



ENDODONTIC TREATMENT OF CHRONICALLY INFECTED PRIMARY TEETH USING TRIPLE ANTIBIOTIC PASTE

Endodontics

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ABSTRACT

Aim: The purpose of this study was to evaluate the clinical and radiographic success of pulpectomized primary teeth with chronic infection using a mixture of metronidazole, ciprofloxacin, and minocycline (3MIX)-MP as an intracanal medicament before the obturation.

Methodology: Sixty primary teeth were selected, which were randomly divided into two groups (Group A and Group B) with thirty teeth in each group. In Group A, 3MIX-MP was used as intracanal medicament whereas in Group B, conventional pulpectomy was performed. Resolution of clinical signs and symptoms were evaluated within 2 weeks after the treatment and at recalled 3rd, 6th, and 12th month intervals. The treated teeth were evaluated clinically and radiographically.

Results: High success rate was observed in Group A samples both clinically and radiographically. Although the difference in clinical success was not statistically significant, the difference in radiographic success was statistically significant.

Conclusion: All the primary teeth with chronic infection which were treated using 3MIX-MP, followed by the instrumentation and obturation provided excellent clinical and radiographic success when compared to conventional pulpectomy and non instrumentation lesion sterilization tissue repair therapy.

KEYWORDS

Pulpectomy; topical antibiotics; zinc oxide eugenol

INTRODUCTION:

The successful management of chronically infected primary teeth is still a challenge owing to its complex root canal system, difficulty in mechanical debridement, polymicrobial nature of infection, and root resorption.[1] The importance of chemical means of disinfection has aroused to accomplish complete sterilization of the canal and to improve the treatment prognosis.

The concept of lesion sterilization and tissue repair (LSTR) therapy, which is a non-instrumentation endodontic treatment that employs a mixture of metronidazole, ciprofloxacin, and minocycline (3MIX) has been shown to be very effective in eliminating endodontic pathogens.[2] However, the LSTR therapy was evidenced to be successful but noninstrumentation endodontic treatment using 3MIX cannot substitute the conventional root canal filling, as a long-term therapy in primary teeth. Because performing the treatment of infected root canals with LSTR therapy alone without mechanical debridement and leaving the canal space is not justifiable and the left necrotic pulp that was left might act as nidus for future infection.[3] Hence, complete removal of radicular pulp and additional filling is logical to prevent bacterial proliferation in root canals. The completely filled canals were shown to have long-term success than unfilled or under filled canals.[4]

It was reported that complete sterilization of root canals can be achieved within 2 weeks after the use of triple antibiotic paste.[5] Thus, a clinical study was carried out with an aim to compare the outcome between conventional pulpectomy technique and root canal disinfection protocol with 3MIX-MP paste before obturation.

METHODOLOGY:

The study design was approved by the Institutional Ethical Committee; the purpose of study was explained to the parents and written informed consent was taken from parents before the start of the study. A total of 60 primary teeth (molars and incisors) with chronic infection were included from 55 child patients, aged between 4 and 10 years, who attended the Department of Dentistry from September 2018 to November 2019.

The primary teeth with chronic infection, gingival swelling or draining sinus, mobility, tenderness to percussion, periradicular radiolucency,

and exhibiting not more than two-third of root resorption were included in the study whereas nonrestorable teeth with excessive root resorption of more than 1/2 of the root length, radiolucency involving underlying tooth crypt, medically compromised children, and children with any history of drug allergy were exempted from the study. The selected samples were randomly assigned into two groups, i.e., Group A – experimental group (n = 30) and Group B – control group (n = 30). Commercially available chemotherapeutic agents such as ciprofloxacin (500 mg) (Ciprobay, Bayer, Germany), metronidazole (400 mg) (Flagyl, Sanofi-Aventis, Thailand) and minocycline (50 mg) (Minocin, Wyeth, China) tablets were procured, and their enteric coating was removed using sterile sharp knife, then these tablets were pulverized into fine powder using sterile porcelain mortar and pestle. Just before use, each powdered drugs were weighed in the proportion of 1:3:3 (one part of ciprofloxacin, three parts of metronidazole, and three parts of minocycline) using electronic weighing machine and were mixed with propylene glycol and polyethylene glycol to form an ointment. Trairatvorakul and Detsomboonrat, Jaya et al., Cruz et al. also followed the similar protocol of preparation of 3MIX antibiotic paste.[3,6,7]

In Group A, 3MIX-MP paste placed in the pulp chamber and pressed with dampened cotton pellet and temporized with cavit. In Group B, formocresol dampened cotton pellet was placed in pulp chamber followed by closed dressing. The patients were recalled after 2 weeks for evaluation. The teeth which remained asymptomatic were obturated with zinc oxide eugenol cement mixed in the proportions of 1:1.5 (P: L) using lentulo spirals. Then, these teeth were restored with glass ionomer cement and further reinforced by placing stainless steel crowns.

Further, these treated teeth were reevaluated both clinically and radiographically at 3rd, 6th, and 12th month intervals postoperatively. At the time of revisits, the teeth were examined clinically for any signs of failure that includes a report of spontaneous pain, presence of swelling, sinus tract, and mobility and radiographic evaluation was done to check the resolution of radiolucency and signs of resorption. The teeth which were asymptomatic without pain, swelling, sinus tract and mobility were labeled as successful; further, the teeth were labeled as failures which exhibited increase in furcation radiolucency or development of root resorption which is abnormal for the age of the child.

RESULTS:

The treatment outcome was analyzed based on clinical and radiographic findings; the data were tabulated and subjected to statistical analysis using Fisher's exact test. The results were summarized as follows.

Table 1 depicts the clinical evaluation which was carried out at 3rd, 6th, and 12th month intervals. In test group [Table 1], a total number of 30 teeth were subjected to pulpectomy procedure. At 3rd month recall, 30 teeth were available for evaluation, out of which all the teeth were clinically asymptomatic, which accounted for 100% success. At 6th month recall, 30 teeth were available for evaluation, out of which, 1 tooth exhibited pain, and it was extracted, thus the remaining 29 clinically asymptomatic teeth accounted for 97% success. Moreover, at the 12th month recall, 29 teeth were available for evaluation, out of which all the teeth were clinically asymptomatic; hence, total 29 teeth (97%) were considered successful. In the control group [Table 2], out of 30 teeth, two teeth showed exaggerated clinical signs and symptoms at initial follow-up of 2 weeks and were extracted; thus, a sample of 28 teeth was available for further clinical evaluation. At 3rd month recall, 28 teeth were available for the evaluation out of which 2 teeth exhibited exaggerated clinical and radiographic signs and symptoms were extracted; thus, the remaining 26 teeth accounted for 87% success. At 6th month recall, 26 teeth were available for evaluation, out of which, 1 tooth exhibited pain, and it was extracted; thus, the remaining 25 clinically asymptomatic teeth accounted for 83% success. Moreover, at the 12th month recall, 25 teeth were available for evaluation; out of which, all the teeth were clinically asymptomatic; hence, a total 25 teeth (83%) were considered successful.

Table 1: Comparison of treatment outcomes based on clinical findings in both test and control groups at different time intervals

Group	Total teeth (n)	3rd month followup P (%) Failure	Success	6th month followup (%) Failure	Success	12th month followup (%) Failure	Success
Test group	n = 30	0	100	3	97	0	97
Control group	n = 30	13	87	3	83	0	83
P		0.03		0.07		0.07	

Table 2: Comparison of treatment outcomes based on radiographic findings in both test and control groups at different time intervals

Time interval	Furcational radiolucency	Bony changes (%) Count	Radiographic success	Bony changes (%) Count	Radiographic success	p value
3rd month	Regeneration Static bone morphology Increase in bone loss	12 (40) 100 18 (60) 0		6 (20) 77 17 (57) 5 (16.6)		0.02
6th month	Regeneration Static bone morphology Increase in bone loss	14 (47) 97 15 (50) 1 (3)		7 (23.3) 67 13 (43.3) 6 (20)		0.03
12th month	Regeneration Static bone morphology Increase in bone loss	16 (53.33) 97 13 (43.33) 0		9 (30) 47 5 (17) 11 (36)		<0.01

DISCUSSION:

The first topical antibiotic introduced to endodontics was Grossman's polyantibiotic paste in 1951 later many topical antibiotics have been introduced with varying combinations, few of those include septomixine forte; PBSC (Combination of Penicillin, Bacitracin, Streptomycin and Caprylate sodium), and clindamycin. However, none of these combinations has proven to be 100% successful in eradicating all the bacterial strains from the root canal system, thus the search for a right combination is still on.[8]

Therapy introduced by Niigata university school of dentistry; Japan has gained reputation as it proved to attain 100% sterility in the root canal system.[2,9,10]

Although the existing literature has demonstrated that the LSTR technique as one of the successful technique for management of chronically infected primary teeth, the controversies aroused about the duration of therapeutic activity of the medicament and leaving the infected material in the radicular region. To address these above-said issues, present study planned where in treated tooth were revisited after 2 weeks for medicament removal and obturation; then, the obtained outcome was analyzed.

The following conclusions were drawn within the limitations of this study:

- Endodontic treatment of infected primary teeth treated with 3MIX-MP followed by instrumentation and obturation provided an excellent success when compared to conventional pulpectomy and non-instrumentation LSTR therapy
- As antibiotic resistance has become an emerging global problem these days, the development of multidrug resistance strains may decrease the success of this treatment modality. Hence, the value of mechanical debridement in ultimate success cannot be ignored.

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The concept of LSTR therapy or NonInstrumentation Endodontic