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Delayed multidisciplinary management of an extrusively luxated maxillary central incisor

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Abstract – This paper reports a case of delayed (1 month after the injury) multidisciplinary management of an extrusively luxated permanent central incisor. The extruded tooth was diagnosed as necrotic without coronal discoloration. Upon completion of root canal treatment, the tooth was repositioned orthodontically and finally restored for esthetic purposes with a composite resin. The tooth was diagnosed as normal in the 1 year check-up.

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Extrusive luxation or partial avulsion is the partial displacement of a tooth from its bony socket. Clinically, extruded teeth were seen elongated with deviation in association with bleeding from the periodontal ligament. Extrusively luxated teeth display an abnormal mobility. There is pain during occlusion, either no or mild spontaneous pain. Radiographically, an extruded tooth exhibits an increased periodontal ligament space after the accident (1, 2). In the primary dentition, extrusive luxation was reported as the most common type (38.23%) of dental injury (3).

The major parameters influencing pulp healing after luxation trauma is the stage of root formation and the severity of luxation (1, 4). As a result of displacement of the root after luxation injuries, several pulpal changes may occur. These changes are pulp necrosis with gray color change in the crown, pulp revascularization which may lead to regressive changes and pulp canal obliteration with yellow color change in the crown (1). There is a possibility of pulp necrosis associated with periapical radiolucency among these teeth showing pulp canal obliteration over time (5).

Experimental studies on monkeys showed normal healing of the periodontal ligament of the extrusively luxated teeth after 3 weeks (6). However, external root resorption may be seen as healing complications of periodontal ligament following luxation injuries (7, 8).

Andreasen et al. (4) categorized the treatment periods after traumatic dental injuries as acute (within few hours) subacute (within the first 24 h) and delayed (after the first day). The categorization was based on the data obtained from the consequences of treatment delay on pulpal and periodontal healing following dental traumatic injuries. According to this criteria, the extrusively luxated tooth should be repositioned in its position within the first 24 h in an acute or subacute manner (4). In case of delayed treatment, the tooth may realign spontaneously into its normal position or may be repositioned orthodontically (1).

This case report presents the multidisciplinary treatment of an extrusively luxated tooth with a month's delay.

Case report

A 13-year-old boy presented to the Department of Endodontics, Faculty of Dentistry, İstanbul University, with discomfort and mild pain in his maxillary left central incisor upon biting. He reported falling on his face while playing at school 1 month earlier. He did not feel extensive pain after the trauma; so he did not seek dental treatment immediately after the accident.

Clinically, the right central incisor was extrusively luxated while the left central incisor had a horizontal crown fracture. To establish a differential

diagnosis between lateral luxation and extrusive luxation, the facial alveolar bone wall was palpated and additional radiographs were also taken to detect any bone socket displacement caused by the previous fracture. The right central incisor was diagnosed as extrusively luxated and positioned palatally. There was a premature occlusal contact between the maxillary right central and mandibular right incisors, which prevented normal occlusion between the rest of the teeth (Fig. 1). The crown of the left central incisor was fractured horizontally, with pulp exposure. The tooth was diagnosed as non-vital after electrical pulp and cold tests. There was no color change in the crown and the crown of the tooth was intact. The left central incisor was vital and there was a polyp-like granulomatous tissue on the exposure site. Radiographically, the right central incisor was displaced with an apical radiolucency associated with the loss of lamina dura and widening of the periodontal ligament along its mesial root surface (Fig. 2). There was no sign of external or internal root resorptions. The mobility of the luxated tooth was recorded as grade 1 (horizontal loosing ≥1 mm).

The root canals of both teeth were cleaned, shaped and filled with the interim placement of slurry calcium hydroxide for 1 week. Root canal

Fig. 1. Clinical condition of the teeth during occlusion 1 month after the injury. Note the premature contact between the maxillary right incisor and mandibular first and second right incisors.

Fig. 2. Radiographic appearance of maxillary anterior teeth. Note the displacement of the maxillary right incisor with apical radiolucency.

Fig. 3. Clinical view of the teeth after treatment.

Fig. 4. Radiographic appearance of the teeth after 1 year.

therapies were performed using laterally condensed gutta-percha and sealer (AH26; Dentsply, Konstanz, Germany) in both teeth and restored with a composite resin (Filtek Z250; 3M, St Paul, MN, USA). Orthodontic therapy was planned to reposition the luxated right incisor. Orthodontic therapy was performed using a removable appliance for 4 months and the tooth was repositioned. Both central incisors were restored again to improve esthetics using the composite resin (Fig. 3). Both teeth appeared normal clinically and radiographically after 1 year (Fig. 4).

Discussion

One complication of extrusive luxations may be tooth malposition because of treatment delay following the injury. Andreasen & Andreasen (1) pointed out that the extrusively luxated tooth should be repositioned within 2 days with finger pressure; otherwise, it should be performed orthodontically. In the present case, the right central incisor was diagnosed extrusively luxated, malpositioned palatally thus preventing occlusion between the rest of the teeth. There is only one previous case report presenting delayed orthodontic and endodontic treatments of an extruded immature maxillary central incisor (9). Apexification and orthodontic treatment of the extruded tooth were successfully completed at the same time.

The prevalence of pulp necrosis following extrusive luxations was noted in two studies as 26 and 43%, respectively (7, 10). Lee et al. (10) reported that pulp canal obliteration is the second most common healing complication following extrusive luxation injuries, as seen in 35% of the cases. They reported that root resorptions are an uncommon outcome following extrusions. Andreasen & Vestergaard (7) found a significantly higher level of pulp necrosis in mature teeth, on the contrary, Lee et al. (10) noted the degree of extrusion as the main predictor for pulp necrosis as well as pulp canal obliteration after extrusions.

In this case, there was no coronal discoloration of the crown despite the fact that pulp vitality tests were negative and the treatment was initiated after 1 month following the injury. In cases of extrusive or intrusive luxations, instant rupture of blood vessels at the foramen may cause no internal pulp bleeding and show no immediate coronal discolorization (1).

It should be noted that the exposed pulp tissue was still vital in the left incisor 1 month after the injury, which may indicate its defensive capability against bacterial invasion. The polyp-like tissue is a confined granulation tissue at the exposure pulp site and may prevent bacterial ingression by its pathoimmunological cell substrate and indicates a good prognosis for pulp healing. However, it was reported that 100% of the crown fracture cases with pulp exposure can become necrotic if the delayed treatment period exceeds 1 month (11).

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