

An interdisciplinary approach in the management of severe intrusion injuries in permanent anterior teeth.

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INTRODUCTION

Intrusion injuries to the permanent dentition are rare (0.3-1.9%)(1) and are often associated with severe damage to the tooth, gingival tissue, periodontal ligament, alveolar bone and pulpal tissues (1). Furthermore, dental trauma has been shown to have a negative functional and emotional impact on children's quality of life(2). Therefore, successful management of these injuries both in the short and long terms is crucial. This poster presents three intrusion cases in which an interdisciplinary approach in the form of orthodontic repositioning was employed. This was related to different factors such as delayed presentation, patient cooperation, and failed surgical repositioning. These cases, therefore, demonstrate that in delayed presentation of severe intrusion cases, and where surgical repositioning is not possible or successful, orthodontic repositioning is an appropriate treatment option as it optimises gingival and bony healing and facilitates future advanced interventions.

CASE SERIES

We present three severe intrusion injury cases treated at the Leeds Dental Institute (a specialist centre), UK, following an interdisciplinary pathway to facilitate rapid orthodontic repositioning (OR) several days following the trauma. In addition to the severely intruded teeth presented in each of the three cases, other teeth sustained different types of traumatic injuries. Although these teeth were treated at the LDl, for the purposes of this case series only management of the severely intruded teeth is described. All the patients were advised to maintain a soft diet and good oral hygiene.

CASE ONE

HISTORY

A healthy 8 year 11 month old girl was referred by the Salaried Dental Services for the management of her dental injuries, sustained five days earlier. The patient reported tripping and falling "head first" in the bathroom with the maxillary dentition contacting the toilet seat.

Following an interdisciplinary discussion between the paediatric and orthodontic practitioners, a decision was made to orthodontic reposition the UL1 after gentle luxation under local analgesia. The following table describes the clinical, radiographic findings and treatment provided.

Appointment	Figures	Exam	Treatment
At presentation to LDl (Five days after trauma)	1 a 1 e	UL1 sustained severe intrusion >7mm and enamel/dentine uncomplicated fracture. The tooth showed complete root formation.	Gentle luxation under LA followed by orthodontic extrusion using brackets on upper 4s, Cs and 2s, an 0.016" stainless steel wire to hold the arch form, eyelet on the UL1 and elastic tubing to extrude the UL1.
Five weeks after OR	1 b	UL1 extruded 2-3 mm over the gingival level	Pulp extirpation and Ca(OH) ₂ dressing to UL1 was performed.
Ten weeks after OR	1 f	Radiographic examination revealed severe inflammatory resorption in UL1.	Continuation of orthodontic extrusion and repositioning of UL1.
Fifteen weeks after OR	1 c	UL1 in traumatic occlusion with lower teeth	UL1 built up with composite to facilitate bracket placement and repositioning of the UL1.
Thirty six weeks after OR	1 d	UL1 was completely repositioned after twenty four weeks of active movement followed by three months of retention.	Appliance de-bonded and UL1 built up with composite.
Forty six weeks after OR	1 g	Radiographic examination revealed cessation of inflammatory resorption.	No signs or symptoms of continuation of inflammatory resorption, therefore UL1 was obturated



CASE TWO

HISTORY

A healthy 8 year old boy was referred by his GDP to the LDl following trauma sustained two weeks earlier when the patient fell and hit his face against some concrete steps. The patient presented with severe intrusion of UR1 and subluxation of UL1. The patient was very anxious and fearful throughout the examination session. Following an interdisciplinary discussion between the paediatric and orthodontic practitioners, a decision was made to orthodontic reposition the UR1. The following table describes the clinical, radiographic findings and treatment provided.

Appointment	Figures	Exam	Treatment
At presentation to LDl (Two weeks after trauma)	2 a 2 d	Severe intrusion of the UR1 (7mm). Radiographic examination showed incomplete root formation and parallel walls of UR1. The UR1 showed positive response to vitality testing.	Orthodontic extrusion using brackets on upper Es, Ds, Cs and UL1; an eyelet on UR1; with 0.014" NITI wire to extrude UR1.
Eight weeks after OR	2 b 2 e	The UR1 was extruded by 3mm. The UR1 showed positive response to vitality testing.	The eyelet on UR1 was removed and replaced with a bracket.
Fifteen weeks after OR	2 c 2 f	The UR1 was fully repositioned. Vitality testing and radiographic examination did not reveal any signs of loss of vitality.	Oral Hygiene instructions and monitoring.



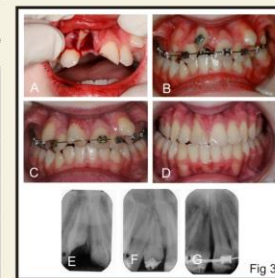
CASE THREE

HISTORY

A healthy 9 year 10 month old girl attended the LDl following an injury sustained after falling at her school playground. Following a discussion between the orthodontic and paediatric specialists, the following initial treatment plan was devised.

- In the short term: orthodontic repositioning of UR1 in order to maintain bone height and quality and to facilitate future restorative options.
- In the long term: Since the patient was in need of orthodontic treatment including upper arch extraction of second premolars, a decision was made to extract UR1 and transplant one of the upper second premolar teeth into UR1 socket. The following table describes the clinical, radiographic findings and treatment provided.

Appointment	Figure	Exam	Treatment
At presentation to LDl	3 a 3 e	The UR1 was found to have severe intrusion and complicated enamel/dentine fracture. The UR1 had an open apex with convergent walls.	Attempted surgical reposition, which failed due to patient cooperation. The patient was prescribed chlorhexidine mouthwash and amoxicillin for 5 days and was advised to maintain a soft diet and good oral hygiene.
Six days following trauma			OR started using fixed orthodontic appliance (an 0.016"ss wire was placed to maintain the arch form and power-chain was used to extrude UR1)
Three weeks after OR	3 b 3 f	The UR1 extruded past the gingival margin.	Pulp extirpation and Ca(OH) ₂ dressing of UR1 was performed.
Eight months following trauma.	3 c	The transplanted UR5 had an open apex and therefore pulp vitality was maintained.	Transplantation of the UR5 into the UR1 position was carried out under GA. The transplanted tooth was built up 10 days post transplantation with a composite veneer. Orthodontic movement continued after five months.
Two and half years following trauma	3 d 3 g	Slight labial gingival recession. No clinical or radiographic signs of vitality loss.	Patient waiting for gingival graft assessment labial to the transplanted tooth in UR1 area.



DISCUSSION

The current evidence in management of intrusion injuries is based on retrospective studies and typically low sample sizes(3). However based on these published data, three treatment options are available namely spontaneous, orthodontic and surgical repositioning. Spontaneous repositioning was advocated by few researchers(4,5) in the management of severely intruded teeth as such treatment was shown to be associated with the least treatment complications and best treatment outcomes mainly in children under the age of 12 years. Complete repositioning, however, took several months; therefore, these authors recommended close monitoring of these cases. On the other hand, this treatment does not allow rapid access to the pulp tissues should pulp necrosis or inflammatory resorption develop and therefore not currently recommended for severely intruded teeth.

Several studies showed no significant differences between orthodontic and surgical repositioning on the development of pulp necrosis, root resorption or marginal bone loss. Some studies, however, showed a slight better gingival and bony healing when using orthodontic repositioning (4,5). Orthodontic repositioning also has the advantage of being less invasive, and therefore more suitable in anxious children. On the other hand this treatment requires several appointments, delays access to the root canal system, and requires advanced clinical skills.

Surgical repositioning, on the other hand, requires less treatment time, allows rapid repositioning and access to the pulp tissues. However such treatment is dependent on patient cooperation and might require a general anaesthesia in some instances. In addition some authors suggested that such treatment could cause a second trauma to the tooth and periodontal tissues. The choice of repositioning technique in cases of severe intrusion injuries (> 6-7mm) is currently (3,6) based on the root formation stage of the tooth. Surgical repositioning is recommended for teeth with complete root formation for rapid access to the pulp tissues while teeth with incomplete root formation could be repositioned either surgically or orthodontically. The current guidelines, however, do not extend to those cases with delayed presentation or cover cases such as that of failed surgical repositioning.

We present three cases with severe intrusion injuries, where orthodontic repositioning was successfully used in repositioning the teeth, yielding good outcomes in the short and medium terms. Good aesthetics and function were maintained in each case and bone integrity has been preserved for any future definitive treatment. The first and second cases were delayed in presentation to the specialist centre by five days, and two weeks, respectively, whilst the third case was that of a failed surgical repositioning due to poor patient co-operation. The first two cases show short and medium term outcomes, while the third case shows longer-term treatment outcomes.

CONCLUSION

Orthodontic repositioning should be considered as an alternative treatment in severe intrusion cases option as it optimises gingival and bony healing. An interdisciplinary management ensures that the patient receives optimal care. Gentle forces should be used to reposition intruded teeth and careful clinical and radiographic monitoring should be conducted due to the potential for short and long-term complications.

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