

CHALLENGES IN THE MANAGEMENT OF INTRUSION INJURIES IN PERMANENT TEETH WITH EXTRACORONAL RESTORATIONS

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ABSTRACT

Intrusive luxation is a traumatic dental injury, characterised by apical displacement of a tooth into the surrounding alveolar bone. In permanent teeth, this injury is rare, comprising 0.3-1.9% of traumatic injuries in the adult dentition.

Treatment modalities for intrusive luxation include waiting for re-eruption without active intervention or repositioning, either surgically or orthodontically. There are multiple factors to consider that determine the most appropriate therapeutic intervention. These include: the severity of intrusion, age of the patient, the degree of root formation and the presence of existing restorations. Repositioning is always indicated in teeth with mature root formation.

The case presented involves a 45-year-old female patient that sustained intrusion injuries to the upper left central incisor (UL1), upper right central incisor (UR1) and upper left lateral incisor (UL2). The UL1 and UR1 were restored with porcelain fused to metal crowns. The UL2 had a concurrent enamel-dentine fracture. Management of the displaced teeth included digital (surgical) repositioning and splinting with a modified Essix retainer. This was achieved with the use of a temporary immobilisation material called Triad™ (Dentsply Prosthetics, Pennsylvania, USA). The UL2 was restored with resin composite and will be monitored for signs and symptoms of pulpal necrosis. Root canal treatment of the UR1 was undertaken due to the severity of intrusion. This report aims to emphasise the clinical challenges and considerations of managing this injury in heavily restored permanent teeth to achieve successful treatment outcomes. Further, it highlights the common sequelae to consider with intrusive luxation injuries.

INTRODUCTION

Intrusive luxation involves apical displacement of a tooth into the alveolar bone (1). In permanent teeth, this injury is rare, comprising 0.3-1.9% of traumatic injuries (2). Extensive damage is inflicted to the periodontal ligament, gingiva and alveolar socket wall via compressive forces (3). In mature teeth with closed apices, surgical or orthodontic positioning is advocated for severe intrusion (4). This case report describes the clinical challenges in managing severe intrusion injuries on teeth restored with extracoronal restorations.

CASE DETAILS

History

A 45-year-old female was referred to secondary care by her general dental practitioner regarding traumatic dental injuries sustained whilst cycling. She was knocked over by a car and fell onto the pavement hitting the left side of her face.

She did not have any loss of consciousness but sustained a laceration to her lower lip and traumatised her teeth.

She attended an emergency department who cleared her of any head injury and sutured her lower lip (Figure 1).

The patient was seen in secondary care 3 weeks following the trauma.



Figure 1. Extraoral facial view at presentation

Medically, she was fit and well with no allergies. She is a non-smoker and works as a chef.

Clinical Examination

Examination revealed marked florid gingival inflammation around the traumatised teeth with subgingival calculus deposits localised to the lingual gingival margins (Figure 2).

There were multiple missing teeth posteriorly (extracted previously due to caries). The remaining dentition was minimally restored with a carious lesion noted distally on the upper right canine (UR3).

The clinical crowns of the upper central incisors appeared short; they were firm and locked in position (Figures 2 and 3).



Figure 2. Labial view of the teeth at presentation showing upper right central incisor (UR1) 3mm intruded, upper left central incisor (UL1) 5mm intruded and upper left lateral incisor (UL2) 1mm intruded



Figure 3. Occlusal view of the teeth at presentation

Special investigations

At presentation, periapical and upper standard occlusal radiographs were taken (Figure 4 and 5).



Figure 4. Periapical radiograph. UL1 deficient crown margins, mesial/distal loss of periodontal ligament space, root filling (some voids, gutta percha within 2mm of radiographic apex). UL2 mesial radiolucency, mesial/distal widening of the periodontal ligament space, apical loss of periodontal ligament space



Figure 5. Upper standard occlusal radiograph. Good bone levels. UR2 radiolucency beneath mesial restoration. UR1 mesial/distal/apical loss of periodontal ligament space

Diagnoses

- 1) Generalised gingivitis
- 2) Caries UR3 (distal)
- 3) UL2 mild intrusive luxation & enamel-dentine fracture
- 4) UR1 & UL1 severe intrusive luxation
- 5) Acquired loss of UL4, UL678, UR4, UR678, LL6, LL8, LR678

Treatment options

Generalised gingivitis

- 1) Oral hygiene instruction
- 2) Gross scale

Caries – UR3 (distal) & Enamel-dentine fracture – UL2 (mesial/incisal)

- 1) Leave
- 2) Composite restoration

Intrusive luxation

- 1) Leave teeth in displaced position
- 2) Surgical repositioning of the teeth
- 3) Orthodontic repositioning of the teeth
- 4) Extract teeth and provide an immediate denture

Missing teeth

- 1) Leave
- 2) Resin-bonded bridges
- 3) Removal partial denture
- 4) Implants

The patient wanted to save her anterior teeth; following discussion regarding the guarded prognosis due to delayed presentation, digital (surgical) repositioning was

chosen over orthodontic, to avoid prolonged treatment times and due to the lack of posterior teeth and reduced anchorage.

The material properties of porcelain prevent the traditional method of splinting with composite resin; thus alternative splinting methods were necessary (Figure 7).

Due to the severity of intrusion, root canal treatment of the UR1 was planned following splint removal.

Treatment plan agreed with the patient:

1. Digital repositioning UR1, UL1,2
2. Restoration of enamel-dentine fracture UL2
3. Restoration of caries UR3
4. Root canal treatment UR1
5. Oral hygiene instruction - 5000ppm Duraphat toothpaste, Fluoride varnish, gross scale
6. Monitor UL2 for signs/symptoms of pulp necrosis
7. Monitor UL1

Treatment details

Under local anaesthetic, a flat plastic instrument was used interproximally to disengage the intruded teeth from the alveolar bone. This was carried out carefully not to further traumatise the cementum (5). The crowns were held between the index finger and thumb to avoid totally avulsing the teeth during disengagement.

The UL2 was repositioned first and temporarily splinted to the UL3 using Triad™ (Dentsply Prosthetics, Pennsylvania, USA) on the incisal edge. Then the UL1 and UR1 were repositioned and secured in the same way. Once the teeth were in as close to the pre-trauma position, Triad™ was placed onto the cervical third to immobilise the teeth (Figure 6). The incisal Triad™ was then removed before taking an alginate

impression for a modified Essix retainer.



Figure 6. Repositioned teeth prior to alginate impression for modified Essix retainer. Demonstrating use of Triad™ (Dentsply Prosthetics, Pennsylvania, USA), a light cured resin material used for temporary immobilisation of the teeth



Figure 7. Modified Essix retainer fitted on the same day as repositioning. Partial coverage design to allow atraumatic removal and insertion after brushing

The patient was advised to only remove the retainer to aid brushing, but otherwise keep in at all times, including eating (5).

The patient was warned of poor prognosis, advising she might still lose her teeth.

She was reviewed at 2-weeks (Figure 8), reporting less pain since treatment.



Figure 8. Labial view of the teeth at the 2-week follow up visit showing marked improvement in gingival inflammation

The UR3 and UL2 were restored with composite resin (Figure 9).



Figure 9. Labial view of the teeth showing mesial incisal UL2 composite restoration

Root canal treatment UR1

Under local anaesthesia and rubber dam, palatal access was undertaken. Working length was confirmed with an apex locator and radiograph (Figure 10). Chemo-mechanical preparation was completed with Protaper® manual files (Dentsply Sirona, Pennsylvania, USA) and a R25 RECIPROC® rotary instrument (VDW Dental, Munich, Germany) with copious irrigation (3% sodium hypochlorite).



Figure 10. Working length radiograph. K-file within 2mm of radiographic apex

A hybrid cold lateral/ warm vertical compaction technique was used using the System B™ Endodontic Heat Source (Kerr Dental UK, Hayes, England) and HotShot obturation device (Discus Dental, California, USA) (Figure 12).



Figure 11. UR1 masterpoint radiograph. Gutta percha masterpoint within 2mm of radiographic apex

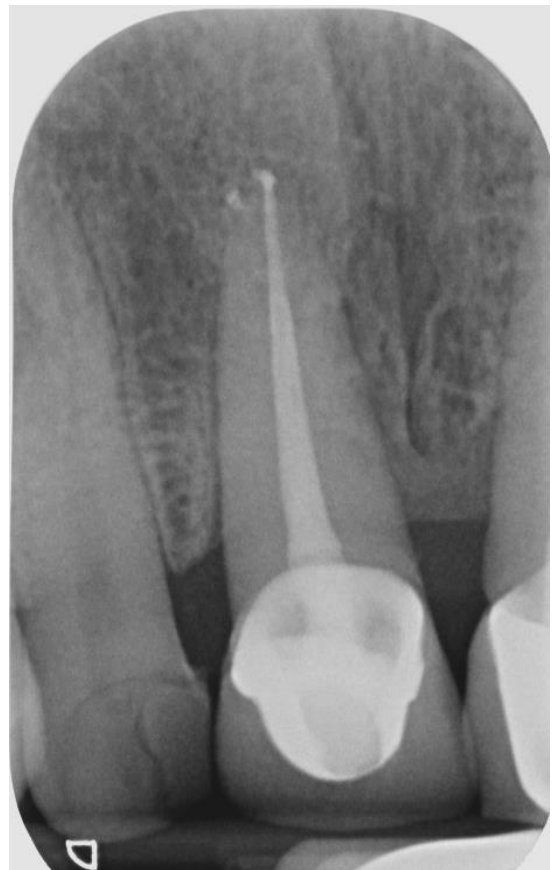


Figure 12. Final obturation radiograph. System B™ Endodontic Heat Source used to condense gutta percha 6mm short of the working length. HotShot obturation device used to fill remaining canal space. Well-condensed obturation, within 2mm of radiographic apex, tubuliseal extruded through apex and lateral canal

A subseal of IRM was placed and the access cavity was restored with resin composite.

Follow-up

The follow up period was as follows:

Review at 2 weeks, 4 weeks and 6 weeks.

Splint removal 6 weeks

An extended splinting period of 6 weeks was chosen as a result of the associated injury to the marginal alveolar bone, common in intrusive luxation (5)(6).

At 20-weeks, the patient reported no pain. Complications of intrusive injuries include pulpal necrosis, marginal bone breakdown and external/replacement root resorption (3). These sequelae are anticipated, thus the patient was fully informed. She has a follow-up visit in 6 months. The recommended follow-up period is 5 years (5).

DISCUSSION

Delayed presentation, severity of intrusion and the presence of crowns added complexity to this case. Leaving the teeth in position would have resulted in cosmetic challenge and extraction would have led to significant loss of alveolar bone, impeding further management options.

Spontaneous re-eruption is generally limited to immature teeth, thus not a viable option in this case (7).

The UL2 will be monitored for signs of pulpal necrosis; should two signs and symptoms manifest, root canal treatment will be undertaken (5).

Alveolar bone loss is a common complication of intrusion, resulting in black triangles between the teeth (Figure 13).



Figure 13. Facial view demonstrating a low smile line in this case, therefore black triangles were not an aesthetic concern

The patient functions well with her current dentition; she did not want to replace missing teeth. If the traumatised teeth are lost, a partial denture could be provided to replace multiple maxillary missing teeth.

CONCLUSION AND CLINICAL IMPLICATIONS

In severe intrusion cases, the management of patient expectations is of vital importance. This case has demonstrated that variations in conventional splinting methods must be employed for crowned teeth to achieve equal treatment outcomes.

REFERENCES:

- (1) International Association for Dental Traumatology. Dental Trauma Guide: IADT treatment guidelines for intrusion. Available at: <https://dentaltraumaguide.org/free-dental-guides/permanent-teeth/intrusion/>.
- (2) Andreasen JO, Bakland LK, Matras RC, Andreasen FM. Traumatic intrusion of permanent teeth. Part 1. An epidemiological study of 216 intruded permanent teeth. Dental Traumatology. 2006 Apr;22(2):83-9.
- (3) Djemal S, Kärki T, Mack G. Challenges in treating traumatically intruded and ankylosed permanent incisors: a case report with a multidisciplinary approach. Dental update. 2015 Jan 2;42(1):44-50.
- (4) Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, Bourguignon C, DiAngelis A, Hicks L, Sigurdsson A, Trope M, Tsukiboshi M, von Arx T. International Association of Dental Traumatology. Guidelines for the management of traumatic dental injuries. I. Fractures and luxations of permanent teeth. Dent Traumatol 2007; 23: 66–71.
- (5) Djemal S, Singh P, Tomson R, Kelleher M. Dental trauma part 1: acute management of luxation/displacement injuries. Dental update. 2016 Nov 2;43(9):812-24.
- (6) Rao A, Rao A, Shenoy R. Splinting—when and how?. Dental update. 2011 Jun 2;38(5):341-6.
- (7) AlKhalifa JD, AlAzemi AA. Intrusive luxation of permanent teeth: a systematic review of factors important for treatment decision-making. Dental Traumatology. 2014 Jun;30(3):169-75.