A Comparative Evaluation of Five Obturation Techniques in the Management of Simulated Internal Resorptive Cavities.

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Abstract

Background: This study was conducted for Comparative Evaluation of Five Obturation Techniques in the Management of Simulated Internal Resorptive Cavities.
Material and methods: 50 freshly extracted, completely formed root apex human maxillary central incisors were collected. Teeth were chosen for this research if they lacked calcification, internal resorption, and a root canal filling. Ultrasonic cleaning removed calculus and debris from the nearly 21 mm teeth that were recovered, which were then placed in a saline solution for storage. The apical foramen was located by inserting a size 10 K-file into the prepared endodontic access in each tooth. Finally, the teeth were irrigated with saline and 2.5% sodium hypochlorite solution after being instrumented with a master apical file size 40 and the step-back technique up to size 80.
Results: Group III showed the highest percentage of gutta-percha plus sealer and gutta-percha, and the fewest voids, which was statistically significant (P 0.000) when compared to groups I and II for warm vertical compaction and II for lateral condensation, Group III for Obtura II with System B, Group IV for E and Q plus with System B, and Group V for Thermafil. Group II also had a significantly higher percentage of sealers (P 0.0001) in Table 1. Group V likewise displays a significantly higher void percentage (P 0.0001) than any other group.
Conclusion: It can be established that the best obturation strategy for dealing with teeth showing internal resorption is a combination of Obtura II and System B. When used to restore teeth with internal resorption, Thermafil provided the lowest quality of obturation. Similarly, the greatest sealer was shown with the lateral condensation approach, making it inappropriate for the therapy of interior resorptive cavities.
Keywords: obturation, resorption, cavity, sealer, void, gutta percha

Introduction

Endodontic treatment also known as endodontic therapy or root canal treatment (RCT) involves the removal of diseased pulpal tissue to prevent and intercept pulpal/periradicular pathosis and protection of the disinfected tooth from future entrenchment by microorganisms. RCT not only prevents severance of periodontal fibers that help in proprioception for occlusal feedback and efficient chewing but also aids in the retention of infected teeth that otherwise might have been extracted.[1-3] If RCT is indicated, neither a simple filling nor taking antibiotics can resolve the tooth infection. Further, if the treatment is delayed, the tooth can undergo extensive destruction from decay and can get too compromised to be saved; then extraction is likely the only option which may lead to chain of events such as shifting of teeth, collapsed occlusion affecting the mastication, and harm esthetics of patient.[4] Tooth replacement if indicated for esthetic and functional rehabilitation is accomplished with prosthetic appliances, including implants making it a costly enterprise. Therefore, RCT should always be considered whenever indicated as it not only favors the preservation of natural teeth but also has excellent clinical outcomes.[5]The goal of root canal filling is to completely obliterate the canal space with a stable, nontoxic material and at the same time creating a hermetic seal to prevent the movement of tissue fluids, bacteria or bacterial by-products through the filled canal.[6] Obturation provides a seal that prevents reinfection of the

canal and subsequent leakage into the periradicular tissues.[7] Although there are many techniques for obturation of root canals, but still search is on for better techniques, as cold lateral condensation (CLC) technique, the most frequently used technique and the standard with which all other techni-ques are compared, results in creation of voids, spreader tracts and lack of surface adaptation to canal walls.[8]Hence, this study was conducted for Comparative Evaluation of Five Obturation Techniques in the Management of Simulated Internal Resorptive Cavities.

Material and methods

50 freshly extracted, completely formed root apex human maxillary central incisors were collected. Teeth were chosen for this research if they lacked calcification, internal resorption, and a root canal filling. Ultrasonic cleaning removed calculus and debris from the nearly 21 mm teeth that were recovered, which were then placed in a saline solution for storage. The apical foramen was located by inserting a size 10 K-file into the prepared endodontic access in each tooth. Finally, the teeth were irrigated with saline and 2.5% sodium hypochlorite solution after being instrumented with a master apical file size 40 and the step-back technique up to size 80.

The mean, standard deviation, and mean difference were analyzed statistically to shed light on the study's findings. The statistical methods utilized were one-way ANOVA followed by the post hoc Tukey test. The overall variation across groups was analyzed using a one-way ANOVA. The post hoc Tukey test was used to compare the groups and see which ones were significantly different.

Results

Table 1: Estimated least square mean (mean%) evaluated in stereomicroscope (percentage of gutta-percha and sealer, gutta-percha, sealer, and void) between five groups.

Technique	Gutta percha plus sealer	Gutta percha	Sealer	Void
Warm vertical compaction (Group 1)	95.41	62.44	52.11	8.45
Lateral condensation (Group 2)	94.11	52.19	45.23	10.65
Obtura II with system B (Group 3)	98.16	71.99	39.45	4.12
E and Q plus with system B (Group 4)	97.63	64.23	40.84	5.22
Thermafil (Group 5)	87.55	47.88	43.66	19.77

Group III showed the highest percentage of gutta-percha plus sealer and gutta-percha, and the fewest voids, which was statistically significant (P 0.000) when compared to groups I and II for warm vertical compaction and II for lateral condensation, Group III for Obtura II with System B, Group IV for E and Q plus with System B, and Group V for Thermafil. Group II also had a significantly higher percentage of sealers (P 0.0001) in Table 1. Group V likewise displays a significantly higher void percentage (P 0.0001) than any other group.

Discussion

Asuccessful root canal therapy, more often than not, depends upon complete obliteration of root canal space by a dimensionally stable and biologically compatible material.[9] Complete filling of the root canal space with an inert filling material is often considered as one of the vital goals of root canal treatment.[10]

Root resorption is the loss of dental hard tissues as a result of clastic activities. It might be broadly classified into external or internal resorption by the location of the resorption in relation to the root surface. Internal root resorption presents as an irregular defect in the root canal, making that area inaccessible to normal method of cleaning and shaping as well as obturation.[11] Clinically, internal root resorption is usually asymptomatic and diagnosed through routine radiographs or by the sign of a “pink spot” on the crown. Radiographically, internal root resorption appears as a fairly uniform, radiolucent enlargement of the pulp canal and distortion of the original root canal outline.[12]Hence, this study was conducted for Comparative Evaluation of Five Obturation Techniques in the Management of Simulated Internal Resorptive Cavities.In this study, Group III showed the highest percentage of gutta-percha plus sealer and gutta-percha, and the fewest voids, which was statistically significant (P 0.000) when compared to groups I and II for warm vertical compaction and II for lateral condensation, Group III for Obtura II with System B, Group IV for E and Q plus with System B, and Group V for Thermafil. Group II also had a significantly higher percentage of sealers (P 0.0001) in Table 1. Group

V likewise displays a significantly higher void percentage (P 0.0001) than any other group.
Cathro and Love[13] concluded that System B plus Obtura II produced a homogenous obturation of gutta-percha with minimal sealer and no voids. The result for high percentage of gutta-percha was because it is a thermoplasticized technique in which regular beta phase of gutta-percha pellets is heated for obturation. Gandhi M et al[14]evaluated and compared the efficacy of different obturating methods used in primary teeth.Forty one patients aged four to nine years with a total of 60 teeth were selected. Out of the 60 teeth, 32 were primary mandibular first molars and 28 were primary mandibular second molars, the sample was randomly divided into three groups. Disposable syringe, lentulo spiral and past inject were used for obturation. Postoperative evaluation was done for; quality of canal obturation, presence of voids using postoperative radiographs following obturation of teeth. The data were analysed to assess the success rate of the three methods used for obturation using Chi-square test.Among the three groups of the study, past inject exhibited the maximum number of optimally filled canals. Maximum number of underfilled canals was found with lentulospiral, and the maximum number of overfilled canals was seen with disposable syringe. Least number of voids was observed in canals filled with the past inject technique and disposable syringe.

Conclusion

It can be established that the best obturation strategy for dealing with teeth showing internal resorption is a combination of Obtura II and System B. When used to restore teeth with internal resorption, Thermafil provided the lowest quality of obturation. Similarly, the greatest sealer was shown with the lateral condensation approach, making it inappropriate for the therapy of interior resorptive cavities.

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