

## Delayed replantation: Can it be a success?

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### Abstract

This case report describes delayed replantation of an avulsed maxillary central incisor in a 17-year-old male patient following an injury on fall one day earlier. Avulsed maxillary right permanent central incisor was replanted back into the socket after extra-oral root canal treatment. One year follow up showed validity of treatment, with no evidence of resorption in the replanted tooth.

**Key words:** Replantation, Maxillary central incisor, Resorption

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Traumatic injuries are frequent these days. Surveys indicate that traumatic dental injuries in children and adolescents are common problems, and several studies have shown that the prevalence of these injuries is increasing<sup>1</sup>. Andreasen & Andreasen<sup>2</sup> predicted that the incidence of these injuries may eventually surpass the incidence of dental caries. Avulsion accounts for 0.5–16% of traumatic injuries in the permanent dentition<sup>3</sup>. Avulsion of permanent teeth can occur at any age, but is most common in young permanent dentitions. This is because the root is still not completely formed and the periodontium and bone are very resilient<sup>4</sup>. An avulsion injury is the complete displacement of tooth out of the socket resulting the compromised neurovascular supply to the tooth which usually results in loss of vascularization to the pulp. As a treatment of the avulsed tooth, replantation is the method which can restore occlusal function and esthetic appearance shortly after injury. There are various factors influencing the clinical success of replantation, as extraoral time, the degree of injury to the alveolar bone, the storage medium, and the timing of root canal treatment after the avulsion<sup>5-9</sup>. Clinical reports have shown that the prognosis is best for teeth replanted within five minutes of avulsion<sup>5-8</sup>. Because of injury circumstances, replantation often cannot be conducted in such a short period of time, which results in necrosis of the periodontal ligament and consequent healing by replacement root resorption. However teeth replanted even after some delay can now a days be saved and it can either successfully heal or at least fulfill function and/or contribute to a normal development of the jaw in a growing patient waiting for definitive treatment when the growth is completed<sup>10</sup>. Therefore, the clinician must be aware of possible complications after treatment and

understand how to minimize their incidence. Several methods have been suggested to preserve the vitality of the periodontal ligament cells. Axhausen<sup>11</sup> suggested placing the tooth under the patient's tongue in cases in which immediate replantation was not possible. However, Dumsha<sup>12</sup> suggested storing the avulsed tooth in milk, Hank's Balanced Salt Solution (HBSS), or saline. Martin et al<sup>13</sup> suggested propolis as a storage media. As clinicians, it can be confusing as to which regime is the most appropriate treatment, as there are a variety of guidelines and treatment modalities for an avulsed tooth. But for many years the recommendation of immediate replantation as the ideal emergency procedure has not changed<sup>14</sup>. Hence this paper presents a rare case report of replantation after extended dry storage of avulsed permanent incisor.

### Case report

A 17-year-old male patient, reported to the Department of Conservative Dentistry & Endodontics, Manipal College of Dental Sciences Mangalore, for treatment of avulsed tooth. He had fallen down on the floor one day prior to his visit to the department and his maxillary right permanent central incisor tooth had been avulsed. Patient came with the avulsed tooth kept dry in a paper handkerchief. The patient had no relevant medical history. The adjacent teeth showed positive response to the vitality test. Periapical radiograph was obtained, and

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no other hard-tissue injury was detected in that region. Examination of the avulsed tooth revealed that the roots had closed apex. To retain the natural dentition, the tooth was planned for replantation which was stored in extremely unfavourable conditions. As this case was a delayed replantation, endodontic treatment was started before replantation. Conventional enlargement and cleaning of the root canal was performed. After the root canal was dried with sterile paper points (Denstply Maillefer Swiss made, Ballaigues), it was filled with calcium hydroxide paste (Calcicur, VOCO GmbH Cuxhaven Germany). Access cavity was temporarized with kalzinol (DPI, India). Tooth was washed with normal saline and then treated with 0.2% chlorhexidine (ICPA Health Products LTD, India) by dipping the tooth in it. Local anaesthesia was administered, socket was gently curetted to remove any coagulum, granulation tissue and pathologic tissue and irrigated with physiologic saline solution. Tooth was replanted into the socket with the help of finger pressure. Once the tooth was properly seated, it was checked for alignment or occlusion and was splinted to the adjacent teeth with a fiber and acid-etch composite resin. Periapical radiography was obtained to confirm proper positioning of the replanted

tooth. Oral hygiene instructions were given and chlorhexidine mouthwash was recommended. A five day course of systemic amoxycillin was prescribed to prevent infection.

Postoperative recall was done after one week of replantation. There was slight tenderness on percussion but no spontaneous pain was felt by the patient. The root canal was refilled with calcium hydroxide. In two weeks all the clinical symptoms had subsided. The splint was removed. At this stage the canal was obturated with 0.02 taper gutta-percha points (Denstply Maillefer Swiss made, Ballaigues) and AH plus sealer (Denstply DeTrey gMBH Germany) in lateral and vertical compaction technique. The tooth was restored with light cure composite resin (Clearfil, Kuraray) using dentin bonding system (Clearfil SE Primer and Bond Kuraray, Tokyo, Japan). Patient was followed up at 1, 3, 6 months and one year. Tooth showed no clinical symptoms such as mobility, periodontal pocket, colour change or tenderness on percussion. Radiographic examination also showed no sign of external root resorption.



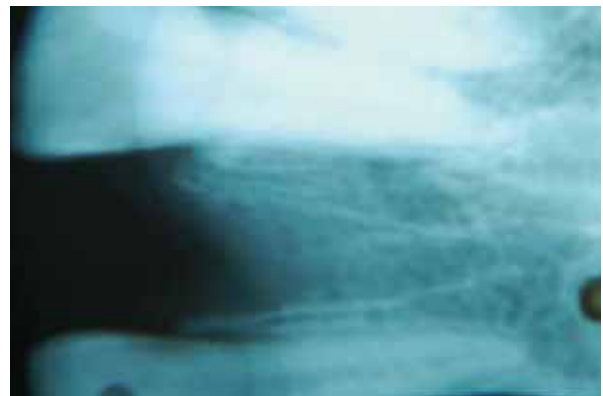
**Fig 1:** Pretreatment-Avulsed tooth



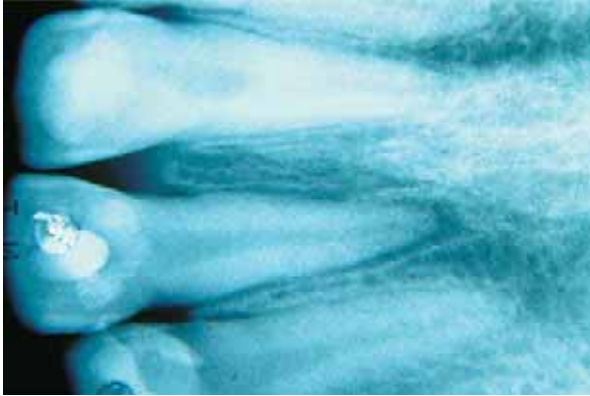
**Fig 2:** Replantation of the tooth



**Fig 3:** Post treatment



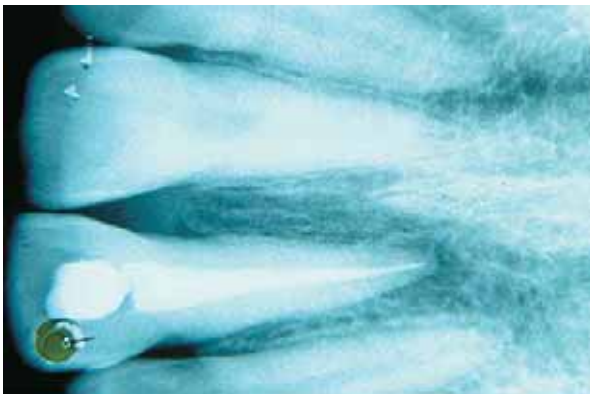
**Fig 4:** Periapical Radiograph showing empty socket



**Fig 5:** Tooth replanted & splinted with fiber & composite resin



**Fig 6:** Completion of endodontic therapy after two weeks



**Fig 7:** Healing after six months



**Fig 8:** Healing after one year

### Discussion

Immediate replantation is widely accepted as the most appropriate treatment for avulsed tooth; however, this may not always be possible. The patient may have other injuries that could delay replantation of the avulsed tooth. Sometimes the tooth is not found for several hours or several days. In our case patient came one day after the injury due to unawareness. When such events do occur, even if the treatment is delayed, considering the benefits that might result from the therapy, replantation should be attempted<sup>15-16</sup>.

Therefore, we decided to replant the avulsed teeth in spite of extremely unfavourable conditions. Replantation is usually not recommended if the avulsed tooth has a very immature root and has been air-dried for a prolonged period or if the patient's medical condition contraindicates replantation. Donaldson & Kinirons<sup>17</sup> found that the risk of early resorption is increased in teeth that have additional damage or contamination of the root, or are kept in dry conditions for longer than 15 minutes. They found that dry time is the most crucial clinical factor associated with the development of post-replantation root resorption. A previous study by Kinirons et al,<sup>18</sup> indicated that the risk of resorption

increases dramatically after five minutes of dryness, with the probability of resorption increasing by 29% for every additional 10 minutes of dryness. In the present case, the avulsed tooth had been in dry condition for one day, so it was anticipated for poor prognosis. As a result, the management of this case differed from the accepted replantation protocol. Considering the patient's age, our essential treatment objectives were to retain the avulsed incisors, to maintain aesthetic appearance and function. This case is a delayed replantation so we decided to perform root canal therapy outside the mouth. The tooth was held with a gauze pad dipped in chlorhexidine. Root canal therapy itself was performed in the conventional manner. Performed prereplantation root canal treatment seemed to prevent against inflammatory root resorption, which is a frequent complication after tooth luxation or avulsion caused by pulpal infection<sup>19-20</sup>. Therefore, endodontic treatment procedures were performed outside the oral cavity before the tooth was replanted. Calcium hydroxide dressing was used to aid asepsis of the root canal. Massler suggested that cutting an apex is not necessary for an ideal reposition<sup>21</sup> so in this case apex was not resected and gentle curettage of socket was enough to remove blood clot and other pathological

tissue. In cases of avulsed teeth with devital periodontal ligament, treatments with various agents such as tetracycline or dexamethasone before replantation have been suggested in the hope of slowing down the resorption process<sup>22-23</sup>. Bryson et al. suggested that immediate intracanal placement of Ledermix (a paste containing triamcinolone acetonide and demeclocycline) during emergency visits after avulsion injuries appears to decrease resorption and increase favourable healing<sup>24</sup>. Andreasen and Andreasen recommended that after planning of the root to remove necrotic periodontal tissue, such teeth be soaked in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 minutes before extraoral root filling and replantation<sup>3</sup>. We followed a simple technique of chemical treatment of the root surface using 0.2% chlorhexidine. Chlorhexidine due to its wide spectrum antibacterial activity must have prevented the infection<sup>25</sup>. A splinting technique that allows physiologic movement of the tooth during healing, and that is in place for a minimal time period results in a decreased incidence of ankylosis<sup>25</sup>. Kinirons et al. demonstrated that the best outcome was achieved if the period of splinting was 10 days or less<sup>26</sup>. Systemic antibiotics given at the time of replantation are recommended to prevent bacterial invasion of the necrotic pulp, thereby avoiding inflammatory resorption<sup>27</sup>.

In this case, replantation treatment restored the patient's aesthetic appearance and occlusal function. Patient is asymptomatic for one year. Further long term follow up has to be carried out to watch the best outcome of the treatment.

### Conclusion

In cases of avulsed permanent teeth with extended non-physiological storage, even though the risk of progressive replacement resorption and subsequent tooth loss is high, the technique used in this case can be tried. This technique seems to have an advantage of seeing the patient through the period of growth as well as maintaining the aesthetic appearance and occlusal function. Long term follow up with regular recall visits may confirm the success of the treatment.

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