

Original Research**Assessment of quality of root canal obturation during Manual and rotary canal preparation technique of root canal therapy: A comparative study****Sapna Devi, Novsheba Showkat, Harpreet Kaur***Private Consultant Endodontist, Shimla, Himachal Pradesh, India**Private Consultant Endodontist, Srinagar, Jammu and Kashmir, India**Private Practitioner, India*

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ABSTRACT

Background:The overall technical preparation quality with nickel-titanium (NiTi) rotary instruments is generally better rated than root canal preparation with hand instruments. The quality of the endodontic obturation is usually evaluated using radiographic images upon completion. Hence; the present study was undertaken for assessing and comparing quality of root canal obturation during Manual and rotary canal preparation technique of root canal therapy.

Materials & methods:A total of 50 patients were included in the present study. All the patients were broadly divided into two study groups as follows: Group A: Patients undergoing root canal therapy by manual canal preparation technique, and Group B: Patients undergoing root canal therapy by rotary canal preparation technique. Preoperative radiographs were obtained. Root canal therapy was carried out in all the patients as per their respective study groups. Evaluation of both pre-treatment and post-treatment radiographs was done for assessing the technical quality of root canal fillings.

Results:Length of root canal was adequate in 56 percent of the cases of group A and in 92 percent of the cases of group B. taper of root canal filling was adequate in 64 percent of the patients of group A and 92 percent of the patients of group B. Significant results were obtained while comparing the obturation quality in between the two study groups.

Conclusion:Rotary system of root canal therapy provided better quality of obturation in comparison to manual technique.

INTRODUCTION

The overall technical preparation quality with nickel-titanium (NiTi) rotary instruments is generally better rated than root canal preparation with hand instruments. Modern NiTi instruments for rotary root canal preparation have been shown to be more reliable in terms of preparation faults, the straightening of root canals, and instrument fractures. Hand instrumentation is taught at universities worldwide as the standard basic technique for root canal preparation.¹⁻³

The quality of the endodontic obturation is usually evaluated using radiographic images upon completion. Additionally, during the root canal preparation and obturation phases of treatment, clinical criteria can be identified that are essential for achieving an adequate root canal obturation. Several variables affect the technical quality of root fillings, such as the length of the filling material in relation to the radiographic

apex, the density of the root filling material (presence of voids), the taper of the canal. Methods used to evaluate the technical outcome of RCT have been based mostly on radiographic evaluation.⁴⁻⁶ Hence; the present study was undertaken for assessing and comparing quality of root canal obturation during Manual and rotary canal preparation technique of root canal therapy.

Materials & methods

The present study was planned for assessing and comparing quality of root canal obturation during Manual and rotary canal preparation technique of root canal therapy. A total of 50 patients were included in the present study. Only those patients were included which were scheduled to undergo root canal therapy for maxillary canine. All the patients were broadly divided into two study groups as follows:

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- Group A: Patients undergoing root canal therapy by manual canal preparation technique, and
- Group B: Patients undergoing root canal therapy by rotary canal preparation technique

Preoperative radiographs were obtained. Root canal therapy was carried out in all the patients as per their respective study groups. Postoperative Periapical radiographs of root canal treated molars were obtained immediately after the obturation using paralleling device. Evaluation of both pre-treatment and post-treatment radiographs was done for assessing the technical quality of root canal fillings. All the results were recorded and were analysed by SPSS software.

Results

A total of 50 patients were included in the present study. All the patients were broadly divided into two study groups as follows: Group A: Patients undergoing root canal therapy by manual canal preparation technique, and Group B: Patients undergoing root canal therapy by rotary canal preparation technique. Mean age of the patients of group A and group B was found to be 35.3 years and 37.1 years respectively. Length of root canal was adequate in 56 percent of the cases of group A and in 92 percent of the cases of group B. taper of root canal filling was adequate in 64 percent of the patients of group A and 92 percent of the patients of group B. Significant results were obtained while comparing the obturation quality in between the two study groups.

Table 1: Comparison of quality of root canal therapy

Obturation quality		Group A		Group B		p- value
		N	%	n	%	
Length of root canal filling	Adequate	14	56	23	92	0.000*
	Under-filled	7	28	1	4	
	Overfilled	4	16	1	4	
Taper of root canal fillings	Adequate	16	64	23	92	0.000*
	Inadequate	9	36	2	8	

*: Significant

Discussion

Preparation of the root canal system includes both enlargement and shaping of the complex endodontic space, together with its disinfection. However, complete mechanical preparation of the root canal system is rarely achieved because of its variety and complexity. Additionally, geometrical dissymmetry between the root canal and the preparation

instrument may prevent the preparation instrument from acting efficiently on all canal walls. In simple, narrow, straight root canals with round cross-sections, most currently used rotary instruments will adequately clean and shape the canal, with favorable results. However, in oval, flat, or curved root canals, rotary files often fail to adequately clean and shape the canal, leaving fins that may not have been touched.^{7- 9}Hence; the

present study was undertaken for assessing and comparing quality of root canal obturation during Manual and rotary canal preparation technique of root canal therapy.

A total of 50 patients were included in the present study. Length of root canal was adequate in 56 percent of the cases of group A and in 92 percent of the cases of group B. taper of root canal filling was adequate in 64 percent of the patients of group A and 92 percent of the patients of group B. Lopes DS et al determined the centering capacity of ProTaper Universal™, Twisted File™ and Revo-S® rotary systems using cone beam computed tomography analysis before and after the instrumentation of root canals. Thirty mesiobuccal roots from human lower first molars were divided into three groups of ten: Group 1 - ProTaper Universal™ Rotary System; Group 2 - Twisted File™ Rotary System; and Group 3 - Revo-S® Rotary System. All teeth were scanned using computed tomography to determine the condition of the root canal before and after instrumentation (4mm, 3mm and 2mm from the root apex). A statistically significant difference was found for the measurement of 4 mm between the “ProTaper Universal” and “Twisted File” systems. For the Twisted File system, a statistically significant difference was recorded between the measurements of 4mm and 3 mm. None of the assessed instruments was completely effective in terms of the biomechanical preparation of root canals since all created deviation from the original anatomy of the canal.¹⁰

In the present study, significant results were obtained while comparing the obturation quality in between the two study groups. Altunbas D et al evaluated the amount of apically extruded debris during endodontic retreatment with different file systems. Sixty extracted human mandibular premolar teeth were used in this study. Root canals of the teeth were instrumented and filled before being randomly assigned to three groups. Gutta-percha was removed using the Reciproc system, the Twisted File system (TF), and Hedström-files (H-file). Apically extruded debris was collected and dried in pre-weighed Eppendorf tubes. The amount of extruded debris was assessed with an electronic balance. The Reciproc and TF systems extruded significantly less debris than the H-file ($p < 0.05$). However, no significant difference was found between the Reciproc and TF systems. All tested file systems caused apical extrusion of debris. Both the rotary file (TF) and the reciprocating single-file (Reciproc) systems were associated with less apical extrusion compared with the H-file.¹¹

Conclusion

From the above results, the authors concluded that rotary system of root canal therapy provided better quality of obturation in comparison to manual technique.

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