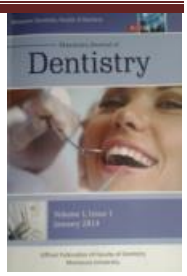

Inducing Root Growth in Nonvital Immature Permanent Teeth Using Revascularization Procedures; a Comparative Study

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Abstract:

Injury to immature permanent teeth may arrest root maturation leaving an open apex root and thin dentinal tubules prone to fracture. Apexification with calcium hydroxide was unable to induce pulp regeneration. Pulp revascularization is an emerging therapy in treatment of immature teeth allows root development. Sixty five permanent necrotic immature teeth of 7-13 years old children with signs and symptoms of periapical pathosis were involved in the study. Teeth were separated into two main groups regarding the disinfectant material Group 1, (triantibiotic paste) and Group 2 (calcium hydroxide paste); each group was classified into two subgroups A and B (MTA or Glass ionomer) regarding the sealing material. The disinfectant pastes were packed in the first visit and were irrigated in the second visit, apical bleeding was induced in the apical region. The sealing materials were placed in the coronal third of the root then composite restorations were done. Children were followed up each three month up to 18 months clinically. Statistical analysis was performed, regarding pain a statistical significant difference was recorded between the four groups at 15 month. There was a statistical significant difference at different follow up period in group 2B regarding swelling. Regarding discoloration, a statistical significant difference was recorded between the four groups at different follow up periods. Teeth discoloration was recorded in 13 (81.2%), 8 (50%), 12 (70.5%) and 5 (31.25%) teeth in 1A, 2A, 1B and 2B groups respectively. At 18 month Pain was recorded in one tooth in group 1A, two teeth in 1B and 2A groups and in five teeth in group 2B. Swelling was recorded in two teeth in1B group, in one tooth in 2A group and in three teeth in 2B group.

Introduction

Pulp necrosis of immature permanent tooth due to caries or trauma arrests the development of the tooth and makes it at risk of fracture [(1)]. Revascularization of immature necrotic permanent teeth is a new treatment option; allows root growth continuation, used as alternative to apexification with calcium hydroxide and MTA, conventional methods initiate barrier formation against which the obturation materials can pack [(2)].

Aim of the study

This study aimed to evaluate the induction of root growth in nonvital immature permanent teeth with revascularization procedures using triantibiotic paste or Calcium hydroxide paste as a disinfectant intracanal medicament with mineral trioxide aggregate or glass ionomer cement as coronal seal.

Materials and Methods

Forty nine children were selected from Pediatric Dentistry Clinic, Mansoura University. The children comprised sixty five immature necrotic permanent teeth, their age ranged between 7-13 years. The selected children were introduced with trauma or badly decayed teeth with signs and symptoms of peri apical pathosis with immature apices and non-responsive to vitality test [(3)]. The teeth were divided into two groups; 32 teeth for group I and 33 teeth for group II, according to medicament. Group I: triantibiotic paste, Group II: Ca (OH) 2 paste. Each group was subdivided into two subgroups according to the coronal seal, Subgroup A: Mineral trioxide aggregate, Subgroup B: Glass ionomer cement. The vitality of the selected tooth was evaluated using Electric pulp tester [(4)]. All teeth treated according to 2-visit regenerative protocol [(5)]. Each root canal was irrigated without instrumentation. In Group I Triantibiotic paste was placed in the pulp chamber and was slackly packed into coronal portion of the root. The tooth was sealed tight with a temporary filling for two weeks. The same procedures done in GroupII with Ca (OH) 2 paste. In Second appointment, in tooth where no signs or symptoms of persistent infection appeared. The pulp champer re-accessed, the disinfectant material eliminated with NaOCl irrigation, the root canals were irrigated with saline and dried with paper points. Bleeding was created by over instrumentation in the apical region [(6)]. In subgroup A, after formation of the blood clot, MTA placed over the blood clot, then the final coronal restorations. In Subgroup B, after formation of the blood clot, the access opening was sealed with glass ionomer cement followed by final restoration. The patient was followed up at three month interval for 18 month.

Results

Table 1 shows the description of preoperative clinical status in all studied groups. Data in table 2 shows that, At 18 month Pain was recorded in one tooth in group 1A, two teeth in 1B and 2A groups and in five teeth in group 2B. During follow up, there was no statistical difference in all groups (P>0.05) except in group 2B, (P=0.004), while between the four groups there was no statistical significant difference at 3,6,9,12,18 months, except at 15 month (P=0.005). Swelling was recorded in two teeth in1B group, in one tooth in 2A group and in three teeth in 2B group. There was no statistical significant difference in all groups

(P>0.05) except in 2B group (P=0.008). There was no statistical difference between the four groups. Crown

discoloration was noted in 13 teeth in 1A group, 8 teeth in 2A group, 12 teeth in 1B group and 5 teeth in 2B group. No statistical significant difference in each groups. A significant difference was recorded between the four groups at different follow up periods (P<0.05).

Table (1): Description of preoperative clinical status in all studied groups.

The group Number of teeth	G1A N=16	G1B N=16	G2A N=17	G2B N=16
pulpal status ,necrotic	16(100%)	16(100%)	17(100%)	16(100%)
Periapical Lesion	16(100%)	16(100%)	17(100%)	16(100%)
signs & symptoms				
• swelling	14(87.5%)	11(68.8%)	14(82.4%)	13(81.2%)
• pain	10(62.5%)	8(50%)	10(58.8%)	10(62.5%)
• discoloration	3(18.75%)	3(18.75%)	3(17.6%)	4(25%)

N for number

Table 2: Description of clinical findings during follow up period

	Group	3month	6month	9month	12month	15month	18month	significance
Pain	1A	0	0	0	0	0	1(6.25%)	P=0.41
	1B	0	0	0	0	1(6.25%)	2(12.5%)	P=0.204
	2A	0	0	0	0	0	2(11.7%)	P=0.06
	2B	0	0	0	2(12.5%)	5(31.2%)	5(31.2%)	P=0.004*
Significance test		P=1.0	P=1.0	P=1.0	P=0.102	P=0.005*	P=0.23	
Swelling	1A	0	0	0	0	0	0	P=1.0
	1B	0	0	0	0	1(6.25%)	2(12.5%)	P=0.204
	2A	0	0	0	0	0	1(5.8%)	P=0.41
	2B	0	0	0	0	0	3(18.7%)	P=0.008*
Significance test		P=1.0	P=1.0	P=1.0	P=1.0	P=0.38	P=0.29	
Discoloration	1A	13(81.2%)	13(81.2%)	13(81.2%)	13(81.2%)	13(81.2%)	13(81.2%)	P=1.0
	1B	6(37.5%)	8(50%)	8(50%)	8(50%)	8(50%)	8(50%)	P=1.0
	2A	11(64.7%)	11(64.7%)	12(70.5%)	12(70.5%)	12(70.5%)	12(70.5%)	P=0.99
	2B	4(25%)	4(25%)	5(31.25%)	5(31.25%)	5(31.25%)	5(31.25%)	P=0.99
Significance test		P=0.004*	P=0.008*	P=0.01*	P=0.01*	P=0.01*	P=0.01*	

Discussion

This study aimed to induce root growth in nonvital immature teeth by stimulating autologous cells from the apical region to avoid potential immune reaction. The revascularization procedures performed after relief of signs and symptoms. The mean age was 8.78±1.17 to achieve vascularity and cellularity in the apical region during these ages [7].

The results showed that, recurrence of pain and swelling in groups (2B and 1B) was high. It occurs after one year so disinfectant materials can be excluded as a cause. Concerning the sealing materials, microleakage of glass ionomer may cause leakage of fluid remnants from defects in resin restoration causing infection. Lack of strength of glass ionomer makes it prone to fracture lead to inflammation. Tatjana et al [8] revealed that release of fluoride from glass ionomer is a source of toxicity to pulp stem cells. There was a higher percentage of discoloration in 1A and 2A groups, MTA may be a cause of discoloration. In 1A group, minocycline in triantibiotic paste may be considered as another cause. Bin-na et al [9] showed that discoloration with triantibiotic paste occurs by minocycline which explain the cause of discoloration in 1B group. Felman and Parashos [10] revealed that white MTA cause discoloration of teeth and this discoloration were most prominent in cervical third of the crown. The induced blood inside the canal may cause complicated discoloration when mixed with the sealing materials MTA or glass ionomer. This may explain the evidence of discoloration in 2B group.

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