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Evaluation of the Effectiveness and Safety of One-Time Endodontics in the Treatment of Chronic Apical Periodontitis with Sinus Tract in Pediatric Deciduous Teeth

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Abstract: *Objective:* To observe the effectiveness and safety of one-time endodontics in the treatment of chronic apical periodontitis with sinus tract in pediatric deciduous teeth. *Methods:* 109 cases of children with chronic apical periodontitis with sinus tract in the deciduous teeth treated in our hospital from January 2022 to December 2023 were selected and grouped by the randomized numerical table method, with 54 cases in the experimental group and 55 cases in the control group. The experimental group was treated with one-time endodontics and the control group was treated with conventional endodontics. *Results:* After the treatment, the total effective rate of treatment was higher in the experimental group than in the control group ($P < 0.05$); the incidence of adverse events was lower in the experimental group than in the control group ($P < 0.05$); the satisfaction of the children's family members was higher in the experimental group than in the control group ($P < 0.05$); the pain duration was lower in the experimental group than in the control group ($P < 0.05$). *Conclusion:* In the experimental group, children with chronic apical periodontitis with sinus tract of the deciduous teeth were given one-time endodontic treatment, and the results of its implementation were relatively good.

Keywords: One-time endodontics; Chronic apical periodontitis with sinus tract; Pediatric deciduous teeth; Therapeutic effectiveness; Safety

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1. Introduction

Chronic apical periodontitis with sinus tract of pediatric deciduous teeth is a frequent oral disease in children [1], which is mainly due to the infection of the pulp of the deciduous teeth without effective and timely treatment, which leads to the gradual spread of inflammation to the surrounding area, resulting in the loosening of the deciduous teeth, falling off, and other symptoms. Conventional endodontic treatment is often used in clinical practice, but it requires more than two sessions, which means that children need to visit the clinic repeatedly, and the overall effect is unsatisfactory. In contrast, one-time endodontic treatment is a new type of surgical measure that

has been widely used in the clinic and has a better therapeutic effect, as children do not need to visit the clinic repeatedly, the postoperative recovery is relatively fast [2,3], and the pain does not last long, which is more easily accepted by the children. The specific application effect of this treatment measure needs to be further studied, thus this study carries out one-time endodontic treatment for 54 cases of research subjects in the experimental group and observes the effectiveness of its implementation.

2. General information and methods

2.1. General information

109 cases of children with chronic apical periodontitis with sinus tract in the deciduous teeth treated in our hospital from January 2022 to December 2023 were selected and grouped by the randomized numerical table method, with 54 cases in the experimental group and 55 cases in the control group. The age range of the experimental group was 5–10 years old, with an average of 5.84 ± 0.64 years old, with 27 males and 27 females; the age range of the control group was 6–11 years old, with an average of 5.83 ± 0.69 years old, with 29 males and 26 females. A comparison of the general data (gender and age) of the two groups found no significant difference ($P > 0.05$).

Inclusion criteria: (1) Good mental state and communication skills; (2) Voluntary participation in the study with informed consent. Exclusion criteria: (1) Other malignant tumor diseases; (2) Other hematologic diseases, major infections; (3) Presence of other serious heart, liver, and kidney diseases.

2.2. Methods

Conventional endodontic treatment was adopted in the control group. After a detailed and comprehensive examination, the children were treated with conventional endodontic therapy according to their actual conditions. Before the operation, X-rays were used to comprehensively understand the actual conditions of the affected teeth, including the degree of ulceration of the cavity and the morphology of the root canals, etc. During the operation, local anesthesia was applied with lidocaine (Manufacturer: Sinopharm Group Rongsheng Pharmaceutical Co., Ltd.; Approval code: Sinopharm H20043676), and the appropriate dosage was selected according to the actual conditions of the children. The total dose should be kept between 4.0 and 4.5 mg/kg. After the anesthesia had taken effect, the pulp was opened and uncovered to completely remove all the decayed material in the pulp, and the root canal was prepared with a pediatric root canal file M3-MR-2506-16, and the root canal was suctioned with a twist of sterilized paper until it was dry, and then a temporary sealing was applied with Wuhan Guanya Calcium Hydroxide Paste (Wuhan Gaodeng Dental Material Co.) The canal was sealed temporarily. The family of the patient was reminded about a follow-up examination two weeks later. If there was no significant exudation or odor at the follow-up examination, Vitapex root canal filling material (Morita, National Instrumentation No. 20173172065, National Instrumentation Preparation No. 20210441) was applied to fill the root canals and zinc polycarboxylate cement was applied for the bottoming operation, and 3MZ350 resin was applied to fill the sockets. If there was any abnormality during the follow-up, the root canal would be cleaned twice, calcium oxide would be used to perform the sealing operation, and the child's family would be reminded to recheck the root canal at an interval of one week until the effect was satisfactory, and then the operation of filling with Vitapex paste would be carried out.

In the experimental group, the implementation of a one-time endodontic treatment was performed. The specific basic treatment operations were the same as those of the control group, and the children were subjected to routine operations such as pulp opening and uncovering, root canal preparation, and so on. After the completion of the basic treatment, Vitapex root canal filling material (Morita, National Instrumentation No.

20173172065, National Instrumentation Preparation No. 20210441) was used to perform a one-time filling of the root canal, and the sinus tract was observed to overflow with paste, and then zinc phosphate was used to close the root canal mouth, and 3MZ350 resin was used to fill the socket.

All children undergoing treatment should avoid foods that are too cold, too hot, or spicy for a week after treatment. Additionally, they should follow medical advice and take oral cephalosporin anti-inflammatory drugs for three days [4].

2.3. Observation indexes

(1) Overall effective rate of treatment: Through the observation of the children's pain, gingival redness, swelling, pus overflow, and other symptoms of the implementation of the assessment, the results were divided into significantly effective, effective, and ineffective; the significant relief of its symptoms was assessed as significantly effective; the relief of its symptoms was assessed as effective; no relief or worsening of the symptoms was assessed as ineffective. The total effective rate of treatment = significantly effective rate + effective rate.

(2) Incidence of adverse events: Cases of infection, root fracture, and periodontal tissue adhesion during the study were recorded.

(3) Satisfaction of the child's family: The satisfaction of the child's family with the care of the child was evaluated through a satisfaction questionnaire, the total score of the questionnaire was 100 points, and the number of points scored was positively proportional to the results of the test subjects' satisfaction. 85–100 points: very satisfied, 60–84 points: more satisfied, 0–59 points: dissatisfied, total satisfaction = (very satisfied cases + more satisfied cases) / total cases × 100%.

(4) Pain duration: The pain duration of the children during the study was recorded.

2.4. Statistical analysis

The data related to this study were calculated using the software SPSS26.0. The count data were compared between groups using the chi-square test, the measurement data conformed to the normal distribution of mean ± standard deviation (SD) and *t*-test was used, and a statistically significant difference was taken as the standard of $P < 0.05$.

3. Results

3.1. Total effective rate of treatment

Table 1 shows the total effective rate of treatment of the two groups of children after the end of treatment, and the experimental group had a higher value than the control group ($P < 0.05$).

Table 1. Comparison of total effective rate of treatment [*n* (%)]

Group	Significantly effective	Effective	Ineffective	Total effectiveness of treatment
Control group ($n = 55$)	22 (40.00)	26 (47.27)	7 (12.73)	48 (87.27)
Experimental group ($n = 54$)	25 (46.30)	28 (51.85)	1 (1.85)	53 (98.15)
χ^2	-	-	-	4.739
P	-	-	-	0.029

3.2. Adverse events

Table 2 shows the incidence of adverse events in the two groups of children after the end of treatment, and the experimental group had a lower value than the control group ($P < 0.05$).

Table 2. Comparison of the incidence of adverse events [*n* (%)]

Group	Infection	Root fracture	Periodontal tissue adhesion	Incidence of adverse events
Control group ($n = 55$)	4 (7.27)	3 (5.45)	2 (3.64)	9 (16.36)
Experimental group ($n = 54$)	1 (1.85)	1 (1.85)	0 (0.00)	2 (3.70)
χ^2	-	-	-	4.813
P	-	-	-	0.028

3.3. Satisfaction of children's families

Table 3 shows the satisfaction of the children's families of the two groups of children after the end of treatment, and the experimental group had a higher value than the control group ($P < 0.05$).

Table 3. Comparison of satisfaction of children's families [*n* (%)]

Group	Very satisfied	More satisfied	Dissatisfied	Satisfaction of children's families
Control group ($n = 55$)	20 (36.36)	25 (45.45)	10 (18.18)	45 (81.82)
Experimental group ($n = 54$)	26 (48.15)	26 (48.15)	2 (3.70)	52 (96.30)
χ^2	-	-	-	5.830
P	-	-	-	0.016

3.4. Pain duration

Table 4 shows the duration of pain in the two groups of children after the end of treatment, and the experimental group had a lower value than the control group ($P < 0.05$).

Table 4. Comparison of pain duration (mean ± SD)

Group	Post-treatment
Control group ($n = 55$)	4.39 ± 1.18
Experimental group ($n = 54$)	3.26 ± 1.07
t	5.234
P	0.000

4. Discussion

Chronic apical periodontitis with sinus tract in pediatric deciduous teeth is a common disease, which is often triggered by pulpal infection. The age of children is relatively young, and the deciduous teeth have the characteristics of low calcification ratio, wide root apex, large pulpal cavity, and thin pulpal chamber [5], which makes it easier for necrosis to occur after pulpal infection, and the inflammation is more likely to spread to periapical tissues, which can lead to apical periodontitis. Children need to be treated as early as possible to further improve their symptoms so that they can better preserve their deciduous teeth until the replacement period. Conventional endodontic therapy is often used in clinical practice, which has a good therapeutic effect, but it requires repeat-

ed treatment of the child's tooth, which prolongs the duration of pain [6,7] and has a poor prognosis. One-time endodontic treatment avoids the pain of repeated treatments, can better relieve children's symptoms, and has a better prognosis.

In the present study, for children with chronic apical periodontitis with sinus tract of the deciduous teeth in the clinic, we chose to carry out a one-time endodontic treatment for children in the experimental group, and their symptoms were better improved after treatment as the total effective rate of the experimental group was higher than that of the control group ($P < 0.05$); the children had relatively fewer adverse events after treatment as the incidence of adverse events was lower in the experimental group than in the control group ($P < 0.05$). The satisfaction of the children's families was improved as the families of the children in the experimental group were more satisfied than the control group ($P < 0.05$). The duration of their pain was shortened as the duration of pain in the experimental group was lower than that in the control group ($P < 0.05$). This is similar to the results of the study by Zhang [8], which indicated that one-time endodontics has a better therapeutic effect. One-time endodontics can reduce the number of times to confirm the direction of the child's root canal and the length of the root canal, the continuity of its treatment is better, and the treatment efficiency is relatively high. In the process of treatment, Vitapex paste is selected to carry out the filling operation, which consists of calcium hydroxide, silicone oil, and iodoform, and can effectively neutralize the acidic products produced by the inflammatory reaction, actively inhibiting the progress and deterioration of bacteria and inflammation [9,10]. In the implementation of the cleaning of the root canal wall, it can also accelerate the formation of hard tissue, further shorten the healing time of the apical tissues, and eliminate the odor inside the children's oral cavity. It effectively improves the therapeutic effect, avoids long-term pain, makes it easier for children to accept the treatment, and promotes their effective recovery.

5. Conclusion

This paper demonstrated that a one-time endodontic treatment is more effective in treating children with chronic apical periodontitis with sinus tract of the deciduous teeth. The treatment can improve the children's symptoms, reduce the occurrence of infection and other adverse events after treatment, enhance the satisfaction of their families, and reduce the duration of pain, which is suitable for widespread clinical application.

Disclosure statement

The author declares no conflict of interest.

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