroxide.



**Figure 3:** Post-treatment intraoral photographs. (a) The intraoral view after the root canal treatment was completed. (b) The incisal view after the root canal treatment was completed. (c) The anterior view after direct composite resin restorations. (d) The incisal view after direct composite resin restorations.



**Figure 4:** Post-treatment and follow-up radiographs. (a) The radiographic image after the root canal treatment was completed. (b) The radiographic image 15 months after replantation. (c) The radiographic image 21 months after replantation. (d) The radiographic view 27 months after replantation.



**Figure 5:** Follow-up photographs. (a) The intraoral view 15 months after replantation. (b) The intraoral view 21 months after replantation. (c) The anterior view after adjusting the left central incisor. (d) The intraoral view 27 months after replantation.

immediately (within 5 min) after trauma, as avulsion create crucial damage on the gingiva, periodontal ligament and pulp tissues.<sup>[3-7]</sup> The outcome and success rate of the replantation depend on many factors such as status of avulsed tooth, root development stage, dryness in extra-alveolar period, storage environment, the treatment time and modality.<sup>[10-13]</sup> Storing the tooth in a physiological medium (saline e.g.,) until replantation for a short period is accepted as a well application.<sup>[2,14]</sup>

It is necessary to splint the replanted tooth to the adjacent teeth flexibly during 7-10 days for periodontal healing and then to perform root canal treatment to prevent the inflammatory root resorption in cases with closed apex.<sup>[14]</sup> In the presented case, the avulsed incisor had a closed apex and was kept in saline solution from the moment of trauma until its replantation 3 h later. Prolonged extra-alveolar period and closed apex are the factors that cause deficiency in pulpal and periodontal healing, so it was assumed that the prognosis of the tooth would be negligible or poor. It was aimed to prevent the tooth loss, maintain aesthetic and functional properties and minimize inflammatory root resorption when performing the treatment. In order to achieve the goal of the treatment, the avulsed tooth was replanted back into its original socket, and then splinted to the adjacent teeth with composite resin for 10 days. During this period, the patient was recommended to avoid biting on the splinted teeth and continue to brush her other teeth, and keep the mouth and teeth as healthy as possible. Additionally, systemic penicillin was prescribed. The replanted tooth was endodontically treated and calcium hydroxide intracanal dressing was applied to prevent inflammatory resorption.

The mature teeth in children and adolescents exhibit more extensive inflammatory root resorption after replantation compared to adults.<sup>[15]</sup> The mentioned increase in resorption rate is related to the bone remodeling which is more extensive in children during the grow-up period.<sup>[2]</sup> The root resorption and ankylosis may give rise to infra-occlusion during the growing process.<sup>[15]</sup>

Prosthetic replacement of the missing incisor, orthodontic treatment of the malocclusion would be alternative treatment options if the replantation had not been possible for the presented case.<sup>[16]</sup> The approaches based on orthodontic treatment necessitate orthodontic consultation with a specialist and detailed



treatment design, but this could not be possible at the time of competition state.

The avulsed tooth can maintain aesthetic and functional properties for some years after the replantation.<sup>[17]</sup> In this case, the replanted tooth remained in a stable functional position and did not reveal clinical ankylosis or replacement resorption during the 15 months follow-up period, but mild infra-occlusion (of about 1 mm) and replacement root resorption developed 21 months later. Although the complications such as root resorption and ankylosis occur by a majority in the first year after replantation, the mentioned complications can also be seen in later periods.<sup>[3]</sup> Therefore, long follow-up period is essential for the replantation cases.

## CONCLUSION

Amount of damage to tooth and supporting structures, emergency treatment and follow-up period play a role in the prognosis of avulsed tooth. It can be recommended to keep the avulsed tooth in saline solution at least when more appropriate storage media are not on hand at the moment of accident. According to the findings of the presented case, replantation can be advised for avulsed tooth with prolonged extra-oral time, but the risk of resorption at long time should be considered.

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