MANAGEMENT OF SEVERE INTRUSIVE LUXATION IN PERMANENT TEETH WITH IMMEDIATE SURGICAL REPOSITIONING

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ABSTRACT

Intrusion injury is one of the rarest and most severe type of dental trauma. It is the apical displacement of a tooth into the alveolar bone, affecting deciduous and permanent teeth.

Treatment modalities include spontaneous re-eruption, or surgical or orthodontic repositioning. For teeth with mature root formation, repositioning is essential.

This case illustrates a 27-year-old female patient with severe intrusive luxation of her maxillary canine (UL3) and lateral incisor (UL2) with concomitant soft tissue injuries and dentoalveolar fracture. There was also subluxation of the maxillary first premolar (UL4).

The intruded teeth were digitally repositioned and immobilised with a flexible wire and resin composite splint.

Due to the degree of intrusion, the UL23 were extirpated and dressed with calcium hydroxide. The splint was left in-situ for 3 months, after which root canal treatment was completed.

Clinical and radiographic examination 6 months later showed good healing.

This report aims to emphasise the value of following basic principles and existing evidence base in dental trauma management, allowing for successful outcomes in even the most severe cases.

INTRODUCTION

Intrusive luxation compromises up to 3% of traumatic dental injuries, and is thus one of the rarest to be sustained (n=4,062). During apical displacement of a tooth into the alveolar bone, compression injury damages the neurovasculature at the apex, and the tooth-supporting structures, including periodontal ligament, gingivae and alveolar socket wall [1].

Treatment modalities for teeth with mature root formation include orthodontic or surgical repositioning, or extraction and space replacement. Surgical repositioning is preferred over orthodontic repositioning for severe intrusion (> 7mm) [2].

UK primary care dentists have high confidence in managing simple traumatic dental injuries, but less for complex injuries. This report aims to illustrate the value of following existing evidence-based guidelines, allowing for successful outcomes in even severe cases [3].

CASE DETAILS

History

A 27-year-old female patient sustained traumatic dental injury after falling in a bar on Sunday morning (01:00 AM). She fell face first onto concrete, caught between two flowerpots.

Following clearance for head and C-spine injury on Sunday at an emergency department, she visited her general dental practitioner on Monday who referred her to secondary care. On Tuesday, the patient was seen at King's College Hospital.

Medically, the patient was fit and well, with no allergies. She was a non-smoker and worked as a merchandiser.

Clinical Examination

Extra-oral examination revealed injuries as seen in Figure 1.

Figure 1 *Extra-oral clinical photograph illustrating the patient's extra-oral soft tissue injuries of lip bruising, slight swelling of the left cheek and skin abrasion in the left chin region at presentation.*

Intra-orally, the patient demonstrated good oral hygiene and healthy gingivae. A gingival tear was present distal to the UL3.

Hard tissue examination featured an unrestored, caries-free dentition. The UL3 and UL2 were apically displaced, with shorter clinical crowns. There was crackling of UL23 alveolar bone to palpation. The UL4 displayed slight mobility (Figures 2, 3).

Figure 2 *Intra-oral clinical photograph (front-view) illustrating hard tissue and concomitant soft tissue injuries at presentation.*

Figure 3 *Intra-oral clinical photograph (left lateral view) illustrating hard tissue and concomitant soft tissue injuries at presentation.*

Special investigations

Radiographic examination included an upper standard occlusal (Figure 4) and long-cone peri-apical radiographs of UL23 and neighbouring teeth (Figure 5).

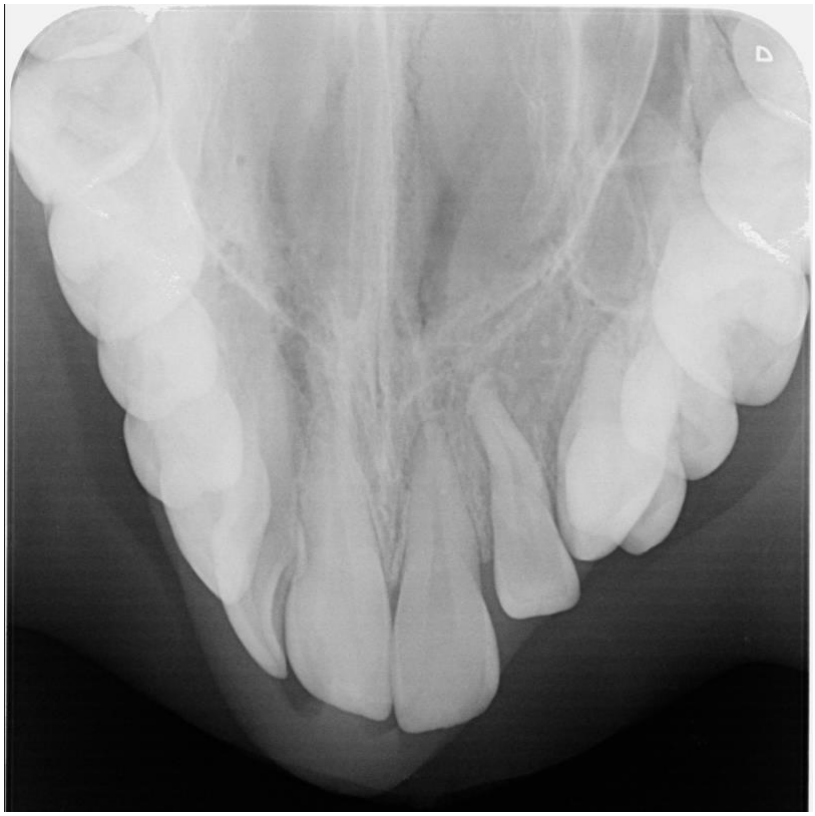

Figure 4 *An upper standard occlusal radiograph on the day of presentation, showing otherwise good bone levels. The UL23 cemento-enamel junction lies apical to crestal bone, indicative of intrusive luxation.*

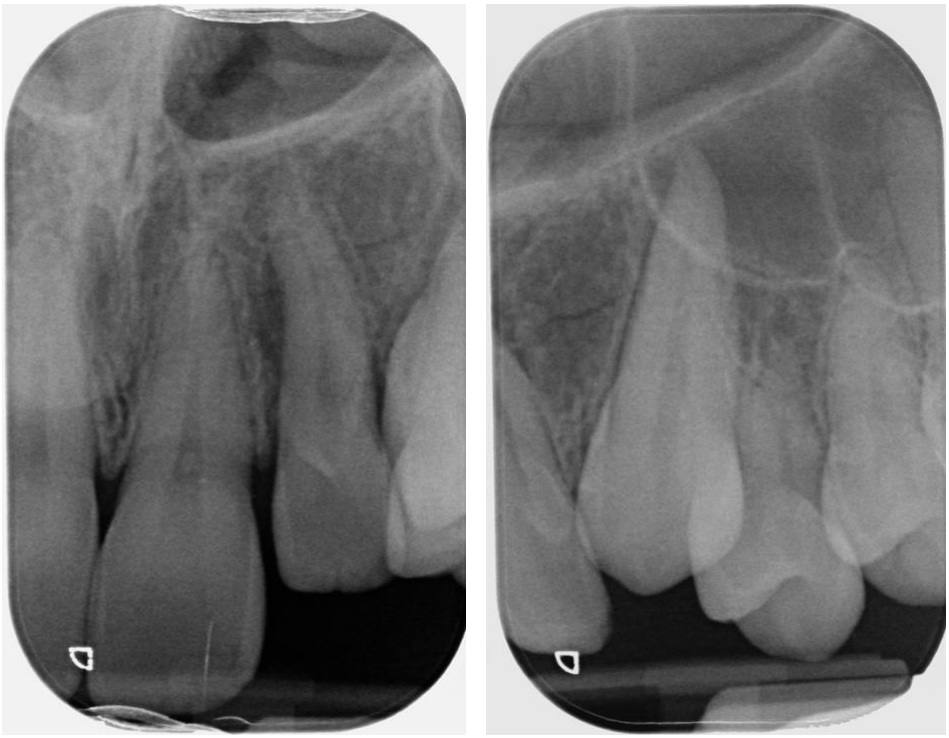

Figure 5 *Long cone peri-apical radiographs of the UL1234 on the day of presentation, showing otherwise good bone levels.*
The UL1 and UL4 display an intact periodontal ligament.
The displacement of the UL23 CEJ apical to crestal bone can be seen again, with loss of periodontal ligament space more evident.
Radiolucent lines of the UL23 alveolar bone are indicative of dentoalveolar fracture.

Diagnoses

Soft Tissues
1. Gingival tear distal to UL3

Hard Tissues
1. UL2 and UL3 severe intrusive luxation with concomitant dentoalveolar fracture
2. UL4 subluxation

Treatment

Under local anaesthesia (buccal and palatal infiltrations (2% articaine with 1:100,000 adrenaline)), the intruded teeth (UL23) were digitally repositioned. A flat plastic was used interproximally to disengage the intruded teeth from the alveolar bone, without traumatising the cementum. The crowns were then repositioned using thumb and index finger.

The UL23 were temporarily secured with Triad™ (Dentsply Prosthetics, Pennsylvania, USA) on the incisal edge, to aid immobilisation with a flexible wire (0.016") and resin composite splint.

The UL3 distal papilla and gingival tear were sutured with 4-0 Vicryl (resorbable) sutures (Figures 6, 7, 8).

Figure 6 *Intra-oral clinical photograph (front-view) post immediate management.*

Figure 7 *Intra-oral clinical photograph (left lateral view) post immediate management.*

Figure 8 *Intra-oral clinical photograph (occlusal view) post immediate management.*

Due to the injury severity, UL23 pulp extirpation was arranged. Calcium hydroxide was used as an intra-canal dressing.

Despite an agreed splinting period of 4 weeks, the splint was left in-situ for 3 months as the patient failed to attend appointments (Figures 9, 10).

Figure 9 *Intra-oral clinical photograph (left lateral view) 3 months post immediate management, before splint removal.*

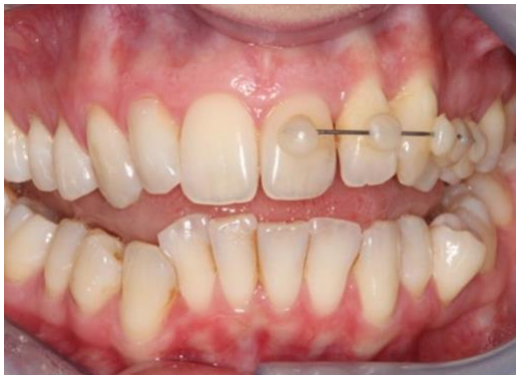

Figure 10 *Intra-oral clinical photograph (front-view) 3 months post immediate management, before splint removal.*

UL23 root canal treatments were completed under rubber dam isolation. Working length was confirmed using an apex locator and working length radiograph (Figure 11). Chemo-mechanical debridement and canal preparation was performed using K-flex and Protaper hand files, with careful and copious irrigation using sodium hypochlorite (3%). Obturation was performed via cold lateral condensation. Final restorations provided used resin-modified GIC (Fuji IX) underlying composite resin (Figures 12, 13, 14).

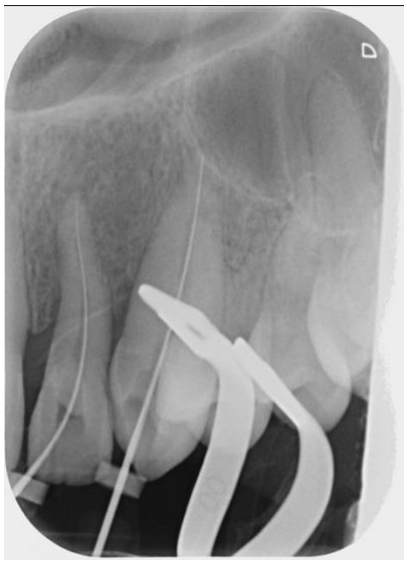

Figure 11 *UL23 Working length radiograph.*

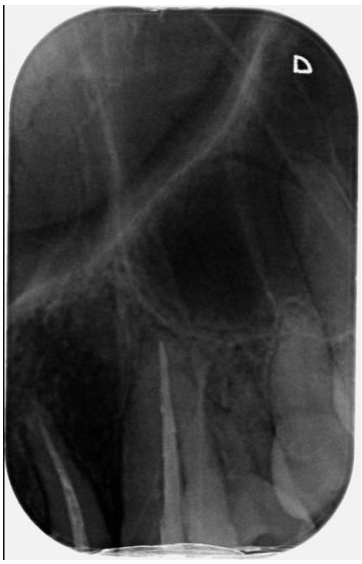

Figure 12 *UL23 Master cone fit radiograph with the master cones within 1mm of the radiographic apices.*

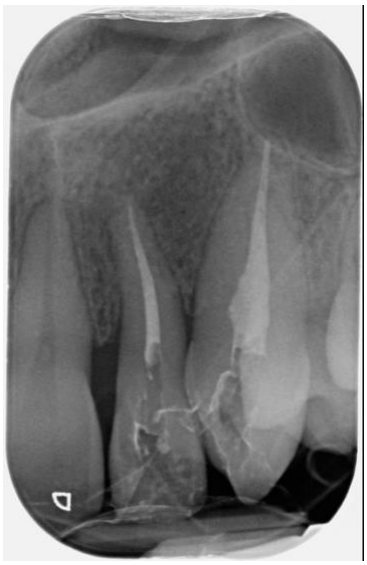

Figure 13 *UL23 Mid-fill radiograph.*

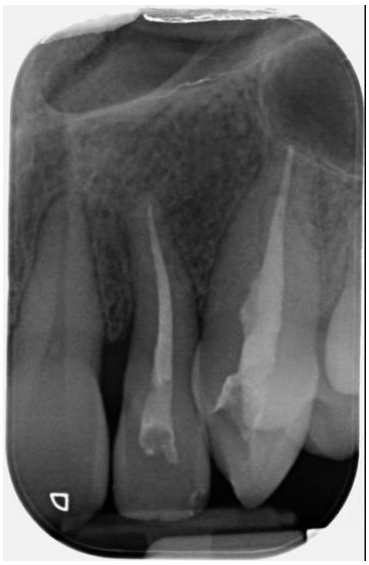

Figure 14 *UL23 post-operative obturation radiograph. The obturation of both teeth are well condensed, within 1mm of the radiographic apex, and confirm to the original anatomy of the root canal systems.*

Follow-up

6-month review showed favourable outcomes in line with IADT guidelines [2].

Clinical healing was suggested by lack of pain, swelling, discolouration, sinus formation or mobility. There was aesthetic compromise, with mild UL3 buccal gingival recession (Figures 15, 16, 17). Radiographic healing was indicated by lack of apical periodontitis or external inflammatory root resorption.

Future reviews will be once yearly for 5 years [2].

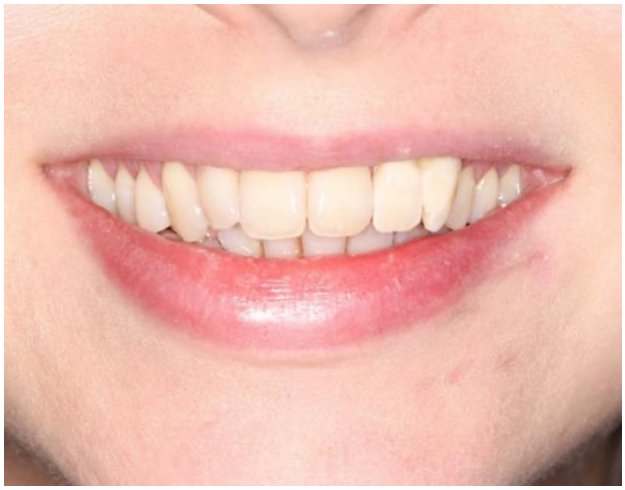

Figure 15 *An extra-oral clinical photograph at 6-month review showing healing of extra-oral soft tissue injuries.*

Figure 16 *An intra-oral front-view clinical photograph at 6-month review showing retention of UL23, with mild UL3 buccal gingival recession.*

Figure 17 *An intra-oral occlusal clinical photograph showing UL23 palatal access cavities restored with composite resin.*

DISCUSSION

The aim of managing an intruded tooth is dis-impaction and movement back into its original position [4]. Alternative options include spontaneous re-eruption (generally limited to teeth with immature apices) and extraction, although the patient wished to retain her teeth.

No significant differences were reported between passive and active repositioning for mature teeth [5,6]. However, these meta-analyses included few studies, with selection and reporting bias, and lack of blinding investigators. In this case, surgical repositioning was performed due to degree of intrusion and reduced treatment time.

Resin composite splinting was compliant with IADT guidelines [2]. Alternatively, use of the titanium trauma splint could have been considered, which has additional benefits of increased ease during application and removal [7].

Prognosis has been compromised due to delayed presentation, intrusion severity and delayed splint removal (3 months as opposed to the recommended 4 weeks). Potential sequelae include pain, swelling, discolouration, sinus formation, marginal bone breakdown and external replacement or inflammatory root resorption [8,9], However, Andreasen et al. (2016) showed no significant effect on success of delayed presentation or splint removal following intrusions repositioned digitally [10]. If lost, the UL23 could be replaced with a removable partial denture.

CONCLUSION AND CLINICAL IMPLICATIONS

This case report of management of severe intrusion demonstrates the successful outcomes which can be achieved by applying relatively simple protocols from evidence-based guidelines. General dental practitioners ought to be adequately trained and supported in managing dental trauma, in order to avoid delays in treatment and optimise prognosis for patients [3].

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