

## **Polytrauma in the Course of Orthodontics**

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## ABSTRACT

**Introduction** Traumatic dental injuries are a frequent occurrence and as such guidelines are readily available. The age bracket is not dissimilar to fixed appliances and in the few where these coincide application of clinical judgement and additional evidence are dictated. **Case Details** We report the management of a 15-year-old girl with avulsion and subluxation injuries sustained during active orthodontic treatment. The aim being a shared address of queries that arose regarding splinting, influence on ongoing tooth movement and outcome information for patients. **Discussion** Immediate and urgent phases were undertaken in secondary care. The teeth were stabilised after replantation and fixed appliance repair with an 0.018" nickel titanium archwire, before root canal treatment. Described is the gold standard that culminated in favourable outcomes and is a corollary of the multidisciplinary team approach. **Conclusion and Clinical Implications** Best practice for dental trauma in the orthodontic patient is not universal. Instead, individual scenarios should be guided by experience (or onward referral), expert opinion and individual case reports in the absence of available studies. *Written informed consent for publication of their clinical details (NOT clinical images) was obtained from the patient/parent/guardian.*

## INTRODUCTION

We report an adolescent female who injured multiple teeth while undergoing fixed appliance therapy. The main reason for selecting this case was not for rarity or novel treatment but conversely regarding key takeaways from a problem likely to be encountered in daily practice. Background figures taken from the latest Children's Dental Health Survey suggest around one in ten children have experienced dental trauma (Pitts, Chadwick, & Anderson, 2015). This is synonymous with the proportion in the orthodontic population before treatment (Bauss, Rohling, & Schwestka-Polly, 2004). These figures then tail off during treatment, which coincides with a grey area in research on which to base practice for this scenario (Kindelan, Kindelan, Spencer, & Duggal, 2008). A chronological account of clinical details will be succeeded by acknowledgement of relevant evidence, mistakes and lessons.

## CASE DETAILS

### History

Referral from emergency department to oral and maxillofacial surgery for avulsion. Attended with mother who recounted that the mechanism of injury was syncope after inhalation of helium approximately. Medically, the patient was fit and well and tetanus status was that of an adequate priming course of vaccine (last dose within 10 years). Regular dental attender and orthodontics underway in primary care.

### Examination

Extraoral NAD

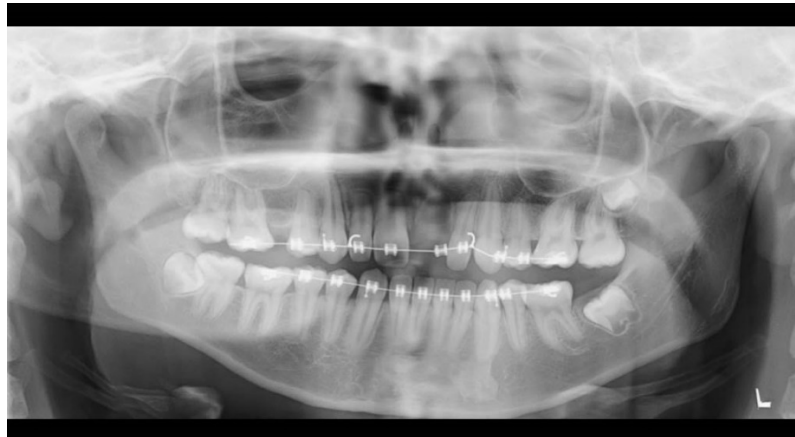
Intraoral Minimal 1 x 0.25 cm laceration wet mucosa lower lip, fixed appliances in place, UL1 missing, UL2 grade 2 mobile and UL3 tender to percussion

Special investigations

OPT

Selection criteria – baseline radiograph, setting restricted intraoral views

Quality rating – diagnostically acceptable ('A')





Report –

- 7 6 - 4 3 2 1	- 2 3 4 - 6 7 (UE 8)
(UE 8) 7 6 5 4 3 2 1	1 2 3 4 - 6 - (UE 8)

Good bone levels, generalised root blunting and no evidence of displacement or root fracture but additional view needed to rule out

Diagnoses

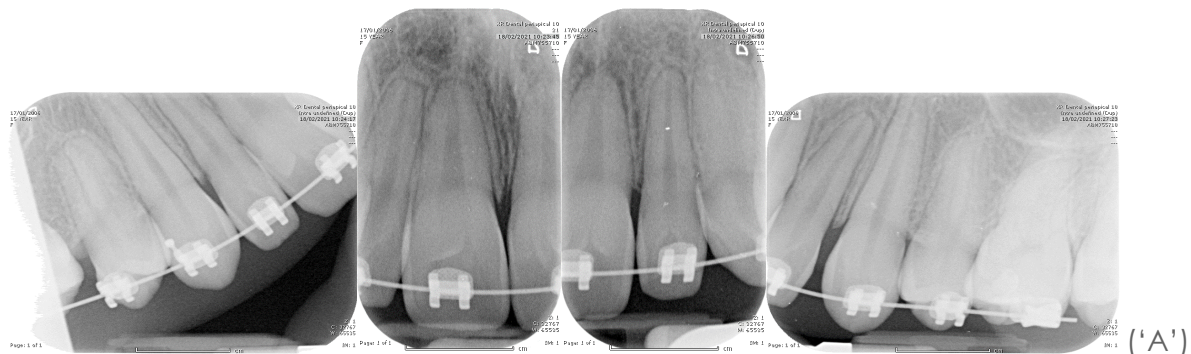
Avulsion UL1	Subluxation UL2	Concussion UL3
		

## Treatment

Immediate Replantation (EO time ~2 hours – 30 minutes dry and 90 in physiologic medium), in lieu of a traditional splint rebonded lost bracket UL1 and dropped down to an 0.018" nickel titanium archwire on the advice of orthodontic consultant, tetracycline prescribed and presuming pulp necrosis onward referral made

Urgent 2/52 restorative trauma clinic, asymptomatic after an initial period of gingival sulcus bleeding and cold sensitivity and examination rounded off with a stamp and periapicals

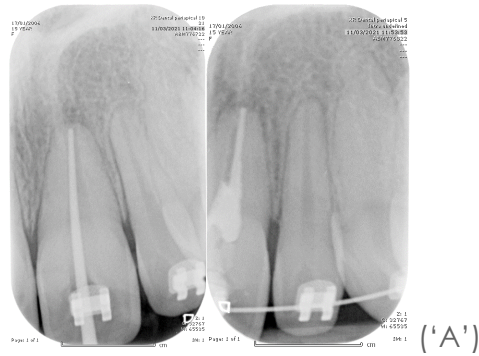
	UR3	UR2	UR1	UL1	UL2	UL3	UL4
Colour	-	-	-	-	-	-	-
Mobility	-	-	-	1	1	-	-
TTP	-	-	-	-	-	-	-
Ethyl chloride	✓	-	✓	✓	-	✓	✓
EPT	6	2	2	8	3	3	3



Interpretation and supplemental report – UL1 exhibits increased periodontal ligament space apically and collective findings indicate asymptomatic irreversible pulpitis

Restorative plan Root canal treatment UL1

- 1/52 – rubber dam, access, extirpation with barbed roach and 10k file to 22.5mm (nil bleeding or pulp tissue), irrigation with 3% sodium hypochlorite, calcium hydroxide dressing and temporised with cotton wool and Cavit



- 2/52 – k-files, sizes 20, 25 and 30, then F3, F4 and F5 used to radiographic apex ~23mm, electronic working length confirmed (above left), obturation with zinc oxide eugenol sealer and F5 and F3 gutta percha cones using cold lateral condensation and warm vertical compaction, restoration with composite and quality of filling checked with radiograph (above right) showing full length obturation well condensed coronally, however apical 1/3<sup>rd</sup> has a mesial void

Monitoring UL2 and UL3

Follow-up

On completion of acute treatment, discharged to GDP and orthodontist accompanied by detailed advice letter. Correspondence received confirming favourable outcomes at all intervals, currently as far as one year.

## DISCUSSION

Diagnosis was two-part and akin to acute trauma and endodontic treatment true to guidelines (American Association of Endodontists, 2013; European Society of Endodontology, 2006; Levin et al., 2020). Prescriptive in action needed, but less so technique, the evidence base and expert opinion served to inform choices. Wire and composite splints are commonplace primarily because of ease of application. However, in this scenario use of the brace in situ was far more suited to fulfil such a requirement. This was also apposite of secondary care where lone working and less-than-ideal environments are the norm. Both approaches challenge Andreasen's ideals, specifically removal without damage to teeth and not irritating soft tissues respectively. Arguably, orthodontic wax offers a simple resolution to lip irritation (Kahler, Hu, Marriot-Smith, & Heithersay, 2016). Concerning root canal treatment, where possible clinical factors were carefully considered for their positive influence on outcome (Ng, Mann, Rahbaran, Lewsey, & Gulabivala, 2008). A critique would be time to endodontics that was outside of the optimal 1-2 week window after replantation heightening infection potential. The greatest learning was surrounding orthodontic considerations, understanding and communicating that care will be prolonged with potential revision of original goals and prognosis is not guaranteed, risks being resorption, pulp necrosis and ankylosis (Sandler et al., 2021). Similar publications are lacking, perhaps because the value of educational reports is overlooked.

## CONCLUSION AND CLINICAL IMPLICATIONS

Literature often describes a very formulaic approach to dental trauma. While this widens the applicability, it lacks address of the minutiae posed by individual presentations. Ergo, the clinical relevance is pragmatism by serving as a reference to one example of successful management in a complex orthodontic case.

**Word count 1000**

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