

**Case Study**

1  
2 **“Replantation of knocked out tooth after traumatic avulsions.”**

3 **Abstracts:**

4 **Background:** Management of permanent tooth avulsion often challenging  
5 for dental practitioner, as avulsion resulting complete exfoliation of tooth  
6 from its socket, is usually associated with damage to the supporting  
7 structures. Managing the edentulous area to improve aesthetics, phonetics,  
8 function is better achieved by replanting the avulsed tooth rather than  
9 prosthesis. **Report of cases:** This article report a case avulsed tooth  
10 management of 12-years-old-girl due to accidental knocked out of both  
11 central incisor. Immediate after injuries patient report to the emergency  
12 department over phone and asked to collect and keep the avulsed tooth  
13 sinking into milk. Patient was managed by dentist within 60minutes of the  
14 accident and have follow-up by radiologically and clinically 1year post  
15 accidentally. **Conclusion:** Replantation of tooth immediate after avulsion  
16 can be managed by replantating into its socket.

17

18 **Keywords:** Tooth Replantation, Tooth avulsion, Athletic injuries, Tooth  
19 injuries,

20 **Introductions:**

21 Traumatic injuries to teeth are common, with between 6-34% of children  
22 aged 8-15 experiencing damage to their permanent teeth<sup>1</sup>. One of the most  
23 severe dento-alveolar injuries is avulsion, where the tooth or teeth are  
24 completely knocked out of the mouth. This injury accounts for between 0.5  
25 to 3% of dento-alveolar trauma to permanent teeth<sup>2</sup>. The active movement  
26 of children at this age group and relatively resilient alveolar bone with  
27 minimal resistance to extrusive forces might be reason behind this age  
28 group being affected children. An avulsed tooth is one that has been  
29 knocked out accidentally from the alveolar socket for a number of reasons:  
30 a blow to the mouth, accident involving the face or during contact sports. It  
31 is possible to replace the tooth in the socket successfully if the action is  
32 taken as soon as possible<sup>3</sup>. Certain predisposing factors like protruded  
33 maxillary incisors and insufficient lip closure may affect the extent of the

34 dental trauma<sup>2</sup>. Healing with periodontal ligament ( i.e. regeneration) after  
35 replantation will occur only if the innermost cell layer along the root surface  
36 is viable<sup>4</sup>. Clinical studies revealed that the prognosis is best for teeth  
37 replanted within 5 minutes after avulsion<sup>2</sup>.

38 Prolonged non-surgical storage of avulsed teeth before replantation results  
39 in total necrosis of the periodontal ligament and healing by replacement  
40 root resorption (i.e. repair) becomes the only option<sup>4</sup>. Some characteristics  
41 of storage medium i.e. p<sup>H</sup>, osmolarity<sup>5</sup> and temperature should be  
42 compatible with the survival of periodontal ligament<sup>6</sup>. Storage media as  
43 milk, Hanks balanced salt solution and viaspan have been proved to  
44 maintain cell viability after long periods<sup>7</sup>.

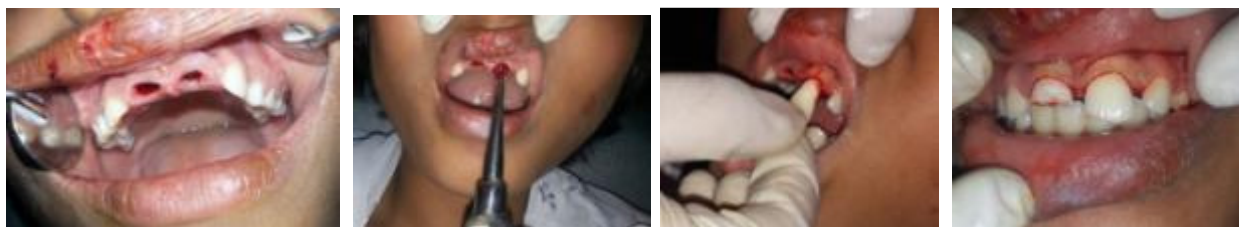
45 This article reports the case of accidentally knocked out of two maxillary  
46 central incisors that were kept in milk from the moment of trauma until its  
47 replantation within 60 minutes later. The successful clinical and  
48 radiographic findings observed after 12-months follow-up are described.

49

### 50 **Report of the cases:**

51 A 12-years-old-girl had and accidental fall down from stairs at her own  
52 house. Immediately her mother gave a phone call to the emergency section  
53 of the Update dental college and hospital, Dhaka, upon instruction from the  
54 Dental officer her two knocked out incisor were kept shrink within milk. The  
55 endodontist attended her case within 60minutes of the accident.

56



57

58

(A)

(B)

(C)

(D)

59 **Figure 1:** Intraoral photograph showing immediate after reported to dentist  
60 (A), removal of clot and debris from the alveolar socket (B), Immediate

61 placing the tooth to corresponding socket (C), to evaluate the occlusal  
 62 relationship (D).

63



64

65

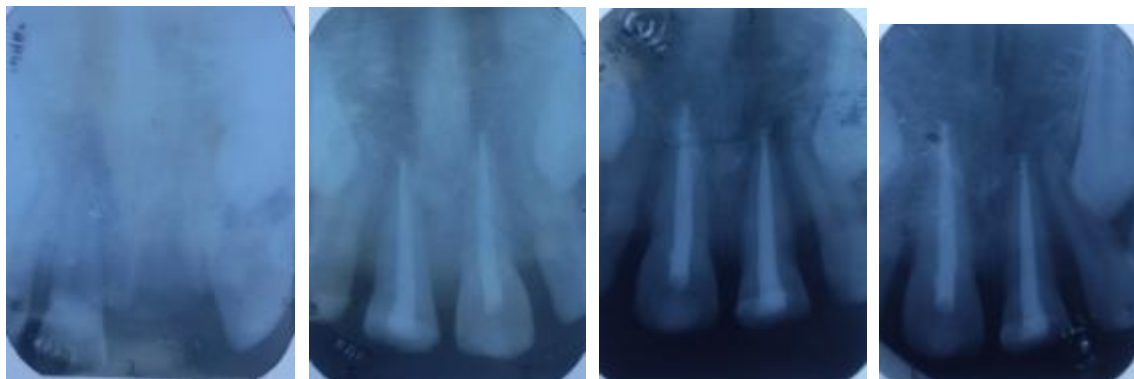
(A)

(B)

(C)

(D)

66 **Figure 2:** The avulsed tooth at saline before endodontic procedure(A),  
 67 access cavity preparation(B), extirpation of pulp (C), and endodontic  
 68 obturation by lateral condensation (D).



69

70

(A)

(B)

(C)

(D)

71 **Figure 3:** Periapical radiographic evaluation of the socket area immediate  
 72 after reporting to dentist (A), 10days post Replantation after removal of  
 73 bonded wire (B), at six month recall visit (C), and at one year recall visit  
 74 (D).



75

76

(A)

(B)

(C)

(D)

77 **Figure 4.1:** Post treatment intraoral photograph on the 10day recall visit  
78 after management (A), immediate after removal of bonded wire (B),  
79 checking of periodontal pocket at 6month recall visit (C), checking of  
80 functional at one year recall visit (D).

81



82

83 (A)

(B)

(C)

84 **Figure 4.2:** Panoramic radiographic evaluation on immediate after  
85 management(A), at 10day recall visit after management (B), at 1year recall  
86 visit (C).

87

88 At initial examination laceration on the lip and clot on the socket of the teeth  
89 12 and 21 noticed. Teeth on the milk were found with intact pulp chamber  
90 with close root apex, however the crown fracture were noticed and patient's  
91 attendant did not able to present any fracture part of the crown. The patient  
92 was immediately anaesthetized; the alveolar socket was washed with  
93 saline and examined with a blunt instrument to check for the patency of the  
94 socket and to create fresh bleeding. Then both teeth were inserted into the  
95 respective alveolar socket to check the occlusion and alveolar patency.  
96 After revealing everything favorable both the teeth were removed from  
97 socket and then teeth were undergone extra oral endodontic treatment.  
98 Then the knocked out maxillary central incisors were replanted back into  
99 the alveolar socket with finger pressure and checked the occlusion as  
100 previously marked.

101

102 The teeth were splinted to the adjacent teeth with composite resin and  
103 gingival laceration was dressed with podon iodine. The patient was

104 instructed about her biting habit and oral hygiene implement. A 7 days  
105 course of systemic penicillin was prescribed and the patient was referred  
106 for an anti-tetanus booster. The splint was removed 10 days later and the  
107 replanted teeth were restored with composite resin. Radiograph and clinical  
108 examination were performed during 12 months follow-up period. During the  
109 above mentioned period, the teeth remained in a stable functional position  
110 and did not reveal any clinical alkalosis or resorption. Moreover, it remained  
111 functional stability and was aesthetically acceptable after 1 year follow-up.

112 Both the patient and her parents were satisfied with the treatment outcome  
113 and wanted to avoid complicated treatment, so it was decided to further  
114 follow-up and keep the replanted teeth as long as possible.

115

## 116 **Discussion:**

117 Literature review reveal that the important factor to ensure a favorable  
118 outcome after replantation is the extraoral time elapsed between the injury  
119 and the replantation of tooth<sup>2,4</sup>. Most importantly care should be taken to  
120 the avulsed tooth to prevent from drying, which causes loss of normal  
121 physiologic metabolism and morphology of the periodontal ligament cells.<sup>4</sup>  
122 Aim is to replant a clean tooth with which means that the patient should be  
123 brought to the office immediately. If delay occurs in replantation, the tooth  
124 should be quickly stored in an appropriate medium until the patient can go  
125 the dental office for replantation. Suggested storage media in order of  
126 preference are: milk, saliva (either in the vestibule of the mouth or in a  
127 container into which the patients spits), physiologic saline or water<sup>4</sup>. Water  
128 is the least desirable storage medium because the hypotonic environment  
129 causes rapid lysis and increased inflammation<sup>8</sup>. Hank's balanced salt  
130 solution has shown the superior ability in maintaining viability of the  
131 periodontal ligament fibers for extended periods<sup>9</sup>. However, they are  
132 presently impractical as they are not generally available at accident site.

133 Irrespective of the root surface treatment, there is consensus in the  
134 literature in that replanted teeth should be treated endodontically because  
135 the necrotic pulp and its toxins affect the periodontal ligament cells through

136 the dentinal tubules and play a decisive role in the root resorption process<sup>9-</sup>  
137 <sup>11</sup>. Some operator suggest that, If extra oral dry time exit 60 minutes in a  
138 closed apex the teeth should be treated endodontically outside the oral  
139 cavity<sup>11</sup>. Another aspect of replantation is the preperation of socket which  
140 consists of removal of destructions as blood clots and bone fragments in  
141 order to facilitate the replantation.

142 The goal of antibiotic therapy is to avoid bacterial proliferation in the area of  
143 ongoing process and contribute to the prevention of inflammatory  
144 resorption. Ideally a broad spectrum antibiotic should be administered for  
145 seven days<sup>12</sup>. It is necessary to splint the replanted tooth to the adjacent  
146 teeth flexibly during 7-10 days for periodontal healing and then to perform  
147 root canal treatment to prevent the inflammatory root resorption in case of  
148 immediate replantation of tooth with closed apex. But if the tooth replanted  
149 to the socket after 60 minutes of accident its better to perform extra oral  
150 root canal treatment prior to replantation<sup>11</sup>.

151 In our presented case, the avulsed incisors had close apices and were kept  
152 in milk from the moment of trauma until its replantation 60 minutes later.  
153 Prolonged extra oral time and closed apices were the factors that cause  
154 deficiency of pulpal and periodontal healing, so it was assumed that the  
155 prognosis will be negligible. But, in 12 months follow-up showed  
156 maintainence of root integrity, intact lamina dura and absent of tooth  
157 mobility, which are indicative of successful replantation. Moreover, It was  
158 aimed to prevent the teeth loss, maintain aesthetic and functional  
159 properties as well as allowing the alveolar bone growth. To achieve the  
160 goal of the treatment, the knocked out teeth were replanted back into the  
161 socket into its original position and splinted for 10 days.

162 Study found that mature teeth in children and adolescents exhibit more  
163 extensive inflammatory root resorption after replantation caompared to  
164 adult<sup>13</sup>. The mentioned increase root resorption rate is related to the bone  
165 remodelling which is more extensive in children during the grow-up period.  
166 The root resorption andankylosis may give rise to infraocclusion during the  
167 growing process <sup>13</sup>. Either prosthetic replacement of the missing incisors, or  
168 prosthetic implant placement might be alternative treatment options for our

169 presented case, if replantation were not practicable. However, both of the  
170 options need time for complete root formation of the abutments as well as  
171 adequate bony thickness of implant. In this aspect, the period of  
172 sustainability of replanted teeth bear utmost importance.

173 The knocked out teeth can maintained aesthetic and functional properties  
174 for some years after the replantation. In this report, the replanted teeth  
175 remained in a stable functional position during 12 months follow-up period  
176 without any sign of ankylosis or resorption. Despite the positive results  
177 observed after 1 year, clinical and radiographic follow-up of the teeth also  
178 planned for further followup.

179

### 180 **Conclusions:**

181 Amount of damage to tooth and supporting structures, emergency  
182 treatment and follow-up period play a role in the prognosis of knocked out  
183 teeth. It can be recommended to keep that teeth in a suitable solution and  
184 treatment started as early as possible. According to the findings of the  
185 presented case, replantation can be advised for avulsed teeth with prolong  
186 extra oral time, but risk of resorption at long time should be considered.

187

### 188 **Referances:**

189

- 190 1. Chadwick BL, White DA, Morris AJ, Evans D, and Pitts NB. Non-carious tooth  
191 conditions in children in the UK, British Dental Journal; 2006: **200**, 379-384.
- 192 2. Andreasen JO and Andreasen FM (2007), Avulsions In *Textbook and color atlas*  
193 *of traumatic injuries to the teeth*, ed.4th Andreasen, J. O., Andreasen, F. M., and  
194 Andersson, L. pp. 444-488. Blackwell Munksgaard, Copenhagen.
- 195 3. Chowdhury SS, Howlader MR. RE-plantation of Accidentally Avulsed Tooth: A  
196 case report. J Bangladesh Coll Phys Surg 2013; 31: 39-44.
- 197 4. Andresen JO, Borum MK, Andresen FM. Replantation of 400 avulsed permanent  
198 incisors. 4. Factors related to periodontal ligament healing. Endod Dent  
199 Traumatol 1995; 11(2): 76-89.
- 200 5. Blomlof L, Otteskog P, Hammarstrom L. Effect of storage in media with different  
201 ion strengths and osmolarities on human periodontal ligament cells. Scand J  
202 Dent Res 1981;89(2):180-7.

- 203       **6.** Siglas E, Regan JD, Kramer PR, Witherspoon DE, Opperman LA. Survival of  
204       human periodontal ligament cells in media proposed for transport of avulsed  
205       teeth. *Dent Traumatol* 2004;20(1):21-8
- 206       **7.** Hiltz J, Trope M. Vitality of human lip fibroblasts in milk, Hanks balanced salt  
207       solution and viaspan storage media. *Endod Dent Traumatol* 1991;7(2):69-72.
- 208       **8.** Blomlof L. Milk and saliva as possible storage media for traumatically  
209       exarticulated teeth prior to replantation. *Swed Dent J Suppl* 1981;8:1-26.
- 210       **9.** Trope M, Friedman S. Periodontal healing of replanted dog teeth stored in  
211       viaspan, milk and Hanks Balanced Salt Solution. *Endod Dent Traumatol*  
212       1992;8:183-188
- 213       **10.** Elinevid H, Jansson L, Lindskog S, Weintraub A, Blomlof L. Endodontic  
214       pathogens: propagation of infection through patent dentinal tubules in  
215       traumatized monkey teeth. *Endod Dent Traumatol* 1995;11(5):229-34.
- 216       **11.** Ingle JI, Bakland LK, Baumgartner JC. *Ingle's endodontics*. 6<sup>th</sup> ed. Hamilton,  
217       Ontario: BC Decker Inc; 2008. p 1348-1351.
- 218       **12.** Sae-Lim V, Wang CY, Trope M. Effect of systemic tetracycline and amoxicillin on  
219       inflammatory root resorption of replanted dogs' teeth. *Endod Dent Traumatol*  
220       1998;14(5):216-20.
- 221       **13.** Ebelesender KA, Freihs S, Ruda C, Pertl C, Glockner K, Hulla H. A study of  
222       replanted permanent teeth in different age groups. *Endod Dent Trumatol*  
223       1998;14:274-8