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Comparision between GuttaFlow and RealSeal as obturating material

Dental Science

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ABSTRACT

Background: Gutta Flow and Real Seal are sealers or adjunct to core obturating materials used in the obturation of root canals.
Objective: To compare the area of sealer and voids in root canals obturated with Gutta Flow and Real Seal .
Material and Methods: Forty premolars were decoronated, cleaned and shaped. Obturation was done with Gutta-Percha using Real Seal and Gutta Flow as sealers. Comparision of the area of sealers and voids were done.
Results: Comparision of gutta-percha/GuttaFlow to gutta-percha/Epiphany yielded a statistical significant difference between the two groups for both the variables ($p = 0.000000094$ and $p = 0.000059202$).
Conclusion: Real Seal as a sealer used in obturation of root canals yields better outcomes.

KEYWORDS

Introduction

The primary objective of endodontic therapy is shaping and cleaning of the root canal system through mechanical and chemical means.[1] The objective of three dimensional obturation ideally confers to three main functions : prevention of coronal ingress of bacteria, entombment of remaining bacteria, and prevention of fluid apically that could serve as nutrients for bacteria. In root canal treatment, complete sealing of the root canal system after shaping and cleaning is critical to prevent oral pathogens from colonizing and re-infecting the root canal and periapical tissues through any communication between oral cavity and the periapical tissues.[2]

The presence of voids in the obturation can be an avenue for microleakage. Among the numerous obturation techniques and filling materials available, gutta-percha continues to be the material of choice, owing to its unique chemical and physical properties. Gutta-percha is an impermeable core material, but there is an absence of a chemical union between gutta-percha and the root canal sealer.[3] Finding a gutta-percha substitute that would provide a superior seal of the root canal system has become a challenge in modern endodontics.[4]

Resilon/Real Seal is the first obturation system to claim the ability to form a "monoblock" between the canal walls and obturation material.[5] The Real Seal soft resin endodontic obturation system consists of a root canal filling material, sealant and a primer.[6] These three components are claimed by the manufacturer to be compatible and bondable to each other.[7]

Materials and Methods

Forty mandibular human premolars which were extracted due to orthodontic purposes were collected and stored in saline solution at 4°C until actual experiments. Their crowns were removed at the cemento-enamel junction by using a water-cooled, low-speed diamond disc (Mani, Japan). The roots were reduced to a size of 15 mm from the coronal aspect. The working length was established 1 mm short of the apical foramen. The canal orifices were coated with sticky wax resin to prevent the outflow of irrigating solution through the apical foramen. The canal orifices were enlarged with Gates Glidden (Moyco Union Broach) drills number 1, 2 and 3.

Roots were further instrumented with EasyRaCe NiTi rotary files (FKG, Swiss Dental Products) in a crown down technique and enlarged to a size 40/0.04 taper. After each instrument, the canals were irrigated with 5mL 2.5% sodium hypochlorite (NaOCl). Irrigation procedures were performed with the roots held upside down to prevent pooling of the irrigant. After preparation, the root canals received a final irrigation of 5mL 17% ethylenediaminetetracetic acid (EDTA) and 5mL 2.5% NaOCl, after which the canals were flushed with 10mL distilled water to avoid the prolonged effect of the irrigating solutions. Root canals were dried with paper points and randomly assigned into 2 obturation groups (n=20/each).

In group 1, a master gutta-percha point having a size 40/0.04 taper was selected. A GuttaFlow capsule was selected and mixed for 30 seconds in a triturator. A GuttaFlow dispensing canal tip was attached to the capsule and inserted into the dispenser. The canal tip was inserted into the apical third of the canal 1mm short of the working length. A small amount of GuttaFlow was gently dispensed into the apical third. GuttaFlow was directly applied on the master gutta-percha point and then inserted into the canal. A few accessory cones were also inserted until the canal was completely obturated. Excess obturating material was removed with a heated hand instrument.

In group 2, RealSeal primer was placed into the canal with a syringe, and after 30 seconds, the excess was removed with a paper point. Thereafter, a size 40, 0.04 taper gutta-percha master point (Dentsply/Maillefer) was seated into the root canal with tug-back. Lateral compaction was performed as with group 1 by using accessory gutta-percha cones. Removal of the excess gutta-percha cones and final vertical compaction was accomplished in a similar manner.
The coronal access of specimen was restored using a hybrid resin composite material (Spectrum TPH; Dentsply), using a total-etch/single-bottle adhesive system (Prime & Bond NT; Dentsply). All clinical procedures were performed by the same operator.

Sectioning and Image Analysis

The specimens were stored for 2 weeks at 37°C and 100% humidity to allow the sealer to set completely. Horizontal sections were obtained of the coronal, middle and apical third at levels of 14-mm, 8-mm and 2-mm from the apex respectively. During sectioning, the specimens were subjected to continuous water cooling to prevent frictional heat and, thus, smearing of Resilon or gutta-percha that could tend to hide areas of sealer. The coronal surfaces of the sections were then digitally photographed at 100X magnification under a light microscope and transferred to an IBM-compatible PC and saved as Adobe (Adobe, San Jose, CA) files. Using Image J (Wayne Rasband; National Institute of Health, Bethesda, MA) software, the cross-sectional area of the root canal and the area filled by the sealer (and voids, if present) was calculated.

For each specimen, the ratio of sealer plus voids to root canal area was calculated by dividing sealer plus void area to the root canal area. The ratio of voids (alone) was also calculated by dividing the area of voids by the root canal area. Thereafter, statistical analysis of the data was done. For each section (coronal, middle and apical) statistical comparisons between the Resilon and gutta-percha groups were made with Kruskal-Wallis Test and intergroup comparisions were made by Mann-Whitney *U* test with Bonferroni correction. Differences within each obturation group for each level of sectioning was analyzed statistically. A pvalue<.05 was considered as statistically significant.

Results

MannWhitney U Test: post hoc with Bonferroni correction (sealer + void / rc area)

Comparison groups	N	Min	Max	Mean rank	Median (25^{th}, 75^{th})	Z	P value
GPGF	30	0.06	1.72	42.53	0.4505 (0.3210, 0.6780)	5.337	**0.000000094**
GPEP	30	0.00	0.40	18.47	0.0915 (0.0712, 0.2258)		

Discussion

Complete and three dimensional impervious obturation of the root canal system is of prime clinical importance for the long term success of endodontic treatment.[8] The goal of attaining a complete seal, which Grossman lists as one of the requirements of obturation, has not been achieved by any of the current obturation materials or techniques to date.[9]

The ideal root canal filling material should entomb residual bacteria after instrumentation, seal the root canal space preventing re-infection from coronal leakage, and stop apical penetration of tissue fluids from reaching surviving bacteria in the root canal system.[10] It is well known that root canal obturation is a very critical determinant for the success and failure of endodontic treatment, as it directly affects the outcome of endodontic therapy.[11] This emphasizes the need for using materials that are able to create a fluid-tight seal.[12]

Comparision of gutta-percha/GuttaFlow to gutta-percha/Epiphany yielded a statistical significant difference between the two groups for both the variables ($p = 0.000000094$ and $p = 0.000059202$). This may be attributable to the excellent flow property and the low surface tension of the Epiphany sealer.[13] The film thickness is an important characteristic of endodontic sealers; the smaller the film thickness, the greater the ability of the material to fill even the smallest voids or discrepancies.[14] This is in contrast to the finding by Herbert et al in which GuttaFlow exhibited the most homogenous sealer distribution with no deficiencies as compared to EndoRez.[15] It has to be taken into consideration that because of its granular structure, the evaluation of GuttaFlow was more difficult than other materials and the interpretations of defects and structures may be limited.[16]

Conclusion

Although adhesive products hold promise for future, a number of technical hurdles need to be overcome to maximize the potential benefits of adhesive root canal fillings. Further studies should be performed in evaluating the quality of apical as well as coronal seal, if adhesive concepts are to be incorporated for a better endodontic therapy.

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