

# The management of a child with multiple dental injuries

## A CLINICAL CASE REPORT

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## Abstract

1 in 5 children experience traumatic dental injury (TDI) to their permanent anterior teeth before leaving school (O'Brien, 1994). Out of these injuries, dental avulsion accounts for 0.5 to 3% of dento-alveolar trauma to permanent teeth (Andreasen and Andreasen, 2007).

A tooth that has experienced avulsion alongside other dental injuries can give rise operator confusion, misdiagnosis and lead to unclear treatment strategies, particularly when the guidance for the injuries sustained conflict.

This case report introduces an 8 year 8-month-old male who experienced multiple dental injuries following a bike accident. It details the distinctive clinical considerations faced following an avulsion/apical root fracture of the UL1 and its subsequent reimplantation. It also highlights the benefits that specialist led inter-disciplinary teams have in the management of complex dental trauma.

## Case details

### Relevant trauma history

27<sup>th</sup> August 2019

- Peddle bike accident - collision into a stationary van.
- Alleged avulsion of UL1: Tooth placed in milk by paramedics (30 minutes + injury).
- Oral and Maxillofacial Surgery (OMFS) Team reimplanted and splinted UL1 under local anaesthetic (6.5 hours + injury).
- Referral to Glasgow Dental Hospital (GDH) Paediatric Dental Department.

Patient attended with his mother (02/09/2019).

### Initial presenting complaints

- Appearance
- Mobility
- Functional issues eating
- 'Traumatised' from experience in hospital (heightened anxiety)

### Medical History

- Fit and well
- Allergy to penicillin (rash as toddler)
- Medication: Clarithromycin (7-day course) for dental avulsion

### Clinical examination: Findings

*Extra oral (Figure 1)*

- Superficial, crusting lesions to philtrum, left nasolabial sulcus, left cheek and nose



Figure 1

*Intra oral (Figure 2 and 3)*

- Composite / wire splint
- Mobility (Grade 2) UL1 and UL2
- Gingival tear UL2
- Moderate oral hygiene – localised plaque deposition to anterior dentition
- Non carious tooth surface loss (NCTSL) to primary dentition
- Stained fissures LLE and LRE



Figure 2

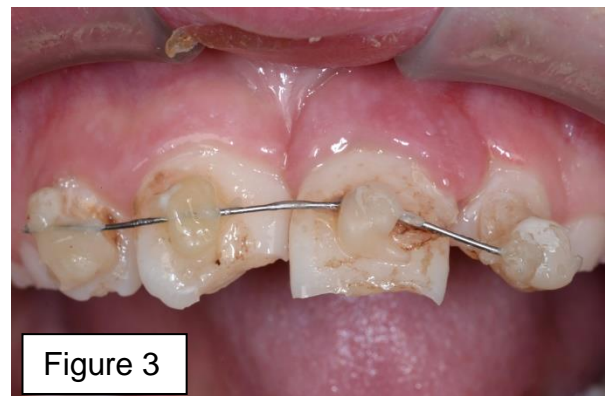


Figure 3

*Charting*

Occlusal amalgam	NCTSL	NCTSL	NCTSL	Splint E #	Splint ED #	Splint ED #	Splint ED #	NCTSL	NCTSL	NCTSL	Stained fissure
6	E	D	C	2	1	1	2	C	D	E	6
6	E	D	C	2	1	1	2	C	D	E	6
Fissure sealant	NCTSL stained	NCTSL	NCTSL					NCTSL	NCTSL	NCTSL stained	Fissure sealant

*Occlusal findings*

- Skeletal Class I
- Class I Incisor relationship - proclined maxillary central incisors with reduced and complete overbite
- Low smile line

Radiographic findings

Orthopantomogram (OPG) from OMFS (27/08/2019) (Figure 4) shows:



- Full complement of permanent successors excluding UR8, UL8 and UL1
- Borders of mandible and condyles intact

An upper standard occlusal (USO) and periapicals (PAs) (02/09/2019) show (Figures 5):

- Displacement of UL1 with non-union apical root fracture
- Suspected fracture line of alveolus (UL1 , UL2)
- Enlarged periodontal ligament (PDL) to UR1, UL1 and UL2
- Pipette shaped roots UL1 and UR1
- Suspected closed apices UR1 and UL1
- Open apices UR2 and UL2



### Sensibility testing

Not performed - limited patient compliance

Diagnoses:

- UR2 (12)
  - Concussion
  - Enamel fracture
- Labial plate (alveolar) fracture
- UR1 (11)
  - Subluxation
  - Enamel dentine fracture
- UL1 (21)
  - Avulsion crown and 2/3 root (extraoral dry time (EODT) of 30 minutes, extraoral time (EOT) of 6.5 hours)
  - Apical root fracture with non-union
  - Enamel dentine fracture
- UL2 (22)
  - Subluxation
  - Enamel dentine fracture.
- NCTSL of primary dentition
- Suspected caries LLE and LRE

Treatment Plan:

*General Dental Practitioner (written correspondence):*

- Enhanced Prevention Plan following the guidance; 'Prevention and Management of Dental Caries in Children' (SDCEP, 2018).
- Bitewings
- Caries management
- Investigate NCTSL and monitor

Table 1 summarises immediate and intermediate treatment undertaken, including results of ethyl chloride (EC) and electric pulp tests (EPT):

Table 1

DOI	27/08/2019
<b>Management protocol: GDH</b>	
<b>Assessment</b> 02/09/2019 (+6 days)	Clinical and radiographic assessment Confirmation of plan
<b>Immediate management</b> 04/09/2019 (+8 days)	Under Inhalation Sedation: <ul style="list-style-type: none"> <li>- Splint replacement</li> <li>- Reposition UL1</li> <li>- Extirpation UL1 to fracture line</li> <li>- Flowable composite over exposed dentine UR1, UL1, UL2</li> </ul>

<b>Follow up (from 04/09/2019)</b>				
<b>Tooth</b>	<b>UR2</b>	<b>UR1</b>	<b>UL1</b>	<b>UL2</b>
Clinical review (RV) 10/09/2019	EPT 54 EC +	EPT 48 EC +	EPT N/A EC -	EPT 41 EC +
18/09/2019 Radiographic RV		Definitive restoration	NS Ca(OH) <sub>2</sub> Definitive restoration	
04/10/2019 Clinical and radiographic RV	EPT 66 EC + Splint removal	EPT 37 EC + Splint removal	EPT N/A EC – Splint removal	EPT 45 EC + Splint removal
14/11/2019 Clinical and radiographic RV	EPT 31 EC +	EPT 48 EC +	EPT N/A EC –	EPT 54 EC +
04/01/2020 Apexification UL1			Mineral Trioxide Aggregate (MTA)	
28/02/2020 Restoration UL2				Definitive restoration
6 months March 2020 Clinical and radiographic RV			Y	
1 year September 2020 Clinical and radiographic RV	Y	Y	Y	Y

In detail

*Immediate management GDH*

UL1 showed non-union of fracture and mild extrusion following repositioning (Figure 5 and 6). Splint removal confirmed a labial plate fracture without full width alveolar involvement. A flexible splint was extended to include ULC (Figure 7). UL1 was accessed and necrotic pulp contents removed.

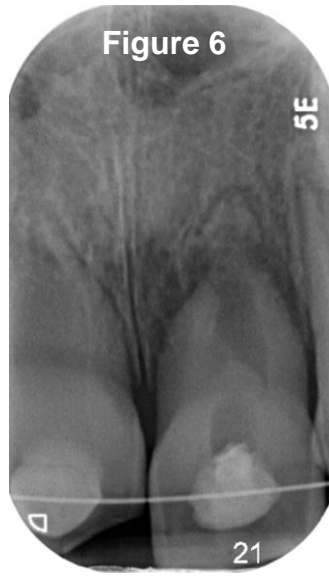
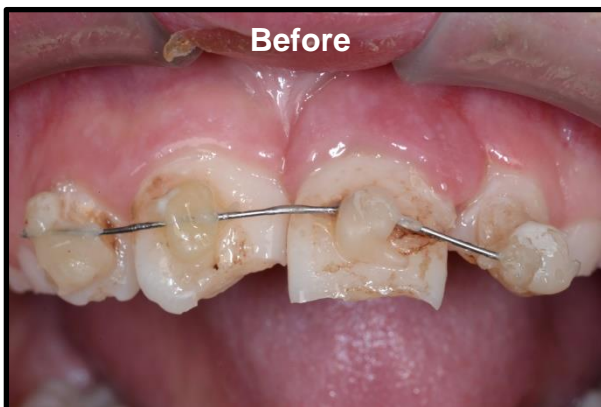


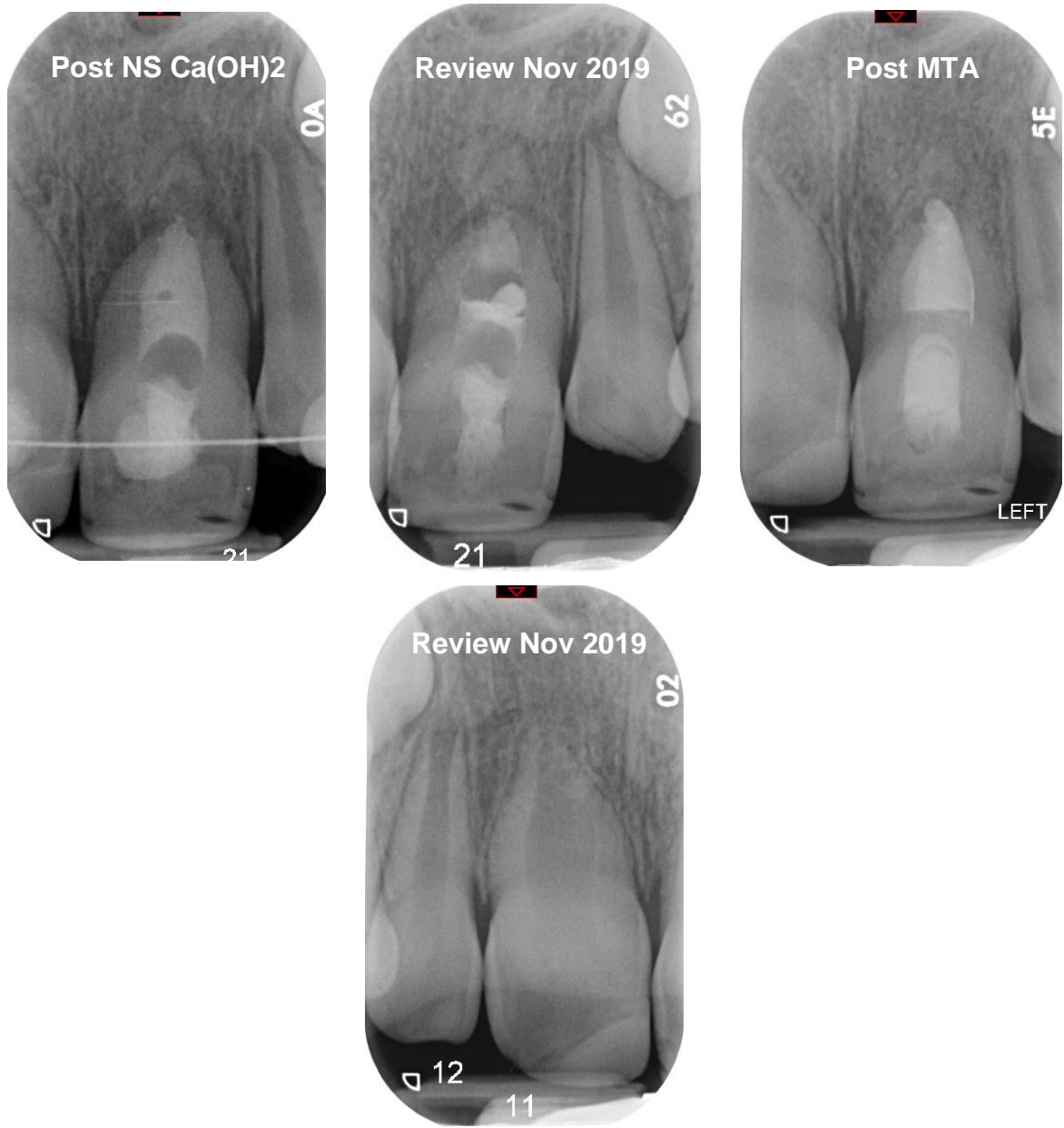
Figure 7



Non-setting calcium hydroxide was dressed in the UL1. Definitive replacement with MTA to the height of the cementoenamel junction was placed due to the unique canal anatomy.

The UL1, UL2 and UR2 remained absent of infection/signs of pathology. The post MTA radiograph showed the UL1 to have loss of PDL and a poorly defined root surface, suggestive of external replacement resorption.

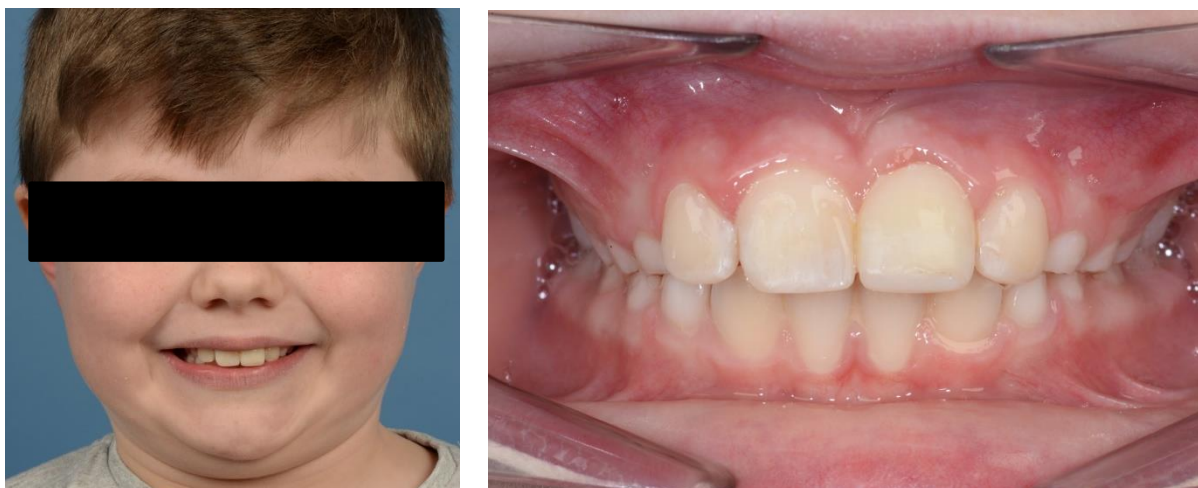
Figure 8





Definitive composites were placed (Figure 9).

Figure 9



Future reviews have been arranged in March and September 2020.

## Discussion

### *Splinting considerations*

Flexible splinting is recommended for dental injuries to maintain physiological mobility, optimise healing outcomes and prevent pulp necrosis and external root resorption (Kristerson and Andreasen, 1978).

With the multiple injuries sustained by UL1 having different recommended splinting times (Table 2), considerations were made as to whether the duration should be 2 or 4 weeks, if it should run from the point of replacement (04/09/2019) or initial placement (27/08/2019), and if these factors would influence healing outcomes.

Table 2

Dental injury	Subluxation	Avulsion 'open apex'	Apical root fracture
<b>Splinting times</b>	2 weeks (optional)	2 weeks	4 weeks

### *Evidence*

With an EOT of 6.5 hours, the UL1 has a poor chance of cemental/PDL healing and an expected outcome of ankylosis (Day et al, 2012). Other literature outlines periodontal outcomes being unaffected by splinting duration between short-term (0-14 days) and longer-term (+14 days) (Hinckfuss and Messer, 2009., Kahler and

Heithersay, 2008). In this instance, the splint was placed for 4 weeks, with duration commencing at the point of splint replacement.

### *Long term implications*

The patient and his parents have been informed that UL1 has a poor prognosis and is acting as a space maintainer until the appropriate time arrives for its replacement. Clinically, this may be when there is more than 1mm discrepancy in the gingival margin of UL1 compared to a contralateral non ankylosed tooth (Day and Gregg, 2012). Depending on healing outcomes, options for UL1 include:

- Extraction (with or without the apical fragment)
- Decoronation with root burial
- Maintenance with composite veneer – this is currently not a viable option due to long term compromised aesthetics.

Replacement options include:

- An upper removable appliance
- A resin retained bridge (when maxillary permanent canines have erupted)
- An implant (when growth complete).

## **Conclusion and clinical implications**

Long term clinical success of complex dental trauma is dependent on initial dental diagnoses, comprehensive treatment planning and multiple patient factors.

In this case, Consultant-led paediatric dental trauma support, with standardised record templates, assisted in achieving a successful short-term outcome. The provision of immediate management under inhalation sedation also proved critical in rebuilding the patient's confidence in dentistry.

Considering the long-term complications of multiple dental injuries, and the potential treatment burden a child may face throughout their childhood, patient-reported outcomes and experiences should be factored into clinical outcomes. This will give rise to more meaningful and qualitative data collection.

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