

A New Era in Treatment of Non – Vital Primary Molars: One Year Follow-up Study

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Abstract

Background: Pulpectomy is a root canal procedure for pulp tissue that is irreversibly infected or necrotic due to caries or trauma.

Aims: The aim of this study is to apply blood clot technique for non-vital deciduous molars. Clinical and radiographical evaluations were carried out after 6 and 12 months.

Materials and Methods: Forty non vital primary molars from twenty children were involved in this study. The root canals are disinfected using triple antibiotic paste. Resembling to blood clot techniques carried out for non vital immature permanent tooth, blood clot created in root canal by by over instrumentation, and put sterile cotton pellet at the canal orifice wait 5 min for blood to clot. MTA barrier placed over blood clot about over the root orifices. The tooth then is restored with a restoration that seals the tooth from microleakage. Clinical and radiographical Follow ups carried out after 6 and 12 months.

Results: All of cases have shown good clinical outcomes good radiographic evidences of absence of apical radiolucency and no root resorption.

Conclusions: The blood clot technique considered to be the easier method of regenerative endodontics that could be carried out for primary and permanent non vital teeth.

Keywords Blood clot; Pulpectomy

Introduction

Caries is “the most common cause of pulp-periapical disease. When the pulp tissue involved in caries becomes irreversibly inflamed and progresses to necrotic, the only treatment option is root canal therapy because the infected necrotic pulp in the root canal system is not accessible to the host’s innate and adaptive immune defense mechanisms and antimicrobial agents. Therefore, the infected necrotic pulp tissue must be removed from the canal space by pulpectomy to prevent development or persistence of apical periodontitis” [1].

The purpose of pulp treatment is to maintain the tooth structure intact in order to preserve optimal function. Maintaining the vitality of teeth damaged due to dental caries or trauma is also one of the purposes of pulp treatment [2].

Regenerative endodontic treatment procedure has been suggested in order to replace the damaged pulp tissue with the viable tissue [3].

Since many types of regenerative endodontic treatment procedures have been suggested, it is important to have knowledge of the procedure that is generally used. The American Association of Endodontics suggests that “regenerative endodontic treatment can be used for teeth of a compliant patient with necrotic pulp and pulp space not needed for post and core” [4].

The routine treatment of non-vital or irreversibly inflamed primary molars is pulpectomy. Even this technique is often considered difficult because of the complexity of the root canals in primary molars and need multi-visits, clinical studies have shown a reasonable prognosis [5].

Although blood clot technique considered as regenerative endodontic technique has been already used for permanent teeth [6], it seems this application on deciduous teeth did not get the same attention. To the best of the author’s knowledge no previous studies have been published regarding deciduous teeth. This might be explained by short life span and replaceable deciduous teeth. Deciduous teeth, however, play important role in proper permanent teeth development and eruption. The aim of this study is to apply blood clot technique for non-vital deciduous molars. Clinical and radiographical evaluations of treated teeth were carried out after 6 and 12 months.

Materials and Methods

The study was conducted in 2016 - 2017 in Private Pediatric Dentistry Clinic, Baghdad, Iraq. Before the start of the study, ethical approval was obtained from the College of Dentistry/Ibn Sina University of Medical and Pharmaceutical Sciences for conducting the study. Informed consent was obtained from the parents of children before their final recruitment into the study.

Forty children of both genders aged 6-8 years old were randomly selected from sixty children with non vital deciduous lower molars without any roots resorption (one tooth from each child) were involved in this study. All children were cooperative, healthy and without history of drug allergy. After detailed history and thorough clinical and radiographical examinations (Figure 1), full detailed treatment plans were explained to the children's parents.



Figure 1: Clinical and radiographical examination of included non vital primary molar.

Under local anaesthesia (Septodont, France) and rubber dam isolation, access opening was carried out (Figure 2),

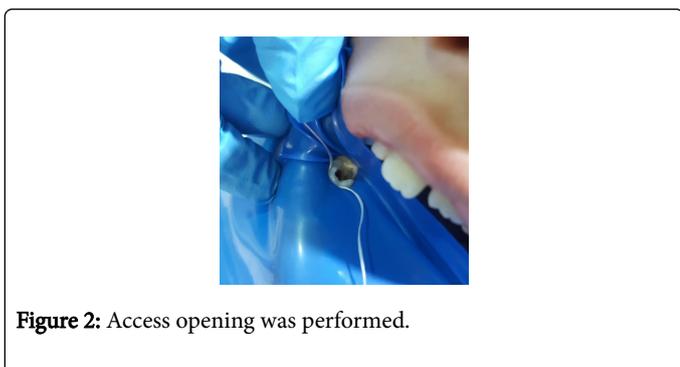


Figure 2: Access opening was performed.

The canal was disinfected with two smallest sizes K-file mechanical instrumentation for each canal in addition to irrigation using 5.25% sodium hypochlorite. After drying the canal, the tri-antibiotic paste formed by mixing equal proportions of ciprofloxacin, metronidazole, and minocycline with distilled water and introduced inside root canal as an intra-canal medicament. After 4 weeks, the antibiotic was removed by irrigating with sodium hypochlorite, drying the canals and create bleeding into canal system by over-instrumentation (Figure 3),

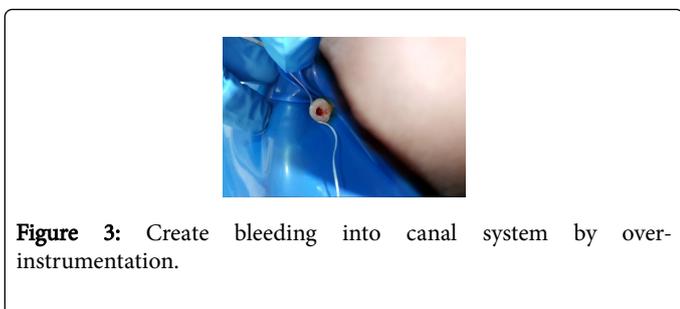


Figure 3: Create bleeding into canal system by over-instrumentation.

then using sterile cotton pellet over the canal orifices for 5 minutes to allow formation of clot. Place 3-4mm quick setting MTA (Rootdent, Russia) over the canal orifices then put a layer of reinforced glass ionomer cement (RIVA Silver, SDI, England) as final restoration [7].

An intraoral radiograph was taken for a baseline record to be compared with follow-up radiographs at 6 month and 12 months. Both

clinical and radiographical evaluation was done at each follow-up visit. The outcome of success or failure was determined by the following clinical and radiographical criteria [8]:

- Presence of any signs as spontaneous or nocturnal pain, tenderness to percussion or palpation, abscess, swelling, fistula and pathological mobility was definitively indicative of clinical failure.
- Presence of any sign of pathologic external or internal root resorption as well as periapical radiolucency was definitively demonstrated of radiographical failure.

Data analysis was carried out using SPSS package version 15 (SPSS Inc., Chicago, IL). Descriptive statistics were calculated using Chi-square test. Statistical significance was set at $P < 0.05$

Results

Table 1 illustrated the post operative clinical and radiographical outcomes after 6 and 12 months recall visits. At 6 and 12 months there was no clinical and radiological finding observed in all cases - (absence of any pathologic clinical signs and symptoms) and good radiographic evidences of absence of apical radiolucency and no root resorption at all recall visits (Figure 4), except, there was higher incidence of periodontal ligament widening at 6 months as compared to that at 12 months but the findings were statistically non significant ($p > 0.05$).

Parameter	After months 6 (No=20)		After months 12 (No=20)		Significance of difference	
	No.	%	No.	%	X2	p
	Clinical parameters					
Pain	0	0	0	0	-	-
Sinus formation	0	0	0	0	-	-
Swelling	0	0	0	0	-	-
Mobility	0	0	0	0	-	-
Radiographical parameters						
Periodontal ligament widening	4	20	1	5	2.014	0.36
Internal resorption	0	0	0	0	-	-
External resorption	0	0	0	0	-	-
Periapical radiolucency	0	0	0	0	-	-
Canal obliteration	0	0	0	0	-	-
Furcation radiolucency	0	0	0	0	-	-

Table 1: The post operative clinical and radiographical outcomes after 6 and 12 months recall visits.



Figure 4: Radiographical view after (A) 6 months. (B) 12 months.

Discussion

This study involved the using of blood clot technique as regenerative endodontic approach for treating non vital primary molars which is not published yet. In this study, after different time intervals of 6 and 12, clinically, there was no gingival redness, bleeding, swelling or abscess, draining fistula, mobility of the all involved teeth and there were no any remarkable soft tissue changes and the teeth remain function normally. As well as, radiographically, there was no any sign of pathologic external or internal root resorption as well as no any periapical radiolucency.

Success or failure of regenerative endodontic treatment is dependent on three elements: root canal disinfection, the presence of a scaffold, and hermetic coronary filling [9].

The most important step in regenerative endodontic therapy is the disinfection of the root canal system. Since the infection of the root canal system is considered to be polymicrobial, consisting of both aerobic and anaerobic bacteria. A combination of drugs would be needed to treat the diverse flora. In this study, triple antibiotic paste comprised metronidazole, ciprofloxacin, and minocycline in a saline was used. This medicament has been extensively studied by Sato et al. [10] and Hoshino et al. [11]. In this study, instrumentation of the root canal was avoided and agreed with Zhang and Yelick [12] and Nosrat et al. [13] who advocated no instrumentation procedure because using root canal instrument could not only increase fragility of dentin walls but also injure stem cells present in the apical area of these dentin walls.

As an important requirement for successful results is to achieve seal coronally to inhibit bacterial invasion in to the pulp space before revascularization could take place. A seal with MTA to a level below the cement-enamel junction covered by a light cured glass ionomer cement coronal seal is preferred. The use of MTA is for its excellent microleakage-proof property and biocompatibility. MTA is also able to set in a moist environment such as the bleeding area of the tooth. Additional placement with glass-ionomer further secures the sealing ability and the integrity of the filled Access [13].

Widening of periodontal ligament was observed in 22.5% of teeth after 6 months and in 7.5% of teeth after 12 months. This could be attributed to occlusal trauma or lack of bone support arising from pre-operative advanced bone loss. These findings were consistent with couple of other studies in which most common pathologic finding was periodontal ligament widening associated with primary molars involved with pulp therapy using different medications [14,15].

Appropriate outcomes of this treatment were determined by the clinical and radiographical evaluations revealed the effectiveness of using blood clot technique for mature non vital primary molars agreed with others used in immature permanent teeth with necrotic pulp and

apical periodontitis [16,17] those mentioned that "induction of periapical bleeding into the canal space is a necessary step in regenerative endodontic procedures of non vital teeth and the blood clots in the canal spaces could serve as a matrix or scaffold to promote pulp tissue wound healing and brought mesenchymal stem cells from periapical area into the canal space. Blood contains many platelet – derived growth factors, therefore, the term -regenerative endodontics- was introduced in clinical endodontics".

Conclusion

Components needed for successful regenerative endodontics include absence of intracanal infection, coronal seal to prevent reinfection, a physical scaffold with growth factors to promote cell growth and differentiation. Since, the studying the possibility of different technologies to fabricate tissue-engineered scaffolds with their ability toward a tissue-engineered tooth was needed even have many difficulties. The blood clot technique considered to be the easier method of regenerative endodontics that could be carried out for primary non vital teeth. The clinical and radiographical success were obtained in this study may be related to:

- The use of MTA is for its excellent microleakage-proof property and biocompatibility. Additional placement with glass ionomer further secures the sealing ability and the integrity of the filled access.
- The presence of blood clot might help the situation by acting as a scaffold to aid the in-growth of new tissue into the empty canal space.
- The blood clot itself, being a rich source of growth factors and stem cells aid in certain way in regeneration endodontic.

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Nil.

Conflicts of Interest

There are no conflicts of interest.

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