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COMPARATIVE EVALUATION OF ABSORBING CAPACITY OF STANDARDISED ENDODONTIC PAPER POINTS: AN IN VITRO STUDY.

Endodontic

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ABSTRACT

Introduction: Three dimensional root filling, cannot be achieved if the prepared canal is not dry before obturation. Drying of root canal is an important step for successful hermetic sealing. For this purpose, paper points are used. They should have an adequate capacity to absorb liquid to effectively dry the canals. As the absorbing capacity of paper points increases, the number of paper points decreases.

Methodology: 30 premolars with single canal according to inclusion criteria were collected and stored in distilled water. They are decoronated using diamond disk at 14mm from the apex. A 10K file is introduced into canal until the tip is visible at apex and working length is established 1mm short of tip. Cleaning and shaping was done using protaper rotary system upto F2 size and irrigation with 5ml of 3% NaOCl at each change of instrument and final rinse with distilled water. The tooth was subsequently divided into 2 groups based on type of paper points. Group 1: Dentsply; Group 2: Diadent. Paper points were introduced into the canal and difference in measurements were noted.

Results And Conclusion: Comparing the fluid absorbed values, group 2 (Diadent absorbent paper points) showed significantly higher fluid absorbing capacity and ability to dry the canals.

KEYWORDS

Absorbing Capacity, Electronic Laboratory Balance, Paper Points.

INTRODUCTION:

Absorbent paper points are used in endodontics for multiple purposes. Uses of paper points include: to dry root canals after irrigation, to carry antiseptic or disinfecting dressings, to transfer bacteriological samples from the root canal to the culture medium[1] and also as indicator to determine the quality as well as the color of canal exudate[2].

The biomechanical preparation and disinfection of the root canal, will leave humidity inside the root canal system. This will promote the formation of bubbles, porosity and / or empty spaces which decreases the flow capacity and the adhesiveness of the endodontic sealer,in turn compromising the apical seal[3]. Therefore, it is very important to remove residual moisture after biomechanical preparation, for which various materials were used. Alcohols, aspiration cannula and cotton wicks have been proposed for the same. But the most commonly used and effective method is absorbent paper points[4,5].

Absorbent paper points should have an adequate capacity to absorb liquid to effectively dry the canals. As the absorbing capacity of paper points increases, the number of paper points needed to dry the canals decreases[1,6]. As the paper point is the last material inserted into the prepared canal before root filling, it must be considered important for the outcome of therapy[7]and they should be free of microorganisms, to prevent a possible break in the aseptic chain and subsequent treatment failure.

Although many brands are available on the market, there are few studies comparing the absorbing capacity of paper points. So the purpose of this study was to compare the absorbing capacity of standardised endodontic paper points.

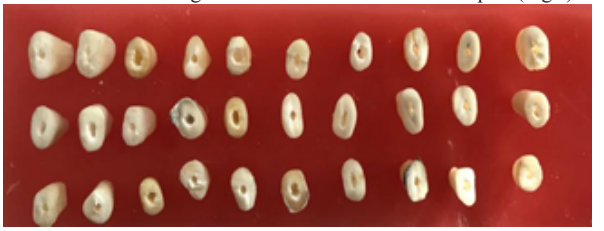
METHODOLOGY:

Materials (Fig 1)

- 30 premolars.
- Diamond disk
- K file- #10, #15,#20
- 3% NaOCl
- Distilled water
- Endomotor and ProTaper rotary files.
- ProTaper absorbent paper points
  - o 1.Dentsply
  - o 2.Diadent
- Electronic laboratory balance

Fig 1. Materials

30 premolars with single canal and complete root formation, collected and stored in distilled water were used for the study. Tooth with caries and multiple root canals were excluded from the study.The samples were decoronated using diamond disk at14mm from the apex. (Fig 2)



Decoronated Specimen (fig2)

A 10K file was introduced into canal until the tip was visible at apex and working length was established 1mm short of tip.(fig3)

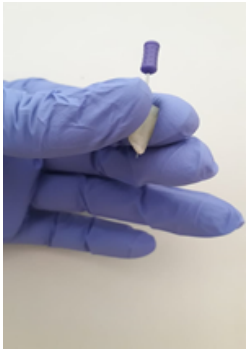


Fig 3 Working Length Established.

Cleaning and shaping was done by using protaper rotary system upto F2 size and irrigated with 5ml of 3% NaOCl at each change of instrument and final rinse was done with distilled water.

The teeth were subsequently divided into 2 groups based on the type of paper points evaluated.

Group 1: Dentsply Protaper Paper Points

Initial dry weight of paper points were calculated by electronic laboratory balance, then paper points were introduced into the canal. Final weight after immersion to canal were calculated and difference in measurement was noted. This process was continued until the canal became dry.

Group 2: Diadent Protaper paper points

Initial dry weight of paper points were calculated by electronic laboratory balance, then paper points were introduced into the canal. Final weight after immersion of paper points were calculated and difference noted. This process was continued until canal became dry.

RESULTS

Values are depicted in table1, table2, and table 3

Group 1: Dentsply

Table1

Sl. No	Preweight (gm)	Post Immersion	Fluid Absorbed
1	0.056	0.06	0.004
2	0.056	0.07	0.014
3	0.056	0.09	0.034
4	0.042	0.05	0.008
5	0.028	0.03	0.002
6	0.028	0.03	0.002
7	0.042	0.06	0.018
8	0.056	0.08	0.024
9	0.042	0.06	0.018
10	0.056	0.07	0.014
11	0.042	0.06	0.018
12	0.042	0.07	0.028
13	0.056	0.07	0.014
14	0.028	0.04	0.012
15	0.042	0.05	0.008
MEAN	0.042	0.0593	0.0137
SD	0.010844	0.01710	

Group 2: Diadent

Table2

Sl.No	Pre Weight	Post Immersion Weight	Fluid Absorbed
1	0.042	0.06	0.018
2	0.056	0.07	0.014
3	0.042	0.07	0.028
4	0.042	0.05	0.008
5	0.028	0.04	0.012
6	0.042	0.05	0.008
7	0.028	0.04	0.012
8	0.028	0.06	0.032
9	0.042	0.05	0.008
10	0.056	0.08	0.024
11	0.042	0.06	0.018
12	0.042	0.06	0.018
13	0.042	0.07	0.028
14	0.028	0.03	0.002
15	0.056	0.06	0.004
MEAN	0.041067	0.05667	0.0156
SD	0.009852	0.01345	

Table 3

Characteristics	Group 1	Group 2
Dry weight(gm) Mean Standard deviation	 0.04480g 0.010844	 0.04107g 0.009852
Post immersion weight(gm) Mean Standard deviation	 0.0593g. 0.01710g	 0.0567g 0.01345g
P value	0.001	0.001

The mean dry weight of paper points in group 1 was 0.04480g and that of group 2 was 0.04107g and the mean value of fluid absorbed in group 1 and group 2 were 0.0593g and 0.0567g respectively. Comparison between group 1 and group 2 , using Wilcoxon Signed Rank Test, showed statistically significant difference (p value 0.001) .The finding shows that there was statistically significant difference in absorbency between the groups (p=0.001) and group 2 (Diadent) exhibited greater absorbing capacity.

DISCUSSION

Absorbent paper points have become indispensable as they facilitate easy and complete drying of the cleaned and shaped root canals, maintain asepsis, and promote close adaptation between the root canal walls and sealers.

Edwards et al[7].in 1981 stated the desirable properties for absorbent paper points:
- they should quickly absorb a series of medications, water, blood and fluids;
- they should be straight, conical, have a uniform length and a shape in compliance with International Standard Organization specifications.
- should exhibit sufficient integrity (dry or wet) in order to the fibers not become detached or the tips themselves disintegrate during use;
- they should be clean and able to withstand sterilization by conventional methods without affecting their properties;
- they should also be white and odourless

Silva et al. evaluated the absorbing capacity of paper points and concluded that paper points havean absorption capacitywhich is greater than 100% of their own weight. Maillefer and Kerr, shows a greater absorbing capacity than absorbency that would relate to their own dry weight[8]

The present study compared the fluid absorption efficiency of Dentsply Protaper paper points (Group 1) and Diadent absorbent paper points(Group2); the mean value of fluid absorbed in group 1 and group 2 were 0.0593g and 0.0567g respectively. The results showed, fluid absorbent capacity of Diadent paper points were significantly higher (p=0.001) than Dentsply Protaper paper points. This result may be explained by differences in fabrication processes as well as the material used to make the points, paper solubility and the glue used by different manufacturers[6].

Pumarola-Sune et al, evaluated the absorbency properties of 12 brands of paper points and concluded that absorbency of standardized absorbent paper points of three brands (Diadent, Kerr, and Dentalite) was significantly higher than that of the remaining 10 brands tested[9], which is similar to the present study.

The methods employed in the present study to determine the absorption properties of the different brand of paper points were those described by Pereira et al [2.] who found that percentage of increased mass determination was the most efficient method for determining absorption properties.

Aguiar CM et al. in 2012analyzed the influence of sterilization methods on absorption capacity of the three brands of standardized endodontic paper points(Dentsply, Endopoints , Tanari), and

concluded that there was no statistically significant difference between these three brands[6]and found that commercial brands assessed exhibited different degrees of absorption capacity.

Different methods are used for sterilization of paper points which include dry heat, formalin tablets and electric sterilizer with marbles[6]. Among these the wet heat sterilization is the most used method, as it is fast and efficient[6]andccordingto Kubo et al[10,11]the absorption capacity of paper points is influenced by the number of sterilization cycles. Aguiar CM[6] et alfound that sterilization process did not influence the absorption capacity of the absorbent paper points. Paper points either maintained their stability or were positively influenced (such as increased absorptive speed or capacity) by humid heat sterilization performed in an autoclave.[2,9,12]But dry heat sterilization procedure, decreases the absorption capacity of the paper points, thus compromising their effectiveness[2,9,12.]

Even though absorbent paper points have several advantages, should be used with caution, because of the limited integrity aswell as the extension of paper points into the periapical tissues ,the chance of lodging of paper fibers,may lead to foreign body reaction[2].

To conclude, comparing the fluid absorbed values , group 2 (Diadent absorbent paper points) showed significantly higher fluid absorbing capacity and ability to dry the canals.

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