

Introduction

Avulsion of permanent teeth is seen in up to 16% of dental injuries. Prompt and correct emergency management is essential for best prognosis. Replantation is the best treatment of choice for a healthy patient, however, cannot always happen immediately. The International Association of Dental Traumatology (IADT) has developed a consensus on replantation of avulsed teeth. Physiologic storage medium and extraoral dry time are the most important factors, with extraoral dry time <60min providing the best prognosis. However, in this case study, replantation of avulsed tooth with dry time of >17 hours has shown promising results post root canal treatment (RCT), despite common concern of poor prognosis in delayed replantation.

Patient Information

Medical History: No medical conditions, No medications, No known drug allergies
EOE: No swelling, inferior border of mandible palpable bilaterally, no lacerations, no LAD
IOE: #7,8 avulsion, no gingival laceration, no step defects, no alveolar fracture, no abscess, oral hygiene is fair, FOM non-elevated, hemostatic coagulation in sockets #7,8, no frenal lacerations, no coronal fractures on adjacent teeth #6,9,10

Images

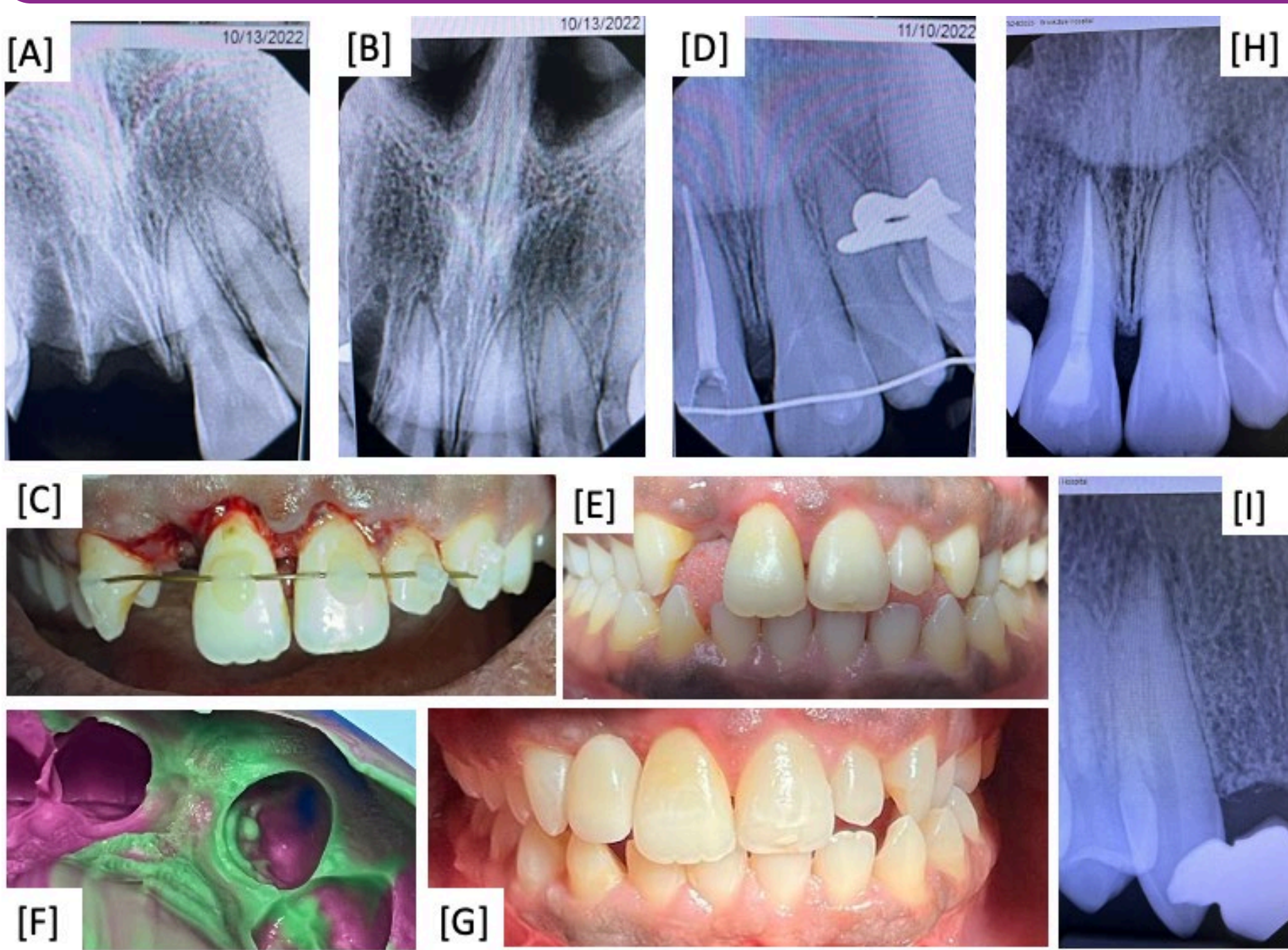


Figure 1: [A],[B] 10/14/22 Initial presentation following trauma; no alveolar frx [B] replantation #8 under digital pressure [C] Flexible brass wire splint #6-11 [D] RCT was initiated at 1 week; image shows completion of RCT at 4 weeks [E] 4 week follow up and splint removal [F] impression of Resin bonded Maryland bridge single winged on #6; lingual rest seats [G] Post-insertion of Maryland bridge #6-7 [H/I] 6mo follow up; Maryland bridge intact, no unfavorable clinical outcomes observed

Discussion

Patients presenting with avulsed teeth with extended extraoral dry time followed by replantation and RCT initiated within 3 weeks, minimal inflammatory resorption was found. However, in teeth where RCT was completed >3 weeks of replantation, inflammatory resorption was significantly higher in young patients 8-16 years. Tooth replanted with necrotic periodontal membrane will become ankylosed and resorbed within 3-7 years (up to 10 yrs) in younger patients whereas in older patients, tooth remained in function. For tooth with extended extraoral dry time, it is recommended to initiate RCT within 3 weeks and if delayed, younger patients <17yo should be closely monitored for resorption post RCT. Replanted teeth should be monitored clinically and radiographically at 2 weeks, 4 weeks, 3 months, 6 months, one year, and yearly for at least five years. Patient compliance to follow up and home care is crucial. Advise patient to avoid contact sports and fabricate mouth guard, improve oral hygiene, maintain soft diet for 2 weeks, use chlorhexidine (0.12%) mouth rinse BID for 2 weeks.

Favorable/Unfavorable outcomes

Favorable outcomes Open/Closed apex	Asymptomatic, functional, physiologic mobility, neg to percussion/palpation, normal sound to percussion, no PARL, intact lamina dura, no signs of root resorption or continued root formation if open apex, pulp canal obliteration, no discoloration
Unfavorable outcomes Open/Closed apex	Symptomatic or asymptomatic, swelling, sinus tract, excessive mobility, ankylosis (high pitched metallic percussion sound, PARL, inflammatory resorption, infra-position of tooth, discoloration

References



A Case Study

A 15 year old male presents to Brookdale Pediatric Dental Clinic as emergency walk in 10/15/22 following traumatic avulsion of #7,8 from previous day. Patient was injured due to head to mouth collision during a basketball game indoors. Patient denies LOC, vomiting, neck pain, fever, nausea. Patient could not locate #7 and located avulsed #8 which was carried in a dry tissue. Due to patient's lack of knowledge in managing traumatic dental injury, patient presented delayed to the clinic the next day. Radiograph was acquired to rule out alveolar fracture and #8 was replanted with digital pressure and without active socket irrigation.

Recommended treatment IADT

Storage medium: Physiologic; tissue culture media and cell transport media. Osmolality-balanced; milk and Hanks' Balanced Salt Solution
Replantation: best replantation is at site of accident (usually not painful). Extraoral time >60mins whether dry or in storage medium, replantation must be attempted. Irrigate socket with saline or chlorhexidine and remove coagulate if necessary
Anesthetics: local analgesia without vasoconstrictor is recommended
Stabilization: Stabilize the tooth for 2 weeks with passive/flexible wire, nylon fishing line
Systemic antibiotics: amoxicillin is drug of choice. If allergic, doxycycline is appropriate in >12yo due to antimicrobial, anti-inflammatory and antiresorptive effects. Doxycycline short term usage < 21 days has no concern for staining >8yo (AAPD)
Tetanus: check tetanus vaccination status and refer to physician for booster requirement
Endodontic consideration: Closed apex, initiate 2 weeks postreplantation. Calcium hydroxide recommended as intracanal medicament (up to 1 mo) followed RCT. If open apex, monitor for spontaneous revascularization vs. necrosis before initiating RCT

Results/Treatment outcomes

Endodontic Outcome	Prosthetic Outcome
Endodontic therapy was initiated at 1 week following replantation, amoxicillin 500mg TID 7 days prescribed	Lost #7: prosthetic replacement via single wing Maryland bridge on #6 discussed until patient is >18yo for implants or alternative fixed/removable tx
8 week f/u: negative radiographic/clinical pathology (i.e. PARL, discoloration, abscess, pain, fistula, inc mobility, neg percussion/palpation)	9 week f/u: #6 Preparation of rest seats and impression. Shade selection performed
10 week f/u: negative radiographic/clinical pathology, "hollow" percussion sound indicated ankylosis as opposed to atraumatic dentition	12-week f/u and Maryland bridge insertion: #8 ankylosis is observed, no mobility. Insertion of Maryland bridge #6-8, Occlusion verified, functionality and esthetics evaluated

Clinical Relevance

Following four factors have the strongest impact upon PDL healing: Stage of root development; length of dry extra-alveolar time; immediate replantation; length of the wet period (saliva/saline). Non-physiological storage, such as homemade saline and sterilizing solutions always led to root resorption. The common denominator for all these factors related to PDL healing is associated with the survival of the PDL cells on root surface. Based on these findings, immediate replantation is recommended irrespective of stage of root development despite extraoral dry time >60min. This clinical case reveals replantation with immediate RCT has promising prognosis despite >17 hour extraoral dry time.

CONCLUSION

Delayed replantation has poor long-term prognosis. The PDL becomes necrotic and is not expected to regenerate. The expected outcome is ankylosis-related (replacement) root resorption. However, to restore esthetics, function, alveolar bone contour, width, and height for future prosthetic treatment, the decision to replant a permanent tooth is almost always correct even if the extra-oral dry time is >60 minutes. It is also important to replant the tooth as soon as possible. Educating teachers, nurses, patients, and parents for immediate replantation at the site of injury can be helpful in improving prognosis of replanted teeth.