What goes up must come down: management of an intruded tooth

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ABSTRACT

Twenty five percent of all school aged children experience Traumatic Dental Injuries (TDIs).[1] Clinical management of acute TDIs can be challenging in even the most co-operative patient. In the paediatric cohort this can be further complicated by lack of clinical experience, dental anxiety, and ability to cope with invasive treatment after a traumatic event.

This case report discusses the treatment journey of a 9-year-old following intrusion of an upper central incisor. Management of the acute injury included a period of active monitoring followed by placement of a sectional orthodontic appliance to reposition the displaced tooth. Given the risk of pulp necrosis in intruded teeth with open apices is approximately 50% [2] and the risk of external replacement resorption (ERR) can be up to 57%,[3] it was imperative that this tooth was repositioned to maximise scope for future restorative intervention.

Following a diagnosis of external inflammatory resorption (EIR), endodontic treatment was initiated. Considerations were made to the nature of the injury, co-operation of the child for interventive treatment and likely onward sequalae, specifically including ankylosis. This was especially prudent given the child was actively growing, increasing the risk of future infra-occlusion.[4] In view of this, the tooth was dressed for a period of 12 months with a calcium-hydroxide iodoform paste. After a review at six and twelve months, given EIR had halted and ankylosis was not identified, this tooth was then obturated. Importantly, with minimal intervention, a positive dental relationship was maintained.

CASE DETAILS

History

- 9-year-old Female; fit and well
- Fell off a swing 3 days prior
- Presented to A&E, cleared of a head injury
- Presented to her General Dentist who referred onwards for specialist-led care

Examination

- Initial examination difficult due to soft tissue swelling
- Nil of note extra-orally

Special investigations

- Sensibility testing not carried out at initial appointment due to discomfort
- Clinical photographs taken
- UR2, UR1, UL1, UL2 tender to percussion; non-mobile
- Upper standard occlusal taken at initial assessment; periapicals not possible due to discomfort

Diagnoses

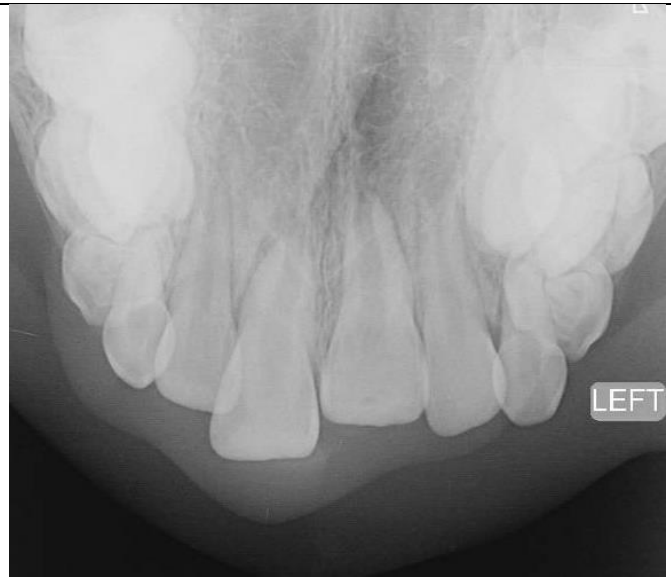
- **UR2 [open apex]:** Concussion
- **UR1 [open apex]:** Subluxation, less than grade1 mobile, crevicular bleeding
- **UL1 [open apex]:** Intrusion (5mm), enamel fracture
- **UL2 [open apex]:** Subluxation, less than grade1 mobile, crevicular bleeding
- Mild gingival de-gloving injury
- Molar-incisor hypomineralisation:
    - mildly affected: UR6, UL6, LL6, LR6
    - enamel opacities: UR1, LL2, LL1, LR1
- Dentally delayed
- Moderate upper and lower crowding; anterior and posterior crossbites
- Dental anxiety

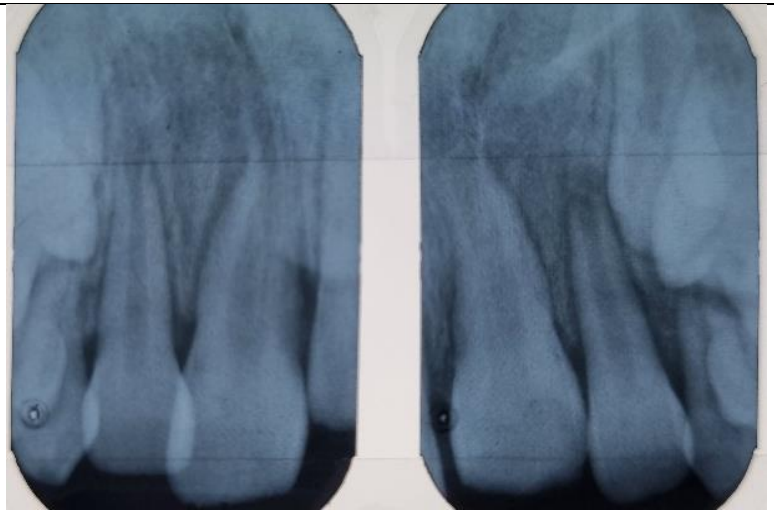
Management and Follow-up summary

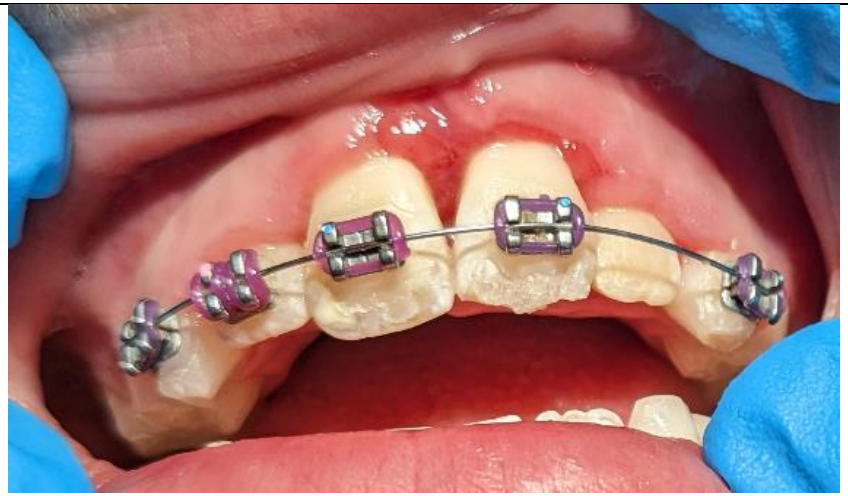
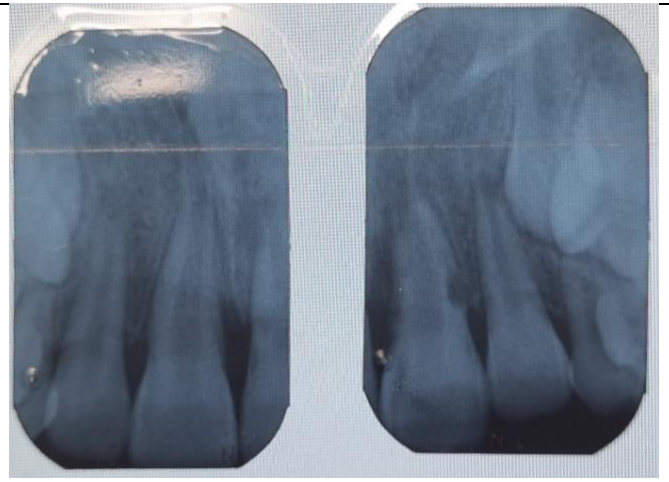
Timeframe *[post trauma]*	**On examination** [clinical / radiographic]	**Treatment**	**Justification**
3 days [initial]	• Per diagnoses above	• Conservative management • Await spontaneous re-eruption	• Per IADT guidelines [1], allow re-eruption without intervention for all intruded teeth independent of the degree of intrusion
2 weeks	• UL1: no re-eruption • Purulent discharge attributed to soft tissue trauma • Sensibility testing [CO_2 and Electric Pulp Testing (EPT)] positive for all anteriors with exception of UL1	• Amoxicillin 500mg TDS 5-day course prescribed • Oral hygiene instructions reinforced	• Treatment of localised soft tissue infection
4 weeks	• UL1: no re-eruption • Soft tissues beginning to heal • Sensibility testing (CO_2 and EPT) positive for all anteriors with exception of UL1	• Sectional fixed appliance placed to orthodontically extrude UL1	• Per IADT guidelines[1] - If no re-eruption within 4 weeks, initiate orthodontic repositioning • Need to re-approximate UL1 given high risk of pulp necrosis, EIR and subsequent need for endodontic treatment
6 weeks	• Position of UL1 improved; incisal and gingival levels almost coincident with UR1 • Bracket de-bonded UL2 • Soft tissue healing further • Sensibility testing (CO_2 and EPT) positive for all anteriors with exception of UL1	• Sectional fixed appliance left in situ	• Sectional appliance left in situ to ensure optimal positioning of UL1 • Bracket UL2 not re-bonded to avoid unwanted orthodontic forces on this tooth
8 weeks	• UL1 incisal and gingival level coincident with UR1 • Soft tissue almost healed • Sensibility testing (CO_2 and EPT) positive for all anteriors with exception of UL1 [UR1 and UL2 delayed] • Resorptive defect noted UL1	• Sectional appliance removed • Consent taken for extirpation of UL1 with local anaesthetic and inhalation sedation	• No further active forces required • Clear resorptive defect UL1, indicating pulp necrosis, requiring pulp extirpation • Dental anxiety and first experience of LA; inhalation sedation required
3 months	• UL1 position stable • Sensibility testing (CO_2 and EPT) positive for all anteriors with exception of UL1 [UR1 and UL2 delayed]	• Necrotic pulp UL1 extirpated • Vitapex [calcium hydroxide and iodoform] intra-canal medicament placed	• Vitapex has good stability in the medium-term when compared to calcium hydroxide alone[5]

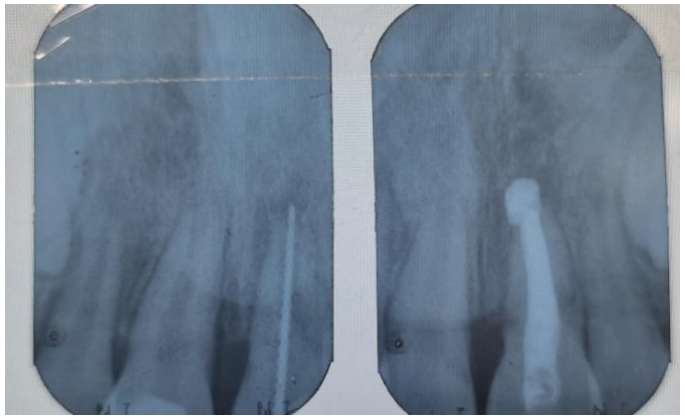
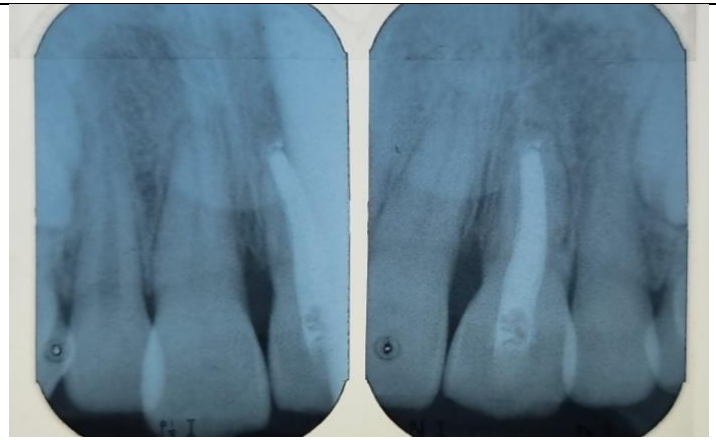
6 months	• UL1 position stable • Vitapex dressing stable, no clinical or radiographic signs of ankylosis or infra-occlusion • No progression in resorptive lesion • Pulp canal obliteration commencing UR1 and UL2	• No treatment carried out	• Dressing stable and not requiring change • Decision not to re-access this tooth in short term, to evaluate if further resorption occurred and assess if ankylosis and infra-occlusion were to occur
1 year	• UL1 position stable • Vitapex dressing stable, no clinical or radiographic signs of ankylosis or infra-occlusion • No progression in resorptive lesion • Pulp canal obliteration established UR1 and UL2	• Appointment made to obturate UL1 with MTA and thermal GP	• No clinical or radiographic signs of ankylosis • No progression of EIR • Patient had a reasonable break between treatment appointments, maintaining cooperation
1 year 2 months	• Per last visit	• UL1 obturated with MTA and thermal GP with local anaesthetic and inhalation sedation • Composite added to incisal edge	• Justification for RCT as above • Composite added due to small enamel fracture • Care taken not to overextend composite as edge-to-edge bite
2 years	• UL1 position stable, tooth slightly dark • No clinical or radiographic signs of ankylosis UL1 • UR1 and UL2 complete pulp canal obliteration	• Patient discharged to General Dentist	• Emergency and short-term management completed

Photographic and Radiographic Timeline

Timeframe *[post trauma]*	**Photograph**	**Radiograph**
Pre-trauma Four months prior to injury		
3 days		

2 weeks		
4 weeks		

6 weeks		
8 weeks		

3 months		
6 months		

1 year		
1 year 2 months		

2 years		 

DISCUSSION

Comprehensive, evidence-based guidelines exist on the management of TDIs, including endodontic management.[1] Placement of calcium hydroxide and repeat dressing changes is recommended until resorptive lesions disappear;[1] this requires regular intervention and good patient co-operation.

Calcium hydroxide and iodoform combination intra-canal medicaments have demonstrated good stability, up to 29 months in traumatised teeth.[5] This allows time to establish if EIR has halted and if signs of ankylosis are present, whilst also preventing patient fatigue and burnout caused by repeat intervention.

In this case, the UL1 remained stable and was then obturated. Consideration could have also been made to obturating wholly with a biocompatible material (e.g. biodentine) to combat the risks associated with EIR and ERR. Additionally, had ankylosis been identified within the review period, in a child of nine years old, decoronation or extraction may have been warranted.[6]

Being aware of the impact of repeat interventions in this case has facilitated a positive outcome whilst keeping the patient on side. This will aid in provision of future dental endeavours, e.g. orthodontic treatment.

CONCLUSION AND CLINICAL IMPLICATIONS

Whilst it is important to refer to clinical guidelines when dealing with TDIs, care must be taken to concomitantly manage the child's needs; staging treatment appropriately, whilst being mindful of their future dental pathway.

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