

Case Study

1
2 “Replantation of knocked out teeth after traumatic avulsion.”

3 Abstracts:

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

16
17 **Keywords:** Tooth Replantation, Tooth avulsion, Athletic injuries, Tooth
18 injuries.

19 Introductions:

20 Traumatic injuries to teeth are common, with between 6-34% of children
21 aged 8-15 experiencing damage to their permanent teeth¹. One of the most
22 severe dento-alveolar injuries is avulsion, where the tooth or teeth are
23 completely knocked out of the mouth. This injury accounts for between 0.5
24 to 3% of dento-alveolar trauma to permanent teeth². The active movement
25 of children at this age group and relatively resilient alveolar bone with
26 minimal resistance to extrusive forces might be reason behind this age
27 group being affected children. An avulsed tooth is one that has been
28 knocked out accidentally from the alveolar socket for a number of reasons:
29 a blow to the mouth, accident involving the face or during contact sports. It
30 is possible to replace the tooth in the socket successfully if the action is
31 taken as soon as possible³. Certain predisposing factors like protruded
32 maxillary incisors and insufficient lip closure may affect the extent of the
33 dental trauma². Healing with periodontal ligament (i.e. regeneration) after

34 replantation will occur only if the innermost cell layer along the root surface
35 is viable⁴. Clinical studies revealed that the prognosis is best for teeth
36 replanted within 5 minutes after avulsion².

37 Prolonged non-surgical storage of avulsed teeth before replantation results
38 in total necrosis of the periodontal ligament and healing by replacement
39 root resorption (i.e. repair) becomes the only option⁴. Some characteristics
40 of storage medium i.e. pH, osmolarity⁵ and temperature should be
41 compatible with the survival of periodontal ligament⁶. Storage media as
42 milk, Hanks balanced salt solution and viaspan have been proved to
43 maintain cell viability after long periods⁷.

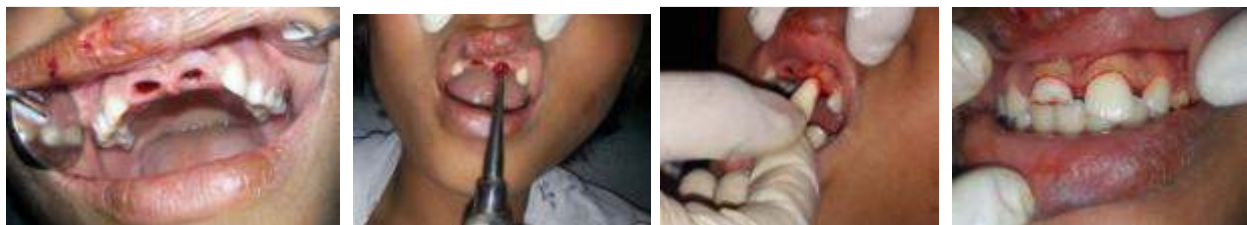
44 This article reports the case of accidentally knocked out of two maxillary
45 central incisors that were kept in milk from the moment of trauma until its
46 replantation within 60 minutes later. The successful clinical and
47 radiographic findings observed after 12-months follow-up are described.

48

49 **Report of the cases:**

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

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(A)

(B)

(C)

(D)

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

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

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(A)

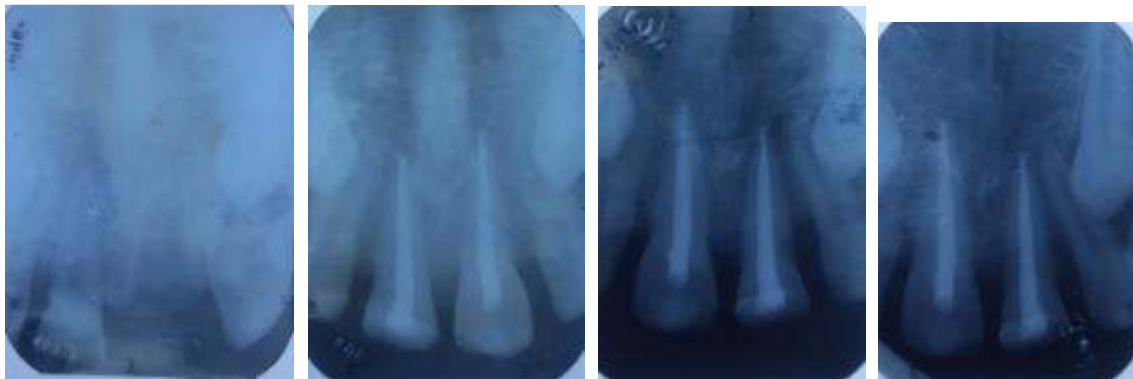
(B)

(C)

(D)

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

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(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 months** recall visit (C), and at one year recall visit
74 (D).

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(A)

(B)

(C)

(D)

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

82

83 At initial examination laceration on the lip and clot on the socket of the teeth
84 12 and 21 noticed. Teeth on the milk were found with intact pulp chamber
85 with close root apex, however the crown fracture were noticed and patient's
86 attendant was not able to present any fracture part of the crown. The
87 patient was immediately anaesthetized, the alveolar socket was washed
88 with saline and examined with a blunt instrument to check for the patency
89 of the socket and to create fresh bleeding. Then both teeth were inserted
90 into the respective alveolar socket to check the occlusion and alveolar
91 patency. After revealing everything favorable both the teeth were removed
92 from socket and then teeth were undergone extra oral endodontic
93 treatment. The knocked out two maxillary central incisors were prepared by
94 placing those we only immerse the teeth within tetracycline solution for 5
95 mins and replanted. Root canal were prepared with protaper hand
96 instruments and obturated with gutta percha and zinc oxide eugenol sealer.
97 Then the knocked out maxillary central incisors were replanted back into
98 the alveolar socket with finger pressure and checked the occlusion as
99 previously marked.

100

101 The teeth were splinted to the adjacent teeth with composite resin and
102 gingival laceration was dressed with povidone iodine solution. The patient
103 was instructed about her biting habit and oral hygiene implement. A 7 days

104 course of systemic penicillin was prescribed and the patient was referred
105 for an anti-tetanus booster. The splint was removed 10 days later and the
106 replanted teeth were restored with composite resin. Radiograph and clinical
107 examination were performed during 12 months follow-up period. During the
108 above mentioned period, the teeth remained in a stable functional position
109 and did not reveal any clinical **ankylosis** or resorption. Moreover, it
110 remained functional stability and was aesthetically acceptable after 1 year
111 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^{2,4}. 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.⁴
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 water⁴. Water
128 is the least desirable storage medium because the hypotonic environment
129 causes rapid lysis and increased inflammation⁸. Hank's balanced salt
130 solution has shown the superior ability in maintaining viability of the
131 periodontal ligament fibers for extended periods⁹. However, they are
132 presently impractical as they are not generally available at accident site.

133

134 Irrespective of the root surface treatment, there is consensus in the
135 literature in that replanted teeth should be treated endodontically because
136 the necrotic pulp and its toxins affect the periodontal ligament cells through
137 the dentinal tubules and play a decisive role in the root resorption process⁹⁻
138 ¹¹. Some operator suggest that, If extra oral dry time exit 60 minutes in a
139 closed apex the teeth should be treated endodontically outside the oral
140 cavity¹¹. Another aspect of replantation is the preparation of socket which
141 consists of removal of destructions as blood clots and bone fragments in
142 order to facilitate the replantation.

143 The goal of antibiotic therapy is to avoid bacterial proliferation in the area of
144 ongoing process and contribute to the prevention of inflammatory
145 resorption. Ideally a broad spectrum antibiotic should be administered for
146 seven days¹². It is necessary to splint the replanted tooth to the adjacent
147 teeth flexibly during 7-10 days for periodontal healing and then to perform
148 root canal treatment to prevent the inflammatory root resorption in case of
149 immediate replantation of tooth with closed apex.

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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 **maintenance** 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 **compared** to
164 adult¹³. 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 **ankylosis** may give rise to infraocclusion during the
167 growing process¹³. 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 bears **s** 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 **follow up**. **As such injuries are not uncommon, in the**
179 **developing country like Bangladesh where advance materials and**
180 **infrastructure is not available, following such management protocol with**
181 **basic technique could save million.**

182

183 **Conclusions:**

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

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191 **References:**

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