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Rapidly progressive internal root resorption: a case report

CASE REPORT

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Abstract – The etiology of internal root resorption is not fully understandable, trauma and chronic pulpitis are considered the main risk factors. Usually the process is asymptomatic and diagnosed upon routine radiographic examination. This case report presents a rapid progression of internal resorption related directly to traumatic injury. A 16-year-old female arrived at the emergency room after a mild extrusion of the mandibular incisors. The initial treatment included repositioning and splinting of the teeth. Radiographs performed at repositioning and splinting demonstrated normal configuration of the incisor's roots. Ten months later progressive internal resorption of the left mandibular first incisor was diagnosed. While treating this tooth similar process was detected in the right mandibular second incisor and in the mandibular left second incisor. The lower right first incisor reacted inconsistently to vitality test. As a result of the severe and rapidly progressive nature of the process, root canal treatments were performed in all lower incisors. The follow-up radiographs demonstrate arrest of the internal resorption process.

Internal root resorption is a rare finding, usually asymptomatic, slowly progressing, and detectable upon routine radiographic examination (1). A radiograph of the affected tooth usually shows an oval enlargement of the root canal space (1, 2). Radiographs performed at different angulations confirm that the resorption lacuna is a continuation of the distorted outer borders of the root canal. The etiology of the resorptive process is not fully understood, although trauma and persistent chronic pulpitis (3) as well as orthodontic treatment (4) have been suggested as contributing factors.

It may be assumed that the resorption of dentin occurs as a result of a chronic inflammatory process in the pulp tissue combined with the loss of the protective layer of odontoblasts and predentin (2, 5). The internal aspect of the root canal is resorbed by activated multinucleated giant cells that are adjacent to the granulation tissue in the inflamed pulp. Teeth in which the resorptive process reaches the cervical area of the crown may have a pinkish color, known as 'pink tooth' (6, 7), resulting from granulation tissue ingrowths.

Differential diagnosis includes external root resorption and/or cervical root resorption. In these cases, as opposed to internal resorption, there usually is a positive response to vitality tests and radiography reveals a regular root canal space. In this case report rapidly progressive internal root resorption in four teeths as a direct complication of an extrusion injury is described.

Case report

A 16-year-old girl was admitted to the Emergency Medicine Department at the Haddassah Medical Organization in Jerusalem following a car accident. She had been sitting in the front seat without a seat belt and sustained a mild head injury. Oral examination revealed mild extrusion of the lower incisors combined with mandibular bone fracture. Emergency treatment included repositioning and splinting of the bone and teeth with an Erich arch (Fig. 1). A month later, the splint was removed and the radiograph revealed normal anatomy of the teeth. Follow-up appointments at 1-month intervals were scheduled in the Department of Endodontics. At all appointments vitality tests of the lower anterior teeth were performed using dichlorodifluoromethane (Endo Ice, Hygenic Corp., Akron, OH, USA), and an Electronic Pulp Tester (Digitest, Parkell Electronics Division, Farmingdale, NY, USA). The results of these tests are summarized in Table 1.

The radiographic examinations performed in the first 5 months after the trauma (three follow-up appointments) showed a normal anatomy with no signs of external or internal root resorption (Fig. 2).

Eight months after the trauma, a minor deregulation in the canal anatomy of the lower left first incisor was observed (Fig. 3). A 'wait and see' approach was chosen until the next follow-up examination before determining if this warning sign indicated an internal resorption lesion and need for root canal treatment. Unfortunately, 2 months later the radiographic examination revealed severe internal resorption (Fig. 4), and root canal treatment was initiated immediately. The treatment included multiple appointments; at the first one, after local anesthesia and rubber dam placement, an access cavity was prepared, followed by cleaning and shaping of the root canal system with 2.5% sodium hypochlorite and

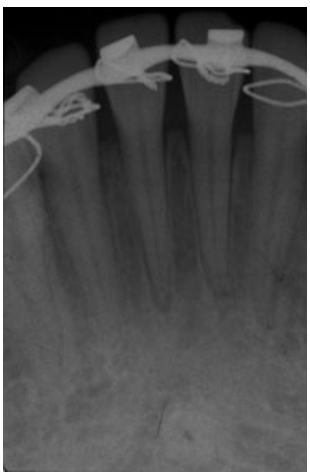

Fig. 1. Radiograph taken at the emergency room after repositioning and splinting.

Table 1. The results of the vitality tests carried out on the follow-up appointments

	1		2		3	
	Cold	EPT	Cold	EPT	Cold	EPT
LR canine	−	+	+	+	+	+
LR lateral	−	−	−	−	−	−
LR central	−	+	−	−	−	−
LL canine	−	+	+	+	+	+
LL lateral	+	−	+	−	−	−
LL central	−	+	−	−	−	−

LR, lower right; LL, lower left; EPT, Electronic Pulp Tester.
1 – 1 month after trauma; 2 – 2 months after trauma; 3 – 3 months after trauma.

Fig. 2. Radiograph taken 5 months after trauma.

RC-Prep (Premier Dental Products, King of Prussia, PA, USA) were performed. Root canal cleaning and shaping were performed with both stainless steel files (Dentsply Maillefer, Tulsa, OK, USA) and NiTi files (ProFile;

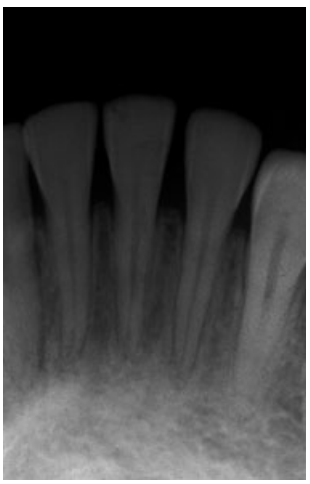

Fig. 3. Radiograph taken 8 months after trauma. Minor signs of irregularity in the root canal of the lower left first incisor are seen.

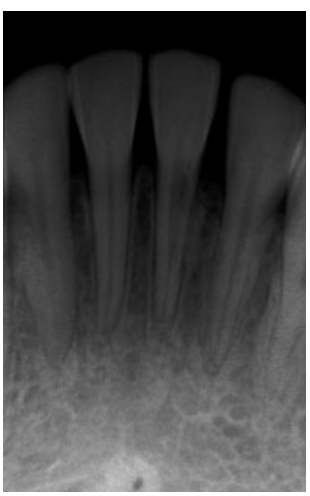

Fig. 4. Radiograph taken 10 months after trauma. Advanced resorption in the lower left first incisor is evident.

Dentsply, Tulsa Dental). Working length was determined with the aid of an electronic apex locator, (Apit; Osada Inc., Los Angeles, CA, USA) and by radiography. Calcium hydroxide was used as an interappointment dressing. At the next appointment for root canal cleaning and shaping, the pulp canal was irradiated with Er:YAG laser (Opus 20; Lumenis, Opus Dent, Tel Aviv, Israel) at 500 mJ per pulse and at a frequency of 12 Hz for four cycles of 15 s each (8). The Er:YAG laser tip (RCLase; Lumenis, Opus Dent) was introduced into the root canal to remove the infected smear layer (8). The obturation was performed at the third appointment with warm gutta-percha and AH_{26} (Caulk/Dentsply, Milford, DE, USA) as sealer to fill the resorption lacunae.

A week later, root canal treatments were initiated in the lower right second incisor and in the lower left second incisor because of the radiological signs of internal resorption (Figs 5 and 6). Although the response of the lower right first incisor to the vitality test was not

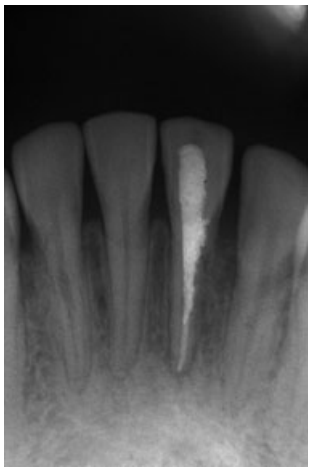

Fig. 5. Radiograph taken 12 months after trauma. Resorption process of lower right second incisor is evident.

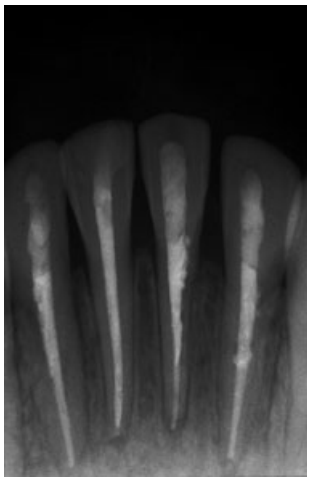

Fig. 7. Radiograph taken 15 months after trauma and completion of root canal treatment in all lower incisors.

Fig. 6. Radiograph taken 13 months after trauma. Note resorption in lower right second incisor.

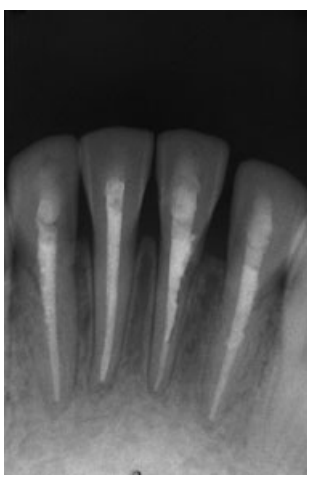

Fig. 8. Follow-up radiograph taken 23 months after trauma.

conclusive, it was decided to perform a preventive endodontic treatment in this tooth (Fig. 7) because of the severe resorption in the other incisors.

All the teeth revealed a necrotic pulp in the coronal portion of the root; vital tissue was seen in the middle third of the root with bleeding and pain sensation, notwithstanding the local anesthesia that was applied prior to treatment. A follow-up radiograph (Fig. 8) showed arrest of the resorption process.

Discussion

The case presented here demonstrates a direct connection between a traumatic injury and an internal resorption process. Such rapid progression of internal resorptive lesions in teeth affected by trauma nor multiple involvements of adjacent teeth affected by the same traumatic injury, has not been described previously, in the dental literature (1, 2). It was only suggested that the etiology was a previous trauma; in our patient, we clearly show that the etiology was the extrusion injury to the teeth.

The outcome of treatment of teeth with internal root resorption depends primarily on the size of the lesions (9). Large lesions cause a reduction in the resistance of the tooth to shear forces that may lead to tooth fracture (10). Therefore, it is imperative to initiate endodontic treatment as soon as possible to arrest the progression of the resorptive process and to prevent root or cervical crown fracture.

In our patient, treatment of the first tooth was delayed as the diagnosis of irreversible damage to the tooth was ambiguous. Retrospectively, we cannot rule out that earlier intervention would have been beneficial (11).

Vitality tests of teeth, especially after trauma, are not conclusive (12). Differentiation between internal and external resorption is essential as different etiological factors are involved and, therefore, different treatment protocols should be followed (13). In teeth with internal root resorption the radiolucent lesion 'moves' with the canal when the radiographs are taken at different angles, while in external resorption the radiolucent lesion

'moves' outside of the canal (2). Furthermore, external resorption has an irregular border with an alteration in the adjacent bone, and the canal can often be visualized through the radiolucent area. In internal resorption there is a uniform enlargement of the canal space with regular bone structure (14). Rarely does the internal resorption process involve perforation of the root with damage to the adjacent bone.

The active resorption phase is caused by inflamed granulation tissue. Therefore, in internal resorption, at least a part of the pulp must have a blood supply during expansion of the lesion. Notwithstanding, a negative sensitivity test can be obtained as a result of the presence of necrotic pulp tissue in the coronal portion of the root canal (5).

This case report demonstrates the importance of a frequent follow-up evaluation of the affected and adjacent teeth after traumatic injuries. Endodontic intervention should be initiated upon the observation of radiographic signs of internal root resorption.

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