CASE REPORT

Blessing Nonvital Tooth with Life through Revascularization

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ABSTRACT

In recent times, revascularization has been found to be a better alternative in treatment of immature, nonvital tooth with blunderbuss canal since, it enables formation of root apex radiographically which allows the clinician to get a better hermeatic seal in the apical area. Success of the treatment also depends greatly upon the disinfection of the canal, which is achieved not only by the use of intracanal irrigants, but also with the use of intracanal medicaments like triple antibiotic paste, which is followed by getting a good coronal seal to prevent orthograde infection during the procedure. However, long-term prognosis of the treatment and the tissue occupying the canal space requires further investigation.

Keywords: Blunderbuss canal, Nonvital tooth, Revascularization, Triple antibiotic paste.

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INTRODUCTION

The advantage of pulp revascularization is the possibility of further root development and enforcement of dentinal walls by deposition of hard-tissue thus strengthening the root against fracture. Young and immature tooth has an open apex, which allows new tissue to grow in to the pulp quickly. The incidence of revascularization is enhanced, if the apex shows radiographic opening of more than 1.1 mm.[1]

Outcome of successful regeneration depends upon complete disinfection of the canal space. The necrotic uninfected pulp acts as a scaffold for in growth of new tissue from periapical area.[2] Disinfection with mechanical instrumentation and irrigation with NaOCl alone has been proven ineffective.[3] Therefore, we must rely on the placement of a medicament to achieve reduction of intracanal bacteria. Research with topical antibiotics has shown that a combination of metronidazole, minocycline and ciprofloxacin is effective *in vitro*[4] at killing common endodontic pathogens from necrotic infected root canal.

This report discusses the successful outcome of revascularization of immature, necrotic and infected permanent tooth with apical periodontitis.

CASE REPORT

An 11-year-old girl, reported to the department of pedodontics and preventive dentistry complaining of pain in upper right front tooth region since 15 days. The medical history was non-contributory. On clinical examination, Ellis class III fracture was diagnosed in maxillary right central incisor[11] and the tooth was tender on percussion. Diagnostic test was inconclusive on cold and electric pulp testing. Radiographically, the tooth confirmed Ellis class III fracture with diffuse periapical radiolucency and widened periodontal ligament (PDL) space and blunderbuss apex (Fig. 1). Since, the apex was more than 1 mm wide it was decided to attempt for regeneration of pulp. Written consent was taken from the parents and ethical clearance was obtained from ethical clearance committee of the institute. The technique used was similar to that described by Rule and Winter[5] and Iwaya et al.[6]

Fig. 1: Diagnostic IOPA radiograph showing open apex of 21

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An access cavity was made, no purulent or hemorrhagic discharge was encountered indicating pulp necrosis. An irrigating needle was placed within 1 mm of apex and the canal was slowly flushed with 2.5% NaOCl followed by sealing access cavity with cavit. After 15 days, the mixture of ciprofloxacin (Ranbaxy laboratories), metronidazole (Nicholas piramal) and minocycline paste (1:1:1) mixed with sterile water, as described by Hoshino et al[4] was introduced into the canal with the help of lentulospiral instrument. Access cavity was again sealed with 4 mm thickness of cavit (ESPE, Seafeld Germany).

Patient returned asymptomatic after 1 month. Access cavity was re-opened, the canal appeared clean and dry with no signs of infection. Canal was flushed with 2.5% NaOCl and a 27 gauge sterile needle was used to prick the periapical area until it bleed. Bleeding was stopped at 3 mm below the level of cementoenamel junction (CEJ) and left until clot was formed, which was followed by careful placement of mineral trioxide aggregate (MTA) (Angelus) over the blood clot and cavit was placed. After 2 weeks cavit was replaced by composite resin restoration (Z250 Filtek; 3M ESPE).

Patient was found to be asymptomatic after 3 months, 1 year (Fig. 2) and 2 years (Fig. 3) of follow-up. Radiograph showed evidence of periradicular bone healing, partial regeneration of PDL space and continued evidence of root apex formation as compared to preoperative radiographs.

DISCUSSION

Revascularization of an immature tooth is considered to be a great challenge especially, when the pulp is necrotic since it becomes extremely difficult to disinfect the canals. In an immature tooth the walls of the roots are very thin, therefore mechanical instrumentation cannot be performed since, it may lead to fracture of roots then or in future.

Irrigation with NaOCl alone cannot render the canal free of bacteria, thus other intracanal medications are used like $Ca(OH)_2$. An advantage of $Ca(OH)_2$ is that, it not only cleans and disinfects the canal, but also leads to a apical barrier formation (apexification) at the root apex against, which obturation can be done. But at the same time studies have reported that long-term use of $Ca(OH)_2$ makes the root more prone to fracture.[7]

Mineral trioxide aggregate has shown to overcome problems associated with calcium hydroxide and been used to create a bridge at the apex. But it does not increase the thickness of root dentin. After complete disinfection of the canal, MTA is placed in the apical 3rd of the immature root to create a stop against, which obturation can be done.[8] Again this technique will not allow new tissue to grow into the canal and the root remains thin and weak, a finding consistent with some of the responses observed in previous case series.[9]

Disinfection of the canal has been shown to play key role in the process of revascularization.[11] In the present case, after copious irrigation with NaOCl triple antibiotic paste was used. This antibiotic paste consisted of ciprofloxacin, metronidazole and minocycline. Paste was kept for 15 days into the canal for complete disinfection. This mixture has been demonstrated to be well tolerated by vital pulp tissues.[10] It has been reported that minocyclin leads to discoloration of teeth. Therefore, either it can be left out or cefaclor can be used as a substitute for minocyclin.[11]

After thorough disinfection a blood clot is created. This blood clot acts as a matrix upon which new tissues can grow into pulp space. In teeth with infected pulp and open apices it is possible that some vital pulp tissue and hertwigs epithelial root sheath cells may have survived apically and after complete disinfection these cells may get a conducive environment to proliferate again.

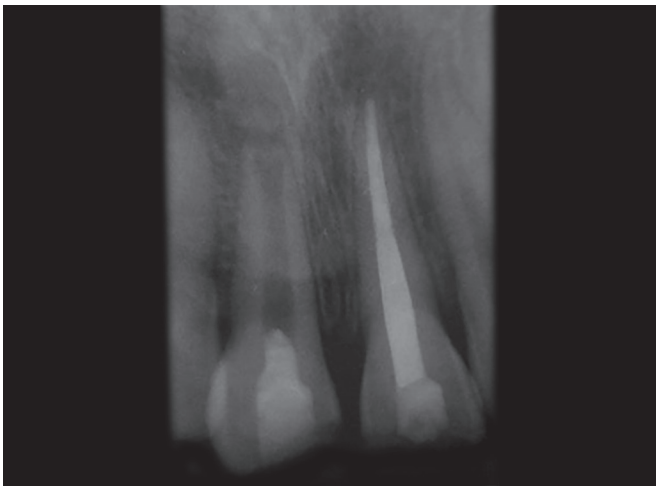

Fig. 2: Follow-up IOPA radiograph after 1 year

Fig. 3: Follow-up IOPA radiograph after 2 years

A bacterial tight coronal seal can be achieved either by bonded composites, MTA to prevent any orthograde recontamination of the root canal.

Now a question arises here that whether it is actually pulp that vascularises the pulp space? However, in this case it was likely that the tissue was pulp, because the root continued to grow and root appeared to thicken with time in conventional manner. Long-term predictability of this new tissue still needs to be studied. However, the benefit of this procedure is so great compared to other conventional methods that it is worth attempting. Also, it should be kept in mind that if no root development is seen within 3 months than more traditional apexification procedures should be performed.

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