ORIGINAL RESEARCH

Evaluation of the Amount of Debris extruded apically by using Conventional Syringe, Endovac and Ultrasonic Irrigation Technique: An In Vitro Study

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ABSTRACT

Background: To compare the amount of debris extruded apically by using conventional syringe, Endovac & Ultrasonic irrigation.

Materials & Methods: Thirty freshly extracted mandibular premolars were selected, working length was determined and mounted in a debris and collection apparatus. The canals were prepared. After each instrument change, 1 ml. of 3% sodium hypochlorite was used as irrigation. Debris extruded apically by using conventional syringe, endovac& ultrasonic irrigation tech, was measured using the electronic balance to determine its weight and statistical analysis was performed. The mean difference between the groups was determined using statistical analysis within the groups &between the groups for equal variances.

Results: Among all the groups, significantly less debris were found apically in the Endovac group (0.96) compared to conventional and ultrasonic group (1.23) syringe.

Conclusion: The present study showed that endovac system extrudes less amount of debris apically as compared to ultrasonic followed by conventional so incidence of flare up can be reduce by using endovac irrigation system.

Key Words: Endovac, Ultrasonic, Debris, Apical Extrusion.

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Introduction

Root canaldebridement is important for endodontic success. Irrigation is a vital part of root canal debridement[1]. Endodontic irrigations are used to remove pulp tissue, microorganisms, microbial by- products and debris from the root canal system. Disinfection and debridement is largely dependent on irrigation protocol of root canal system. Chemicomechanical action of irrigant is needed to optimally clean the canal system. Mechanical part is done by instrumentation and chemical preparation is done by using irrigation. The extrusion of debris to the

periapical region may cause inflammation and flare up after endodontic treatment[2].Severe inflammatory response can occur if an antigen – antibody complex formed by the antigens originating from the root canal are forced beyond the apex[3].Studies have shown that no significant extrusion of debris occur in the absence of an irrigant, while a thick worm of debris extruded when an irrigant was used[4].Every effort should be made to reduce apical extrusion of infected debris[5]. For evaluating the apical extrusion of debris and irrigant ,various instrumentation techniques have been used in the past but very few studies are reported in the literature on amount of debris extruded using list irrigation system. So this study was designed to evaluate the amount of debris extruded apically using 3 different irrigation techniques.

Materials and Methods:

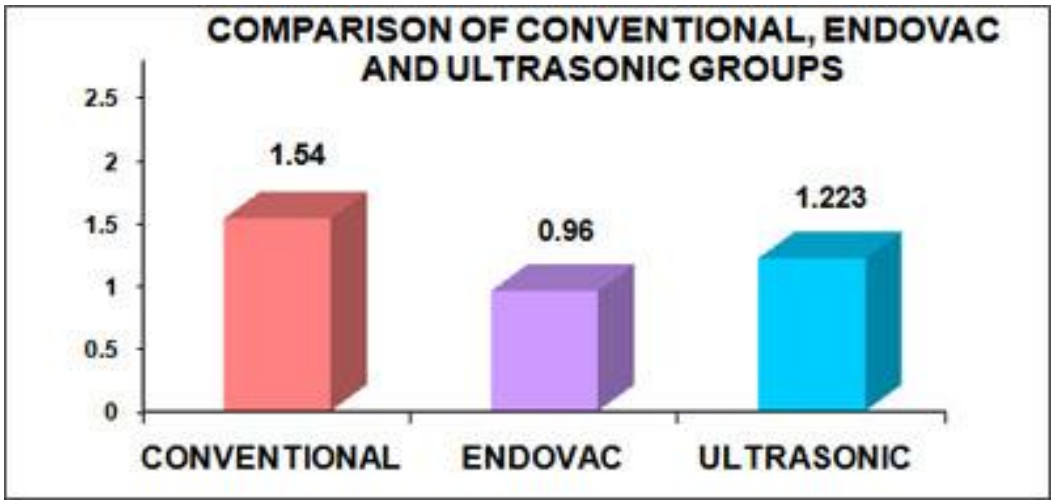
A total 30 human mandibular premolars freshly extracted and with complete root formation were selected. Teeth were mounted individually in wax block. Access cavity preparation was done. The working length was determined by inserting 10 K file(DentsplyMailleferBailaigues) into the canal and digital radiograph was taken. The debris and irrigation collection apparatus was prepared similar to that described by Meyer & Montgomery[6]. After standard access cavity preparation; tooth was forced through a rubber stopper of the vial. The teeth were equally divided into 3 groups irrigation with different technique. Group I: - (Conventional Syringe) the canals were prepared up to apical size of 40 using standard technique with K flex file. After each instrument change 1 ml of 3% sodium hypochlorite was used as irrigation. Group II (Endovac group instrumentation was carried out using standard step-back technique with K-flex upto apical size 40. After each instrument change the microcannula was used for initial flushing of the coronal portion of canal. This was replaced by macro cannula which was used for irrigation at the apical portion of the canal to the working length. Group III (Ultrasonic group) Instrumentation was carried out with standard step back technique with Flex file upto apical size 40. In this group ultrasonic irrigation was performed passively. The root canal was filled with sodium hypochlorite and then the solution was activated with ultrasonic tip for 20 seconds at 1 mm short of the working length. Immediately the apparatus was stored in an incubator. Once the irrigant was evaporated the specimens were weighed 3 times on electronic balance (Corona diligent scale), data was collected & subjected to the statistical analysis.

Table 1: Combined weight of the bottle and debris of Conventional, Endovac and ultrasonic group.

	Conventional (gm)	Endovac (gm)	Ultrasonic (gm)
Combined weight of the bottle and debris of Conventional, Endovac and ultrasonic group	38.250	37.510	37.670
	38.300	37.660	38.060
	38.280	37.800	38.000
	38.930	38.160	38.200
	38.500	37.770	38.120
	38.250	37.510	37.670
	38.300	38.300	38.300
	38.280	37.800	38.000
	38.930	38.160	38.200

Results:

Table No. 1 shows the combined weight of the bottle and debris. The normal bottle weight (36.880 mg) was then subtracted from each of the above values to obtain the weight of the dry debris. From the above table it was seen that the extrusion of dry debris in conventional group was more as compared to ultrasonic followed by endovac group. After applying student unpaired 't' test there was a highly significant difference between dry debris weights in conventional and endovac group .Bar Graph no 1 showed comparison of conventional, Endovac and ultrasonic. From this graph it is seen that the mean bottle weight in Conventional group was more as compared to Ultrasonic followed by Endovac group.



Graph 1: Comparison of mean weight of extruded dry debris of conventional ,Endovac Bgroup.

Discussion:

Endodontic flare up is a true complication characterized by the development of pain, swelling or both [7].Various types of injuries that can take place during preparation of the root canal which lead to flare-up are mechanical, chemical and or microbial[8]. Apical extrusion of infected debris to the periradicular tissue is possibly one of the principal causes of post-operative pain[9].

Forcing microorganism and their product into the periradicular tissue can generate an active inflammation response, whose intensity will depend on the number and or virulence of the extruded microorganism. In other words quantitative and qualitative factor will be decisive in causing a flare up as a result of apical extrusion of the debris[10]. Various factors, such as different irrigation technique, instrument, apical stop &type of irrigation solution affect the amount of apical extrusion. Curvature and presence of more than one canal may affect the final amount of apical extrusion. Therefore, only single rooted teeth with straight canal were used in this study to eliminate variables that might interfere with result .In this study endovac group showed less amount of debris extruded apically. It may be due to irrigants being pulled into the canal and removed by negative pressure at working length. Endovac uses a pair of patent micro and macro cannula to deliver irrigation all the way to the working length and then evacuate it with the hi-vaccum suction unit. Micro cannula makes it possible to irrigate upto working length very safely without extrusion of irrigation solution beyond apical constriction of the canal. Ultrasonic group showed less amount of debris extruded apically as compared to conventional syringe group. It creates both cavitations and acoustic streaming. When files are activated with ultrasonic energy in a passive

manner acoustic streaming is sufficient to produce significantly cleaner canals than with hand filing alone. This technique thus shows enhanced flushing action and improved efficacy of irrigation solution in removing organic and inorganic debris. Serious systemic diseases such as septicaemia, endocarditis and brain abscess can occur due to apical extrusion of microbes into the tissues during endodontic treatment, particularly in medically compromised patients. Therefore, periapical extrusion of intracanal material during treatment should be avoided to prevent of the flare-up phenomena[11].

Conclusion:

The present study showed that Endovac system extrudes less amount of debris apically as compared to ultrasonic followed by conventional so incidence of flare up can be reduce by using endovac irrigation system.

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