

# Evaluation of Post-Operative Pain Subsequent to Endodontic Treatment Utilizing Hand and Pedoflex Rotary files in Primary Mandibular Molars: A Clinical Investigation

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## Abstract

**Aim:** To comparatively evaluate postoperative pain levels following root canal instrumentation with hand files versus Pedoflex rotary files in primary mandibular molars.

**Material and Methods:** This randomized clinical trial involved 60 children aged 6-10 years with primary mandibular molars requiring pulpectomy. They were divided into two groups: Group I received hand K file instrumentation, and Group II was treated with Pedoflex rotary files. Pain levels were recorded using the Wong-Baker FACES Pain Rating Scale at 6, 12, 24, 48, and 72 hours postoperatively.

**Results:** The Pedoflex rotary file group experienced significantly lower pain scores at all time intervals compared to the hand K file group ( $p < 0.05$ ). The mean pain score in Group A gradually decreased from 6 to 72 hours, while Group B showed a more rapid decline in the first 24 hours followed by a plateau.

**Conclusion:** The use of Pedoflex rotary files for root canal instrumentation in primary mandibular molars significantly reduces postoperative pain when compared to conventional hand files. These findings suggest that rotary files may provide a more comfortable postoperative experience for pediatric patients undergoing pulpectomy.

**Keywords:** Primary molars, Pulpectomy, Postoperative pain, Hand files, Rotary files

## Introduction

The management of pulpally involved primary teeth is a common procedure in pediatric dentistry aimed at preserving the health and function of affected teeth until their exfoliation.<sup>1</sup> Pulpectomy, one of the prevalent endodontic treatments, involves the removal of the infected pulp followed by cleaning, shaping, and filling the root canals.<sup>2</sup> Traditionally, this process has been carried out using manual instrumentation with hand files.<sup>3</sup> However, with advancements in dental technology, rotary files designed for pediatric endodontics, such as Pedo Flex rotary files, have been introduced, purporting to improve treatment outcomes and patient comfort.<sup>4,7</sup>

Postoperative pain is a crucial consideration in pediatric dentistry, as it can influence a child's future attitude towards dental care.<sup>8</sup> It is vital to evaluate and adopt clinical practices that minimize discomfort. Therefore, this study's objective is to assess whether the use of Pedoflex rotary files can result in lower postoperative pain levels compared to traditional hand files in primary mandibular molars.<sup>9,10</sup>

Hand files have been the gold standard in root canal instrumentation for decades; however, they may be associated with longer procedure times and might induce more procedural discomfort.<sup>11,12</sup> Conversely, rotary files are designed to be more efficient and cause less tissue irritation. Their use in primary teeth has been limited but is gaining interest with the advent of instruments specifically tailored for primary root canal anatomy.<sup>13-5</sup>

The study hypothesizes that rotary files will cause less postoperative pain due to their design and the ease of operation. This hypothesis is tested through a randomized clinical trial with two groups of pediatric patients. A systematic assessment of pain levels postoperatively using a validated pain scale, the Wong-Baker FACES Pain Rating Scale, offers a reliable measure of the children's discomfort. This study aims to provide evidence-based guidance for clinicians on the optimal choice of instrumentation technique with the potential to enhance the quality of pediatric endodontic care.

## Material and Method

The randomized clinical trial was conducted after approval from the Ethics Committee and obtaining informed consents from the guardians of 60 children aged 4-8 years, diagnosed with pulpally involved primary mandibular molars necessitating pulpectomy. The patients were randomly allocated into two groups using a computer-generated list:

Group I (Hand File Group): 30 children received root canal instrumentation using K files following the standard step-back technique, with each file used in a watch-winding motion to the working length.

Group II (Pedoflex Rotary File Group): 30 children were treated with Pedoflex rotary files following the manufacturer's protocol for instrumentation. Files were used at a constant speed and torque as per specifications.

Preoperative pain was managed using local anesthesia for all procedures. Postoperative pain levels were assessed using the Wong-Baker FACES Pain Rating Scale, a validated tool for pediatric pain assessment, at 6, 12, 24, 48, and 72 hours after the procedure. The scale, showing faces ranging from 'no pain' to 'worst pain', was explained to each patient before their dental procedure. Analgesic use was standardized across both groups, with parents instructed to administer a pediatric dose of acetaminophen if the child experienced pain. Parents were educated on the use of Wong-Baker FACES Pain Rating Scale for pain assessment and maintaining a pain diary.

A p-value of less than 0.05 was considered statistically significant. Pain score trends over time were also analyzed within each group.



Figure 1: WBFPRS

## Results

The results indicated that group II (Pedoflex rotary files) had considerably less postoperative pain at all assessed intervals. Initial pain scores (recorded 6 hours postoperatively) were significantly lower in the rotary file group ( $2.3 \pm 1.1$ ) compared to the hand file group ( $4.5 \pm 1.4$ ). This trend continued, with group II showing a rapid decline in average pain scores within the first 24 hours, plateauing thereafter, with scores ranging from 0.5 to 1.0. In contrast, group I scores gradually declined, with reported scores between 3.5 at 12 hours to 2.5 at 72 hours.

**Table 1. Intergroup evaluation of mean pain score at different time interval**

Time	Groups	Mean Pain Score	t value	p value
After 6 hours	I	4.50 ± 1.40	1.0	< 0.05*
	II	2.30 ± 1.10		
After 12 hours	I	3.50 ± 0.75	1.5	< 0.05*
	II	2.00 ± 0.50		
After 24 hours	I	2.50 ± 0.55	1.3	<0.05*
	II	1.50 ± 0.45		
After 48 hours	I	2.00 ± 0.25	1.05	< 0.05*
	II	1.01 ± 0.25		
After 72 hours	I	1.50 ± 0.18	0.5	< 0.05*
		0.50 ± 0.10		

\*Significant

## Discussion

The use of rotary files in pediatric dentistry has been a topic of increasing interest in recent years. The reduced postoperative pain observed in Group II (Pedo Flex rotary file group) of the study aligns with the findings of previous investigations. For example, a study by Barr et al. (2000) introduced the use of nickel-titanium (NiTi) rotary files in children and noted their efficiency and potential for reduced trauma compared to manual files.<sup>6</sup>

Additional research has suggested that the design of rotary files contributes to this comfort. The flexibility of NiTi instruments allows for better navigation through the curved canals of primary molars, which may result in less postoperative discomfort due to reduced canal transportation and fewer iatrogenic errors.<sup>4</sup>

Furthermore, the time factor is an important consideration. Several studies have pointed out that the use of rotary files cuts down the time required to complete the pulpectomy. This decrease in chair time not only improves the efficiency of the procedure but also reduces the duration of potential discomfort for the child during the procedure.<sup>5</sup>

However, it is also crucial to consider the learning curve associated with the adoption of new technologies like rotary files. While the results of this study are promising, the effectiveness and safety of rotary files depend on the practitioner's skill, which may affect outcomes including postoperative pain.<sup>4</sup>

In terms of pain measurement, the Wong-Baker FACES Pain Rating Scale has been validated in previous literature as a reliable tool for assessing pain in children who might struggle with verbalizing their discomfort. In line with these studies, the consistent use of this scale in the present trial provides a credible basis for the reported pain levels.<sup>9</sup>

The shift towards the use of rotary files, as suggested by the outcomes of this trial, indicates a paradigm shift in pediatric evidence-based, child-friendly techniques that prioritize patient comfort without compromising on the procedural efficacy. Further long-term studies and meta-analyses are required to support the widespread adoption of these tools and to understand the implications for practice in terms of cost, training, and potential risks.<sup>14-15</sup>

In conclusion, this study adds to the growing body of evidence that suggests the use of rotary files, such as Pedoflex, can improve the postoperative experience for children undergoing pulpectomy in primary mandibular molars. It emphasizes the importance of ongoing research and training in adopting newer, less painful methods in pediatric dental care.

## Clinical Significance

The clinical significance of this study lies in its contribution to the ongoing effort to improve patient comfort and outcomes in pediatric endodontic treatments. By comparing the postoperative pain associated with two different instrumentation techniques in primary mandibular molars—hand files versus Pedoflex rotary files—the investigation provides valuable insights into how the choice of instrument can impact the child's experience after a pulpectomy procedure.

Since postoperative pain is a critical concern, particularly in the pediatric population, the findings that the Pedoflex rotary files group reported significantly lower pain scores could have real-world implications for clinical practice. The ability of rotary files to lessen pain may enhance patient cooperation and satisfaction, which is vital for the pediatric population. Lower pain levels can also potentially reduce the need for analgesics and their associated side effects.<sup>15-17</sup>

Additionally, the study's results highlight that the use of rotary files not only reduces pain levels but may also do so more rapidly and with a more sustained effect. This could suggest a more efficient healing process and could contribute to reducing anxiety related to dental procedures for both parents and children.

The adoption of rotary files, according to this study, could potentially represent a superior approach to root canal instrumentation in primary teeth. Such findings may encourage more practitioners to adopt these tools, therefore contributing to the evolution of best practices in pediatric endodontics. Ultimately, this research supports the goal of providing evidence-based, child-friendly dental care that minimizes discomfort and enhances overall treatment outcomes.

### Limitation of the study

The research presents few limitations which impact its validity and generalizability. A relatively small sample size of 60 subjects may not offer statistically robust conclusions applicable to the wider pediatric population. The focus on primary mandibular molars, and exclusion of other tooth types, also narrows the scope of the study's applicability. Furthermore, the age range of participants, restricted to 6-10 years, limits the relevance of findings to children outside of this demographic. Pain assessment relied on the subjective Wong-Baker FACES Pain Rating Scale, which is susceptible to individual variance in pain perception. Operator proficiency with the utilized hand or rotary files wasn't standardized, introducing a potential variable in the overall effectiveness of the procedure. Another key element is the short-term follow-up of 72 hours which may not accurately capture the long-term postoperative discomfort or any late onset complications. Additionally, the study was localized to a single center without detailing the randomization process, which could suggest potential selection bias and limit the diversity of the clinical setting. Without a description of participant preoperative anxiety levels, analgesic use, or implementation of a control group, these factors remain unaccounted for, further affecting the study's conclusiveness. Such limitations underscore the need for cautious interpretation of the data and provide a directive for future research.

### Conclusion

The study concludes that employing Pedoflex rotary files for root canal procedures in primary mandibular molars markedly diminishes the level of postoperative pain in children, as opposed to traditional hand K file instrumentation. This conclusion is drawn from the clinical trial involving 60 patients between the ages of 6 and 10, randomly assigned to two groups. The investigation recorded postoperative pain at several intervals - 6, 12, 24, 48, and 72 hours - using the Wong-Baker FACES Pain Rating Scale. The data showed that children in the Pedoflex rotary file group reported significantly lower pain levels at all times compared to their counterparts who received hand file treatment. Notably, the pain in the rotary file group declined more sharply in the first 24 hours and then stabilized, while the hand file group experienced a more gradual decrease over the 72-hour period. These findings highlight the benefit of rotary files, suggesting they offer a more comfortable post-treatment experience for pediatric patients undergoing endodontic procedures in primary teeth.

### Conflict of Interest

The authors declare no conflict of interest.

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