

Incidence of Postoperative Pain after Single Visit Endodontic Treatment with Continuous Rotary and Reciprocating Single File System

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ABSTRACT

Background: Aim: This study aimed to compare the incidence of postoperative pain after using two different single-file systems with different kinematics. **Methods:** 64 patients with necrotic molar pulps were selected and divided into two groups. Group I (n = 32) was instrumented with wave one gold, Group II (n = 32) was instrumented with one curve single file system. All canals were instrumented and obturated in the same visit. The postoperative pain response of patients was evaluated using the visual analog scale (VAS) score. **Results:** For VAS pain scores, statistically no significant difference was found between the WOG and One Curve single file technique (p>0.05). However, the incidence of postoperative pain was slightly higher with the Wave one gold single-file technique. The overall incidence of severe pain is 8.06% while no pain occurred in 48.38%. **Conclusion:** It can be concluded that the difference in postoperative pain is related to the instrumentation technique. Reciprocating file system wave one gold resulted in a higher incidence of postoperative pain than one curve used in a continuous rotation system. However statistically there was no significant difference.

Keywords: Continuous rotary systems, postoperative pain, reciprocating systems, Single file system.

INTRODUCTION

Pain after root canal treatment can be attributed to several factors like improper instrumentation, periapical extrusion of debris, irritants and intracanal medicaments, hyper occlusion, missed canals, history of preoperative pain, number of treatment visits and periapical pathosis.^[1] The major cause of pain after endodontic treatment has been attributed to the extrusion of debris.^[2,3] Different instrumentation techniques also are associated with different amounts of debris extrusion.^[4,5] Advances in metallurgy and kinematics of rotary instrumentation have led to innovative design features in recent years. However, all the preparation techniques and instruments available to date are still associated with some degree of extrusion of debris.^[6,7] Single-visit root canal treatment has now become a common practice also in non-vital cases, because of several advantages including a decreased number of operative procedures and no risk of inter-appointment leakage through temporary restorations.^[8,9]

New concept proposes the use of “single-use, single file system to shape the canal completely from start to finish”.^[10] Single file systems can be used in two different motions, reciprocation and continuous motion. The newer single file systems such as wave one gold (Dentsply Maillefer) and one curve (Micro-Mega, Besancon, Cedex, France) are designed to completely prepare root canals with only one instrument using two different kinematics. WaveOne Gold designed to be used in reciprocating motion utilizes an innovative gold technology. The cross-section of the file is modified to a parallelogram, having 2 cutting edges (tip size 25, 0.07 taper from d1-d3. One Curve is exclusive C. wire heat treated with a variable cross-section all along the blade, triangular in the apical third and almost S-shape in coronel third (tip size 25 with taper 6%) is designed to be used in continuous rotation. The purpose of this study was to compare the incidence and intensity of postoperative pain after the use of the Wave- One Gold and one curve rotary system to preparer out canals in permanent human teeth.

MATERIALS AND METHODS

The study was done in the department of Conservative Dentistry and Endodontics Government Dental College Srinagar and included patients in the age group of 15-55 years who were scheduled for root canal treatment. This study was

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approved by the local research ethics committee. Sixty-four patients requiring endodontic treatment on permanent molar teeth with non-vital pulps were included. Patients refusing to participate in the study, those who had taken any medication preoperatively, those with preoperative pain, those with periapical changes evitable radiographically were excluded. A diagnosis of pulp necrosis was made for each case based on the patient's symptoms and electric pulp test.

The patients were divided into two groups, each group consisting of 32 patients. After isolation and access, the canals of all teeth were prepared using two different instrumentation techniques. The WL was established by introducing a #10 K-file up to the apical foramen as determined by apex locator. The WL was confirmed radiographically. WaveOne gold files were in reciprocating "WaveOne all" mode generated by X- smart TM plus (Dentsply Tulsa Dental). One Curve files were used in continuous rotation as suggested by the manufacturer with torque control endodontic motor (X smart plus Dentsply Maillefer). Irrigation was done using 5 ml, 5% sodium hypochlorite and 5 ml saline alternatingly after instrumentation with each file system. An irrigating needle of 30 gauges was used passively without forceful dispensing of the irrigant 1.5 mm short of its binding point. Intermittent agitation and coronapical movement were done using a 15 number k file. After completion of biomechanical preparation, canals were flushed with 5 ml saline. The final irrigant used was 5 ml of 17% ethylenediaminetetraacetic acid. The teeth in Group I (n = 33) were instrumented using wave one gold instrument, those in Group II (n = 32) were instrumented using one curve single-file systems. After radiographic confirmation of master, cone canals were obturated using corresponding proper gutta-percha cones using Apexit Plus sealer (Ivoclar). All canals were shaped, cleaned, and obturated in a single visit. Patients were instructed to take mild analgesics (400 mg of ibuprofen) if they experienced pain.

After 3 days, the assessment of postoperative pain was carried out. The severity of pain was evaluated using a visual analog scale (VAS) score, validated previously.^[4]

- **No pain:** The treated tooth felt normal. Patients do not have any pain.
- **Mild pain:** Recognizable, but not discomforting, pain which required no analgesics.
- **Moderate pain:** Discomforting, but bearable pain (analgesics if used, were effective in relieving pain).
- **Severe pain:** Difficult to bear (analgesics had little or no effect in relieving the pain).

VAS pain scores were compared using one- way ANOVA. A value of $P < 0.05$ was required for statistical significance.

RESULTS

No statistically significant difference was found between wave one gold and one curve file technique ($P > 0.05$). When evaluating patients experiencing severe pain, the incidence of symptoms was slightly higher with Wave one gold single- file technique. The overall incidence of severe pain is 8.06% while no pain occurred in 48.38%.

The overall incidence of postoperative pain with Wave One Gold and One Curve

Technique	No pain	Mild	Moderate	Severe
One Curve	17 (53%)	8 (25%)	5 (15.6%)	2 (6.25%)
Wave One Gold	13 (40%)	8 (25%)	8 (25)	3 (9.37%)

DISCUSSION

The root canal system is a complex system and preparation procedures are often associated with some iatrogenic errors.^[11,12] One of the iatrogenic errors is postoperative pain, the causes of which can be an extrusion of necrotic tissue, microorganisms, and endodontic irrigants, dentin chips. Postoperative pain can be avoided using proper instrumentation and irrigation techniques.^[13,14] Various factors such as age, gender, preoperative pain, type of tooth, pulpal and periapical status, number of treatment visits were kept in uniform distribution so that only the shaping technique would remain as the main distinguishing factor. The results of this study found no significant difference in postoperative pain between Wave one gold and one curve file. However in our study cases of moderate and severe pain were more with wave one gold (11 cases) as compared to one curve single file system (7 cases). Use of rotary instrumentation in endodontics generates a mechanical wave of motion travels along the length of the working part of the instrument and minimizes contact between the file and dentin and yield cleaner canals with less debris accumulation than reciprocating instruments.^[15,16] The reciprocating single- file technique was found to produce a more significant postoperative pain as the reciprocation movement allows the file to move apically during releasing clockwise angle with more chances of getting debris pushed apically,^[17] which conforms to our study which found more cases with postoperative pain in whom wave one gold single-file reciprocating system was used.

CONCLUSION

Debris extrusion could be related to a higher incidence of pain after the treatment, the

differences in instrument design and preparation of the single-file systems used in this clinical study seem to have some influence although statistically there was no significant difference between reciprocating and single file system on the incidence of postoperative pain. The standardized and controlled kinematics used in this study may also have contributed to minimizing debris remnants or extrusion.

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