

Pulpotomy and apexogenesis (case report)

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Summary

Pulpotomy is the operation carried out to form a neoformative dentin layer on the root section surface following the removal of uninfected pulp at the coronal section. The root section of the pulp can stay vital after a successful treatment. In this case, a pulpotomy treatment was performed for orthodontic purpose on the canine tooth with twinning tooth structure of a patient with number and shape anomalies on the upper jaw. The patient was controlled by clinical and radiographical examinations every 6 months, for 8 years. As the vitality tests were positive, no pathological findings have been observed either clinically or radiologically.

Key words: pulpotomy (partial pulpectomy), apexogenesis.

Introduction

Pulp tissue may be injured due to various reasons such as mechanical, thermal, chemical or bacterial factors. Some reversible or irreversible damages may be formed in the pulp with respect to the type, severity and duration of the factor. In general, pulp tissue tries to constitute repair of dentin in the changes considered reversible. The main goal in the treatment of dental diseases is to conserve the pulp vitality. Therefore, many researchers studied vital pulp treatment [1-6]. In order to have successful results from the vital pulp treatment, the indications should be determined carefully. The vital pulp treatment has numerous indications, including orthodontic and prosthetic indications.

The effect of calcium hydroxide after pulpotomy may be the result of slight chemical injury, which is limited by a zone of firm necrosis against the vital pulp tissue and the toleration of calcium ions by the tissue. Schröder [7] postulated that firm necrosis causes slight irritation and stimulates the pulp to defend and repair itself. The mineralization of the collagen starts with dystrophic calcification of both the zone of firm necrosis and degenerated cells in the adjacent tissue [7].

Case report

A 14-year-old girl was referred to our endodontics clinic in 1993. Clinical and radiographic examination revealed that there were number and formation anomalies in maxillary teeth. The permanent lateral incisors were deficient and there was twin teeth formation (twinning) on the patient's left upper canine (*Figure 1*). Radiographic view of this tooth revealed that the tooth had only one single large canal and its apexification was incomplete (*Figure 2*).

An orthodontic treatment was planned in order to align the teeth with anomaly into the normal position in the arch. A pulpotomy was also indicated, because the incision of the twinning was required, there was a possibility of a large perforation area with this procedure and there was incomplete apexification.

Following local anesthesia, the teeth were isolated with a rubber dam. The pulp cavity was evacuated and the surface of the pulp was irrigated gently with isotonic saline until bleeding ceased. After hemostasis, a pulpal medicament (calcium hydroxide-Merk, Darmstadt, Germany) was applied to the wound surface. Dry, sterile cotton pellets were used carefully with mild pressure to adapt the medicament to the prepared



Figure 1. Anterior view of the maxillary twinned left canine



Figure 2. Preoperative radiograph of the twinned tooth



Figure 3. Postoperative radiograph of the tooth

cavity and to remove excess water from the paste. The remaining coronal cavity was then restored with a material that provided a long-term hermetic seal. It is critical to avoid bacterial contamination to the pulp tissue during the procedures and to avoid any subsequent leakage following restoration (*Figure 3*). Over a week following this procedure, the patient reported a mild sensitivity. The patient's complaints disappeared subsequently. After 6 months, clinical and radiographical examinations revealed that there was



Figure 4. Postoperative radiograph of the tooth after 6 months



Figure 5. Postoperative radiograph of the tooth after 1 year



Figure 6. Postoperative radiograph of the tooth after 8 year

no pain, the vitality test was positive, the periapical and periradicular regions were normal, apexification was completed, and formation of a dentin bridge was apparent (*Figure 4*).

Afterwards, the patient was followed every 6 months for 8 years (*Figures 5, 6*). In routine controls, it was found that the natural color and the translucency of the tooth were maintained (*Figure 7*), and there was no pathological finding.



Figure 7. Anterior view of the tooth during the orthodontic treatment

Discussion

The main advantages of the vital pulp treatments are as follows: conservation of tooth vitality, no requirement of root canal therapy, and the maintenance of the natural color and translucency of the tooth.

In addition to having the same indications along with other vital pulp treatments, pulpotomy is a treatment method performed when the perforation area is very large and the tooth apex is not closed yet. Although a lot of substances are used in these treatments, $\text{Ca}(\text{OH})_2$ is the substance most commonly used. When the products

including $\text{Ca}(\text{OH})_2$ are applied to the pulp directly, caustic effects arise due to alkaline pH, and they inhibit the enzymes. Necrosis area caused by calcium hydroxide leads the mesenchymal cells to turn into fibroblasts first, and then into odontoblasts that would form the matrix [1,5,6,7]. Calcium ions play an important role in cell proliferation, blood coagulation and mineralization. A new tissue, which resembles dentin, is formed by the precipitation of circulating calcium ions to the matrix that is composed of mucopolisaccharides and glycoproteins [4]. When the regenerative tissue was examined histologically, it was determined that this was a structure similar to dentin and included canals which were more irregular and atubular at the coronal side and irregular at the pulp side [8,9]. In this current case, it was observed that the dentin layer formation was considerably thick.

In studies regarding this subject, the protection of the vitality of the tooth, the maintenance of natural color and translucency, and the fact that there was no pathologic finding on clinical and radiographic examinations were specified as success criteria [3,10,11,12]. In the present case, the facts that the findings were positive and there was no pathological finding after 8 years were considered successful as well.

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