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Rotary systems in root canal treatment of primary teeth

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Abstract

Introduction: Root therapy in primary teeth aims to remove the necrotic pulp, to prevent premature tooth loss, and to maintain the primary teeth until exfoliation. Rotary systems allow for more effective root canal treatments.

Objective: To analyze the literature for the characteristics of the rotary systems such as root canal preparation, obturation time, post-operative pain and clinical success.

Methodology: A exhaustive research was performed in PUBMED, to find relevant studies about the use of rotary systems in pediatric dentistry.

Results: Rotary files provide a greater root canal preparation, show more conservation of tooth structure with less mistakes in comparison with other techniques. This technique simplifies the procedure, shows less post operative pain, and is reflected in the cooperation of the pediatric patient. Rotary files exhibit a significant cleaning efficacy and a greater bacterial removal that led to a significant clinical success.

Conclusion: due to the complexity of the primary roots and how precise the root canal treatment must be. The use of rotary techniques can improve root canal treatment of primary teeth.

Keywords: Pulpectomy, primary teeth, rotary system, post-operative pain, obturation time, instrumentation time

1. Introduction

In the pediatric practice, labor time is inestimable, unpredictability and the difficulty of canal morphology present a challenge to the clinician^[1]. Manually performed root canal treatment can be a complicated and time-consuming procedure^[2]. The use of rotary instruments in pediatric practice offers better, more predictable and less time consuming root canal obturation^[3].

Dental pulp is a connective tissue that has inductive, formative, protective, nourishing and reparative activity^[4]. When the pulp is exposed to dental caries or dental fractures it can be at risk of infection, this can lead to pain, necrosis and infection of the jaw bone and surrounding tissues^[5]. In children, dental caries is one of the most common chronic diseases worldwide. Pulpal interventions are performed when dental caries is very extensive. Depending on the extent of caries, three pulp treatment techniques can be performed: direct pulp capping, pulpotomy and pulpectomy^[6]. The goal of pulp therapy in pediatric teeth is to alleviate pulp infection, alleviate associated symptoms, and ultimately preserve the tooth. Deciduous teeth adequately reserve space for their successors; they have been referred to as "the best space retainers"^[7].

Pulpectomy is a procedure where complete necrotic tissue debris is mechanically removed from the root tissue of a primary tooth, followed by irrigation and cleaning with disinfecting agents, finally, the root canal is filled with a suitable coronally sealed filling material^[6]. This procedure is indicated to prevent premature loss of primary teeth with irreversibly inflamed or infected pulp^[7]. Pulpectomy is an important procedure that helps to maintain necrotic primary teeth until physiologic exfoliation^[1].

Manual instrumentation techniques in pulpectomy remain the conventional method for root canal preparation in primary teeth^[3].

The use of manual systems, despite being conventional, is more demanding for the clinician when performing root canal treatment in primary teeth, so the use of other systems such as rotary systems that allow better canal shaping in a shorter amount of time with greater clinical success could be a better alternative. Therefore, the objective of this work is to analyze the characteristics of rotary systems in the literature, such as root canal shaping, working time, postoperative pain and clinical success.

2. Materials and methods

Articles on the subject published through the PubMed, SCOPUS and Google Scholar databases were analyzed, with emphasis on the last 5 years. The quality of the articles was evaluated using guidelines, i.e., identification, review, choice and inclusion. The quality of the reviews was assessed using the measurement tool for evaluating systematic reviews^[9]. The search was performed using Boolean logical operators AND, OR and NOT; with the keywords: "rotatory system", "primary teeth", "pulpectomy", "obturation time", "instrumentation time". The keywords were used individually, as well as each of them related to each other.

3. Results & Discussion

3.1 Duct preparation

Biomechanical root canal preparation plays a crucial role in the success of the treatment, primary teeth need special attention as they differ from permanent teeth in terms of root canal morphology^[9]. Rotary files are effective in debriding the irregular walls of primary teeth, the use of these files has resulted in a uniform and predictable filling quality, so they can be considered a better instrumentation technique^[3, 10]. A study performed on primary molars showed a slightly superior performance in root canal preparation using rotary techniques^[11]. Rotary files are able to shape severely curved canals in a shorter time with a decrease in errors, they also show less canal transport, greater preservation of tooth structure and better centering ability compared to hand files^[12, 13, 14]. It has been found that regardless of the file system used there are still parts that are not instrumented^[15]. It has also been noted that if both manual and rotary protocols are performed correctly there are no significant differences^[16]. As for reciprocating files rotary files show a canal conformation with less canal transport^[17].

Rotary files offer better root canal shaping in primary teeth and better preservation of tooth structure offering fewer errors compared to other techniques.

3.2 Working time

The ideal pulpectomy for the primary dentition requires quick and simple procedures with short treatment times and minimal appointments. In primary molar pulpectomy, efficiency in terms of office time is essential^[18]. Chugh and company document a 5-minute reduction in root canal treatment when using rotary techniques^[19]. Other authors such as Boonchoo indicate that rotary systems avoid multiple steps and simplify the clinical procedure^[7]. The use of rotary systems not only simplifies the treatment, it has also been documented that reducing the working time improves the cooperation of the pediatric patient^[1, 20]. Several studies have found superiority of rotary systems over manual systems in terms of obturation time and instrumentation^[14, 21, 22]. Despite the above Katge

and company compared rotary versus manual systems and found a slight time difference in manual systems^[23]. Regarding reciprocal techniques a 2016 study showed a slight difference to rotary systems^[24].

The rotary techniques allow simplified procedures more efficient and, in less time, compared to other techniques, since these avoid multiple steps concluding with a better patient behavior.

3.3 Postoperative Pain

The prevalence of postoperative pain in children is 65.6% for dental procedures^[25]. Postoperative pain following root canal treatment in primary teeth is a matter of concern for both pediatric patients and the dentist^[26]. A reduction in postoperative pain positively influences the attitude of the pediatric patient^[27]. Rotary files not only allow shorter procedure time, they also offer less postoperative pain compared to other techniques^[28, 29, 30, 31]. Manchada *et al.* found less postoperative pain from 6 to 48 hours compared to manual systems^[32]. When comparing manual, rotary and reciprocal files, they found less postoperative pain in the last two as opposed to manual files^[33, 34]. Lakshmanan *et al.* concluded that rotary systems allow a lower intensity and incidence of postoperative pain in root canal treatment of primary teeth^[35].

Rotary files have shown a reduction in postoperative pain, which is effective in the management of pediatric patients' behavior and has a positive influence on them.

3.4 Clinical success

Successful root canal treatment in primary molars requires good canal shaping, effective cleaning and tight obturation^[36]. Root canal treatment is a long and complicated procedure so it is difficult to obtain good clinical success^[37]. Instrumentation with pediatric rotary files, under complete isolation with rubber dam, promotes superior obturation quality, increasing clinical success^[18]. The use of rotary files demonstrates better canal cleaning compared to manual files in primary molars^[38]. Rotary systems have also been shown to have a significant reduction in the number of bacteria in root canals^[39]. Both manual and rotary techniques show similar success rates, however, the use of rotary in primary teeth leads to better canal shaping providing better treatment quality in less time^[1, 21, 40, 41]. Other studies comparing both techniques show no significant differences in terms of cleanliness, obturation quality, clinical and radiographic success^[22, 23, 32, 42]. Other studies comparing them with reciprocating files show that rotary files allow less micro fracture^[42].

Rotary files show better canal cleaning and bacterial reduction, as well as reduced working time and better root canal conformation leading to superior clinical success.

4. Conclusions

Due to the complexity of primary roots and the precision of root canal treatment in pediatric patients, the use of rotary techniques can improve root canal treatment in primary teeth. The use of rotary techniques can improve root canal treatment of primary teeth.

Conflict of Interest

Not available

Financial Support

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5. References

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