

## Case Report

# A case-report of delayed repositioning of intruded permanent maxillary central incisors accompanied by complicated crown fractures: A 2-year follow-up

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## ABSTRACT

Intrusive luxation is the most severe type of dental injury with a complex healing sequence. Pulp necrosis, root resorption (surface, inflammatory and replacement resorption), and defects in marginal periodontal bone healing are the main complications. Treatment strategies can be either active, by repositioning (surgical or orthodontic extrusion), or passive, by spontaneous re-eruption based on the thorough evaluation of the case. This paper reports a case of delayed repositioning of severely intruded permanent maxillary central incisors accompanied by complicated crown fractures after 3 months. After thorough clinical and radiographic evaluations, and based on guidelines, the teeth were surgically repositioned and splinted for 6 weeks. One week after the initial intervention, the endodontic treatment for both permanent maxillary incisors were initiated using calcium hydroxide. 6 months later, the teeth were ready for MTA plug and gutta-percha root canal filling. During the follow-up period, the teeth had remained functional and esthetically acceptable. Further yearly observations are planned at least for 5 years.

**Key Words:** Dental, extrusion, surgical procedures, tooth injury, trauma

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## INTRODUCTION

Intrusive luxation (intrusion), the most severe type of traumatic dental injury, is defined as apical displacement of tooth in its socket.<sup>[1,2]</sup> It has been found to comprise 0.3-1.9% of all traumatic injuries in the permanent dentition and 5%-12% of laxation injuries. Since intrusion represents the most severe and complex injury to dento-alveolar component, the healing sequence is complicated.<sup>[1-3]</sup> Pulp necrosis, root resorption (surface, inflammatory and replacement resorption), and defects in marginal periodontal bone healing are the main complications.<sup>[4,5]</sup> The occurrence

of these healing complications are related to various treatment factors such as treatment delay, repositioning method (i.e., expecting re-eruption, orthodontic reposition and surgical reposition), type of splint (rigid, semi-rigid and flexible), period of splinting (days) and the use of antibiotics.<sup>[6]</sup> Treatment strategies can be either active, by repositioning (surgical or orthodontic extrusion), or passive, by spontaneous re-eruption.<sup>[1,7]</sup> This paper reports a case of delayed repositioning of severely intruded permanent maxillary central incisors accompanied by complicated crown fractures.

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## CASE REPORT

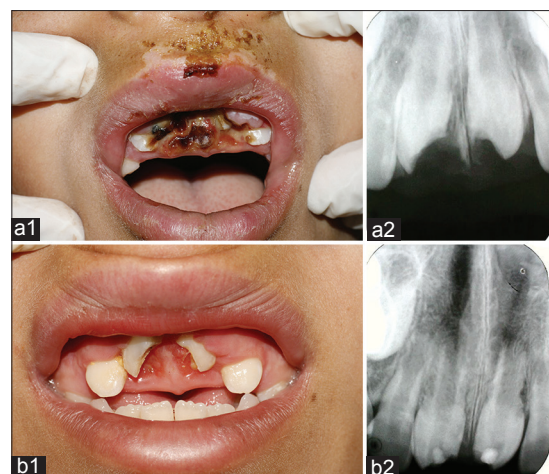
An eight-year old boy was referred to the pediatric department of Shiraz University of Medical Sciences (Shiraz, Iran) with the extraction order of his permanent maxillary central incisors. He had experienced a car accident 3 months before his referral, however nothing was done for him in private setting except for glass ionomer dressing of the exposed pulp horns, systemic antibiotic treatment, radiographic and photographic documentation at the time of injury. 3 months after the trauma, he was visited at that dental office with the chief complaint of ugly smile. New radiographs were taken. After radiographic examination, the dentist had interpreted that both permanent maxillary central incisors were no longer preservable. The patient was then referred to the pediatric department to have his teeth extracted.

Although a remarkably long time had elapsed since his accident, the traumatic dental injury guidelines were followed. After assessing the medical history, the patient was examined for extra-oral signs. He had no facial swelling, changes in skin color, facial and mandibular asymmetry, limited mouth opening, areas of ecchymosis, crepitus or pain on palpation and nostril perforation.

Intra-oral examination revealed dental traumas including complicated crown fracture with severe intrusive luxation of both permanent maxillary central incisors. The patient's history of pre-existing anterior open bite was reported by his mother. The patient had poor oral hygiene. The pulp vitality tests including electric pulp test (EPT), heated gutta-percha test and ice test were performed for control and traumatized teeth. Both maxillary central incisors showed no signs of vitality. Reaction to percussion was tested by tapping non-traumatized and traumatized teeth lightly with the handle of a mouth mirror in vertical and horizontal direction. The intruded incisors revealed normal sound upon percussion. The patient was asked to bring the photographs and radiographs he had taken at the time of injury [Figure 1].

Periapical radiographs evaluating permanent maxillary central incisors showed areas of internal and external root resorption, wide apical foramens, with concomitant complicated crown fracture of both teeth. The neighboring teeth had normal socket.

The parents and patient were informed about treatment options and the expected prognosis of each procedure.



**Figure 1:** Intra-oral and radiographic examinations: (a) At the time of trauma (b) Three months after trauma.

Instead of getting the teeth extracted, they decided to give the teeth a second chance by following a distinct treatment and follow up regimen. Because of severe multiple intrusions (about 6 mm), without spontaneous re-eruption, we decided to choose surgical extraction as repositioning technique. After the administration of local anesthesia, the intruded teeth were initially luxated and grasped mesio-distally with a forceps. The teeth were then brought down into their normal position by applying careful and very gentle force incisally. Finally we splinted the teeth with round wire (0.028 inch) and light cure resin composite (Kerr, Romulus, MI, USA; microhybrid). Another radiograph was taken to confirm the correct repositioning. Systemic amoxicillin 500 mg three times per day, 0.2% chlorhexidine mouth rinse twice daily were prescribed for 7 days. Eating habits and vigorous oral hygiene maintenance were instructed to the parents and patient.

One week after the surgery, the endodontic intervention for both permanent maxillary incisors were initiated since both teeth had exhibited external and internal root resorption. The access to the root canals were gained and the necrotic pulp tissue was removed with step-back technique and copious irrigation with 0.5% sodium hypochlorite while care was taken not to weaken the fragile dentinal walls in the cervical and apical area which may impair healing. The canals were then filled with Vitapex® (Diadent® Group International Inc., Burnaby, B.C., Canada). 6 weeks after the surgery, the splint was removed and a follow-up radiograph was taken. The root canal dressing was checked every 3 months. After 6 months, the root resorption

was controlled based on radiographic evaluation and calcium hydroxide was removed gently. The canals were flushed and dried while being careful not to stimulate bleeding. The mixed MTA (Dentsply, Tulsa Dental Products, Tulsa, OK, USA) with wet sand consistency (based on manufacturer's instruction) was positioned to the desired depth with plugger. After placing a 4-mm MTA plug, a moist cotton pellet was kept coronal to MTA and the access opening was then filled with glass ionomer restoration (GC America, Alsip, IL, USA). At the next day, both teeth were then filled with gutta-percha points with warm vertical compaction technique and restored with a light-cured resin composite [Figure 2]. Clinical and radiographic controls of the treatment condition were planned at 3, 6, 12 and 24 months.

In a 2-year follow-up, the teeth had remained functional and esthetically acceptable. The percussion sound and mobility were normal. In radiographic examinations, external and internal root resorption were stopped in both teeth, no signs of replacement resorption was detected and the adjacent anterior teeth were asymptomatic [Figure 3]. Despite our, the patient had not followed our oral hygiene instruction since his last visit [Figure 4].

The parents and the patient were happy with the functional and esthetic results and were reluctant of orthodontic final corrections. Although acceptable results were achieved, further yearly observations are planned at least for 5 years.

## DISCUSSION

Intrusive luxation is the most severe type of luxation injuries. Its treatment strategies can be spontaneous eruption, orthodontic or surgical repositioning.<sup>[7]</sup> Surgical extrusion has been documented as the treatment of choice for severely intruded teeth.<sup>[6,8]</sup> This paper reports a case of delayed repositioning of severely intruded permanent maxillary central incisors accompanied by complicated crown fractures.

In a study conducted by Kinirons *et al.* it was concluded that there is no extra risk of root resorption if surgical extrusion is used to reposition severely intruded incisors. Another important finding was that the mature intruded teeth showed increased chances of root resorption compared to immature ones thus favoring immediate surgical repositioning in severely intruded immature teeth.<sup>[8]</sup>



**Figure 2:** Intra-oral and radiographic images at the end of treatment intervention.



**Figure 3:** Radiographic image after (a) 1-year follow-up (b) 2-year follow-up.



**Figure 4:** Intra-oral view after 2 years. The patient had not followed our oral hygiene instructions despite our emphasis. This can endanger the overall prognosis of the traumatized teeth.

It is accepted that all injuries should be treated as soon as possible for the comfort of patient and fewer healing complications. Based on the guidelines it is recommended to treat dental intrusions with subacute approach (i.e., within the first 24 hours).<sup>[9]</sup> Any treatment delay may increase the risk of healing

complications.<sup>[6]</sup> In the presented case, permanent maxillary central incisors were severely intruded with complicated crown fractures which were left untreated for 3 months. So a poor prognosis was anticipated. Based on the clinical and radiographic factors we decided to reposition both teeth surgically.

It has been established that calcium hydroxide can arrest root resorption by arresting osteoclastic activity and stimulating tissue repair.<sup>[10]</sup> In the radiographic examination of the presented case, areas of external and internal resorption were evident prior to treatment intervention so endodontic treatment was accomplished with calcium hydroxide therapy. Although acceptable results were observed, further follow-up regimen is mandatory.

The parents and patient were satisfied with functional and esthetic result of the intervention. Therefore, they were reluctant to accept the orthodontic intervention. We chose watchful waiting strategy and decided not to persuade them because orthodontic force might reactivate the recently controlled root resorption process.<sup>[11]</sup>

It is important to highlight that intrusive luxation is a very severe dental injury and about 30% of intruded teeth are lost after 15 years irrespective of stage of root development.<sup>[7]</sup> The regeneration of periodontal tissue is still a challenge in clinical treatment plans because of the complexity of its structure. Many of the recent researches have shifted toward stem-cell based therapies. These treatment modalities might provide valuable results in periodontal regeneration over traditional treatment options in near future.<sup>[12]</sup> The presented case showed acceptable functional result in the follow-up period.

Pulp and periodontal tissue must be closely monitored in intrusive injuries. The treatment modalities should be based on ultimate scientific evidence together with the clinician's expertise.

The outcome of this paper showed that surgical repositioning and root canal treatment using calcium hydroxide dressing were successful in stimulating the repairing potential and arresting the healing complications associated with intrusive injuries even after delayed intervention. Further interpretation of the results needs longer follow-up period.

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## Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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