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ORIGINAL RESEARCH

TO ASSESS THE EFFICACY OF TWO DIFFERENT OBTURATING TECHNIQUE IN ROOT CANAL TREATMENT

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Abstract

Introduction: Complete and effective removal of the irritants, pathogenic micro-organisms and their by-products from the root canal space by effective shaping and filling of the pulp-space with a biocompatible material with proper obturating technique is the determining factor in predicting the success of the endodontic treatment. Therefore the present study was conducted to analyse efficacy of two obturation techniques used in root canal treatment of anterior teeth.

Materials and Methodology: For the purpose of the study, 50 extracted permanent anterior teeth with single canal and completed apex were selected. Certain exclusion criteria were followed in this study includes those teeth with morphological anomalies and with multiple root canals were excluded in virtue of avoiding bias in the study. All the procedures were performed by a single operator. The teeth were properly weighed before and after the completion of obturation. This difference in weight showed the weight of gutta-percha mass. The statistical analysis of the data was done using SPSS version 11.0 for windows. A p-value of 0.05 and lesser was defined to be considered as statistical significant.

Results: Table 1 depicts the mean gutta-percha weight in both the techniques. Mean gutta-percha weight in Group 1 which was obturated with mechanical lateral condensation technique was 10.52 + 1.86 g. Mean gutta-percha weight measured in Group B which was obturated with warm lateral compaction with ultrasonic spreaders condensation technique was 14.72 + 1.23 g. On comparing the results, it was seen that the results are statistically significant ($p<0.05$).

Conclusion: To conclude, WVC produces a homogenous mass of gutta-percha with decreased voids and increased adaptation to the canal walls when compared to CLC. CLC resulted in producing root canal space with definite voids and gaps between the gutta-percha and canal interface at the apical third of the root canals.

Keywords: cold condensation, warm vertical, gutta-percha

Introduction

A successful endodontic treatment is closely dependent on the proper sealing of the root canal system. Additionally a thorough removal of the microorganisms and their by-products that were formed through proper mechanical instrumentation of the root canal, antibacterial irrigation and adequate filling of the root canal space using inert materials that were proven clinically.[1] The major goals of performing the root canal treatment is to obliterate the canals using a stable, non-toxic material and thereby providing a hermetic seal in order to prevent

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the passage of tissue fluids, bacteria and their by-products through the filled root canals. A proper obturation prevents the chances of reinfection of the canal in the near future.[2,3]
The various factors in determining the success of the root canal procedure majorly involves in the absence of pain, regression of the periapical condition, hermetic seal of the root canal system as well as the coronal spaces and providing proper form and function of the tooth. All these factors were considered in re-evaluating the success of the treatment over-time. When any doubt arises in predicting the success, radiological support like CBCT could be taken in detecting and precise localisation of the pathological condition.[4,5]
Numerous studies have reported the various techniques in obturating the root canals but no techniques have been proved better in all the dimensions. Cold lateral condensation (CLC) is the most frequently used technique and it is the gold standard technique in comparing the various other newer techniques. This technique results in providing creation of voids, spreader tracts and poor surface adaptation to the canal walls.[6] In the recent years, quite a number of plasticized gutta percha techniques have been introduced which have been advocated in the mission to seal the root canal space. Warm vertical compaction (WVC) and Thermafil obturating techniques have majorly incorporated the use of a thermal or frictional heat to soften the gutta-percha cones thereby allowing for a better adaptation to canal walls, greater degree of homogeneity and providing optimum apical and ideal coronal sealing of the canal space when compared with the lateral condensation. The WVC technique holds advantages of an excellent gutta-percha cones filling at the apex whereas the thermafil technique results in providing higher radio-opacity, excellent viscosity and fluidity and thereby producing a high degree of homogenous mass of gutta-percha in the root canal space.[6-8] Therefore the present study was conducted to analyse efficacy of two obturation techniques used in root canal treatment of anterior teeth.

Materials And Methodology

After obtaining prior permission from the institutional ethical committee, the study was commenced in the Department of Conservative Dentistry and Endodontics in our college. For the purpose of the study, 50 extracted permanent anterior teeth with single canal and completed apex were selected. Certain exclusion criteria were followed in this study includes those teeth with morphological anomalies and with multiple root canals were excluded in virtue of avoiding bias in the study.
All the selected teeth that met the inclusion criteria were subjected to vaiours cycling process that include immersing in the dilute hypochlorite solution for 48 hours to remove any organic debris on the teeth. After 48 hours, the teeth were immersed in the normal saline solution until the commencement of the study.
For the root canals preparation, access cavity was made and the canal was effectively located using a #8 K-file. After the canals were located, the crown of the tooth was cut such that the working length of the canal was standardized at 22 mm for all the teeth selected. The biomechanical preparation of the canals was done using hand files preferably K-files. After completion of the biomechanical preparation of the canal, the teeth were randomly grouped into two groups: Group - A and B, with 25 teeth in each group. The teeth that were included in the Group 1 were obturated with size 30 gutta-percha master cone and size 15 gutta-percha accessory cones using conventional lateral condensation technique using finger spreaders. The teeth in Group 2 were obturated using energized warm lateral compaction with ultrasonic spreaders. The master gutta-percha cone was selected, adjusted until 'tugback' was observed, seated to working length and compressed with a finger spreader in the same manner as briefed above for the group 1. Two accessory cones (size FF) were then inserted and compressed with the finger spreader, followed by the use of a 0.02-taper, spreader-like, smooth-sided nickel-titanium instrument (ESI instrument; Electro Medical Systems SA,

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Nyon, Switzerland) activated at the lowest power setting using an ultrasonic machine (MiniMaster LED, Electro Medical Systems SA). This ultrasonic spreader was gradually sunk apically up to 2 - 3 mm from the working length. Another accessory cone was subsequently inserted, compressed with a cold spreader and then compressed using the ultrasonically activated instrument. This process was repeated until the cold spreader was left with almost nil space to get inserted into the canal orifice.

All the procedures were performed by a single operator. The teeth were properly weighed before and after the completion of obturation. This difference in weight showed the weight of gutta percha mass. The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be considered as statistical significant.

Results

Table 1 depicts the mean gutta-percha weight in both the techniques. Mean gutta-percha weight in Group 1 which was obturated with mechanical lateral condensation technique was 10.52 + 1.86 g. Mean gutta-percha weight measured in Group B which was obturated with warm lateral compaction with ultrasonic spreaders condensation technique was 14.72 + 1.23 g. On comparing the results, it was seen that the results are statistically significant ($p<0.05$)

Table 1: Mean gutta-percha weight in Group 1 and Group 2

Groups	Mean Gutta-percha weight	P – value
Group – 1 (Mechanical CLC)	10.52 + 1.86 g	0.05
Group – 2 (WLC with ultrasonic spreaders)	14.72 + 1.23 g	

Discussion

The major goals of endodontic treatment is to effectively clean, shape and fill the root canal space promptly and thereby preventing any interchange of fluids, bacteria and their by-products between the oral cavity, root canal system and peri-radicular tissues. All these provide an effective barrier against reinfection. Adequate mechanical debridement and quality obturation with biocompatible material were the two factors in determining the success of an endodontic treatment.[7] According to researchers like *Senia* et al (1971), *Coffae* and *Brilliant* (1975), *Littman* (1977)[9-11]the apical root canal has been observed to be less clean than the middle and coronal portions of the root canal thus suggesting that the bacteria remain in the apical canal. In the present study no sealer was used although generally recommended during conventional root canal filling procedure. According to investigators like *Peters* (1986) and *Georgopoulou* et al (1995) proposed that the sealer that was used in the root canal procedure basically shrinks upon while setting whereas the others are susceptible to dissolution in contact with tissue fluids thus leading to increase in leakage along the root canal filling over time.[12,13] In this study, maxillary anterior teeth were incorporated in the study in attempts to avoid the presence of isthmus that are commonly seen in molars and mandibular incisors. All the prepared teeth were randomly divided and obturated using CLC and WVC using ultrasonic spreaders.

Kumar NS et al analysed and compared the sealing ability between the cold lateral condensation, thermos-plasticized gutta-percha and flowable gutta-percha obturation technique under an examination using stereomicroscope at ×40 magnification. There were fifty single rooted teeth were selected and all the canals were shaped with K3 Ni-Ti files.

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Irrigation was performed with 5.25% NaOCl and 17% ethylene diamine tetra-acetic acid (EDTA). The teeth were then separated into three groups depending on the type of obturation technique: Group A, obturated using the lateral condensation technique and AH Plus sealer; Group B, obturated with thermos-plasticized gutta-percha tech (Obtura III Max) and AH Plus sealer; and Group C, obturated using flowable gutta-percha technique (Gutta Flow). After storing the teeth in 100% humidity for 7 days at 37°C, the roots of the teeth were sectioned at five levels. There was no significant difference between the thermo-plasticized gutta-percha group and lateral condensation group with regard to the AV but there was a statistically significant difference observed between the lateral condensation and flow able gutta-percha groups. The flow able gutta-percha group were observed with the maximum number of voids which was significantly higher than those in the lateral condensation and thermo-plasticized gutta-percha groups.[14]

Another research conducted by *Naseri* M et al evaluated the quality of the four different root canal obturation techniques. cold lateral condensation (CLC), warm vertical condensation (WVC), Obtura II (OII) and Gutta Flow (GF) by using micro-computed tomography (micro CT). Cold lateral condensation (CLC), warm vertical condensation (WVC), Obtura II (OII) and Gutta Flow (GF) by using micro-computed tomography (micro CT). A total of 20 extracted maxillary first molars prepared with Pro Taper files were randomly divided into four groups. Micro CT was applied to measure the internal volume of root canals. Following application of AH26 sealer to canal obturation, new micro-CT images were taken and the volume percentage (VP) of voids, gutta-percha and sealer at different levels were calculated with CT software.[15] Study by *Samadi* et al analysed the percentage of gutta-percha-filled area (PGFA) using microscopic analysis of the cross-sections in the apical third of root canals when filled either with Thermafil technique, Warm Vertical Condensation technique and Cold Lateral Condensation technique without using sealers. Sixty single rooted extracted permanent teeth were collected. After crown amputation, the teeth were randomly divided into three experimental groups of 20 specimens each. They concluded that the Thermafil Obturation technique produces significantly higher percentage of gutta-percha filled area (PGFA) than the warm vertical condensation technique or cold lateral condensation technique.[16]

Conclusion

To conclude, WVC produces a homogenous mass of gutta-percha with decreased voids and increased adaptation to the canal walls when compared to CLC. CLC resulted in producing root canal space with definite voids and gaps between the gutta-percha and canal interface at the apical third of the root canals.

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