Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Evaluation of efficacy of two different root canal sealers during endodontic therapy

Vijay Shekhar[1], Richa Kumari[2], Rahul VC Tiwari[3], Anil Managutti[4], Heena Tiwari[5], Shivam Sharma[6]

[1]Conservative Dentistry and Endodontics, Government Dental Surgeon, PHC Sampatchak, Patna, Bihar, India;
[2]MDS Oral and Maxillofacial Surgery, Senior Resident, Dental Department, MGM Medical College and Hospital, Jamshedpur, Jharkhand, India;
[3]OMFS, FOGS, PhD Scholar, Dept of OMFS, Narsinbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat, 384315, India;
[4]Prof. & HOD, Dept of OMFS, Narsinbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat, 384315, India;
[5]BDS, PGDHHM, Ex-Government Dental Surgeon, Chhattisgarh, India;
[6]JR III, Dept of Cons and Endodontics, Chandra Dental College and Hospital, Barabanki, Uttar Pradesh, India

ABSTRACT:

Background: The strength of endodontically treated teeth depends on the remaining amount of tooth structure after canal preparation. A frequent concern of dentists is the possibility of exposure of the filling materials to the oral environment. Ideally, the root canal sealer should be capable of creating an effective bond between the core material and the dentine of the root canal thus preventing leakage. It should also be non-toxic and preferably have a positive effect on the healing of periapical lesions. Hence; the present study was conducted for evaluating the efficacy of two different root canal sealers during endodontic therapy. **Materials & methods:** A total of 75 freshly extracted mandibular first premolars were included. De-coronation of the specimens was done at the length of 15 mm from the root apex, followed by biomechanical preparation using K files. Afterwards; all the samples were divided into three study groups with 25 specimens in each group as follows: Group A: AH Plus root canal sealers and Gutta-percha points, Group B: MTA Fillapex and Gutta-percha points, and Group C: Control group (unobturated teeth). After completion of obturation according to their respective groups, the access cavity was sealed with temporary cement. Afterwards, embedding of the apical end of the specimens was embedded in acrylic resin upto the depth of 5 mm. All the blocks were placed in universal force testing machine and amount of force required to fracture the root was measured in Newton. **Results:** Mean force required to fracture the root among the specimens of group A, Group B and Group C was found to be 235.9 N, 168.5 N and 90.7 N respectively. While analysing statistically, it was seen the maximum force required for fracturing the root was among specimens of Group A, followed by Group B and minimum for Group C. **Conclusion:** From the above results, the authors concluded that AH Plus root canal sealers had the maximum strength in comparison to MTA Fillapex.

Key words: Sealer, Root canal, Endodontic.

Received: 02/05/2020 **Modified:** 20/05/2020 **Accepted :** 15/06/2020

Corresponding Author: Dr. Vijay Shekhar, Conservative Dentistry and Endodontics, Government Dental Surgeon, PHC Sampatchak, Patna, Bihar, India

This article may be cited as: Shekhar V, Kumari R, Tiwari RVC, Managutti A, Tiwari H, Sharma S. Evaluation of efficacy of two different root canal sealers during endodontic therapy. J Adv Med Dent Scie Res 2020;8(7):26-29.

INTRODUCTION

The strength of endodontically treated teeth depends on the remaining amount of tooth structure after canal preparation. The factors affecting root fracture after endodontic therapy are over instrumentation, dehydration of dentine after endodontic therapy, and also uncontrolled pressure during obturation. All of these factors cumulatively and in addition to occlusal load increase the possibility of a root fracture.[1]

A frequent concern of dentists is the possibility of exposure of the filling materials to the oral environment. Though undesirable, this clinical situation may occur and can dissolve the endodontic sealer, making the root canal obturation permeable to saliva favoring the communication between irritating agents from the oral cavity and the periradicular tissues, via the apical foramen or lateral canals. Such situation can turn a well done endodontic treatment in a failure.[2-4]

Ideally, the root canal sealer should be capable of creating an effective bond between the core material and the dentine of the root canal thus preventing leakage. It should also be non-toxic and preferably have a positive effect on the healing of periapical lesions. A great variety of endodontic sealers are available commercially and they are divided into different groups according to their chemical composition. It is a well-known fact that three dimensional impervious obturation of the root canal system is of prime clinical importance for the long-term success of endodontic treatment.[5-7] Hence; the present study was conducted for evaluating the efficacy of two different root canal sealers during endodontic therapy.

MATERIALS & METHODS

The present study was conducted for evaluating the efficacy of two different root canal sealers during endodontic therapy. A total of 75 freshly extracted mandibular first premolars were included. Carious and grossly deformed teeth and teeth with evidence of resorption were excluded. After extraction, all the tooth specimens were stored in normal saline till further usage. De-coronation of the specimens was done at the length of 15 mm from the root apex, followed by biomechanical preparation using K files. Sodium hypochlorite was the irrigant used during biomechanical preparation. Drying of the canals was done using paper points. Afterwards; all the samples were divided into three study groups with 25 specimens in each group as follows:

Group A: AH Plus root canal sealers and Gutta-percha points,

Group B: MTA Fillapex and Gutta-percha points, and

Group C: Control group (unobturated teeth).

After completion of obturation according to their respective groups, the access cavity was sealed with temporary cement. Afterwards, embedding of the apical end of the specimens was embedded in acrylic resin upto the depth of 5 mm. All the blocks were placed in universal force testing machine and amount of force required to fracture the root was measured in Newton. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Student t test were used for evaluation of level of significance.

RESULTS

In the present study, a total of 75 freshly extracted tooth specimens were analysed. All the specimens were divided into three study groups: Group A (AH plus root canal sealer), Group B (MTA Fillapex sealer) and Group C (Control). Mean force required to fracture the root among the specimens of group A, Group B and Group C was found to be 235.9 N, 168.5 N and 90.7 N respectively. While analysing statistically, it was seen the maximum force required for fracturing the root was among specimens of Group A, followed by Group B and minimum for Group C.

Table 1: Distribution of tooth specimens

Group	Sealer	Number of tooth specimens
Group A	AH Plus root canal sealers and Gutta-percha points	25
Group B	MTA Fillapex and Gutta-percha points	25
Group C	Control group (unobturated teeth)	25

Table 2: Mean force required to fracture the root

Group	Sealer	Mean force (Newton)	SD
Group A	AH Plus root canal sealers and Gutta-percha points	235.9	43.1
Group B	MTA Fillapex and Gutta-percha points	168.5	29.4
Group C	Control group (unobturated teeth)	90.7	18.4

Table 3: Comparison of mean force

Group comparison	t- value	p- value
Group A Vs Group B	1.845	0.00*
Group A Vs Group C	1.996	0.01*
Group B Vs Group C	1.817	0.03*

DISCUSSION

In endodontically treated teeth, the root canal system is reinforced by obturating the root canal in order to increase the resistance of the tooth to compressive strength. To provide a hermetic seal, the bonding of root canal sealer to the dentine is paramount in maintaining the integrity of the seal in a root canal filling. Thus, a root canal sealer with the property of strengthening the tooth against root fracture would be of obvious value.[8]

The main function of a sealer is to fill the spaces between the core material and the walls of root canal and between the gutta-percha cones, in an attempt to form a coherent mass of obturating material without voids. The sealer is expected to fill irregularities and minor discrepancies between the filling and canal walls, accessory canals, and multiple foramina. By its germicidal action, it is also expected to destroy the remaining bacteria left after cleaning and shaping of the root canal. Although all efforts are concentrated to confine the sealer within the root canal space, some extrusion inadvertently occurs during obturation procedure. The biocompatibility and antimicrobial activity of a specific root canal sealer remains one of the principal considerations for selecting an appropriate sealer for a dental restoration. It has been demonstrated that sealer material based on zinc oxide-eugenol release potentially cytotoxic concentrations of eugenol. Calcium hydroxide-based sealers promote calcification but tend to dissolve overtime and compromise the endodontic seal.[9, 10] Hence; the present study was conducted for evaluating the efficacy of two different root canal sealers during endodontic therapy.

In the present study, a total of 75 freshly extracted tooth specimens were analysed. All the specimens were divided into three study groups: Group A (AH plus root canal sealer), Group B (MTA Fillapex sealer) and Group C (Control). Mean force required to fracture the root among the specimens of group A, Group B and Group C was found to be 235.9 N, 168.5 N and 90.7 N respectively. Bhat SS et al compared the ex-vivo effects of different root canal sealers on the fracture resistance of endodontically treated teeth. Seventy-five freshly extracted human mandibular premolars were used for the study. The length was standardized to 14 mm and all the teeth were biomechanically prepared and divided into five different groups based on the type of root canal sealers used. Group I:- Roeko seal + gutta percha, Group II: AH plus ® root canal sealer + gutta percha, Group III: PULPDENT root canal sealer + gutta percha, Group IV: Zinc oxide-eugenol sealer + gutta percha, Group V: Control (unobturated teeth). The teeth were embedded in acrylic resin blocks and compressive strengths were measured using universal testing machine (Instron). All groups showed a statistically significant result ($P < 0.05$). Teeth obturated with Group I and Group II showed higher resistance to fracture than teeth obturated with other three Groups. It was seen that the teeth obturated with group III showed a better fracture resistance than Group IV and there was no statistical significance found between Group and Group V. They concluded that both the resin based sealers that were used in this study were equally effective compared to that of the zinc oxide-based sealers and the control group.[10]

In the present study, while analysing statistically, it was seen the maximum force required for fracturing the root was among specimens of Group A, followed by Group B and minimum for Group C. Monajemzadeh A et al investigated the antimicrobial activity of three root canal sealers against oral pathogens. The antimicrobial effectiveness of three endodontic sealers with different chemical compositions, namely resin (AH 26), zinc oxide eugenol (ZOE), and mineral trioxide aggregate (MTA), against Candida albicans, Streptococcus sanguis, Streptococcus salivarius, Streptococcus mutans, and Lactobacillus casei was assayed by agar well diffusion method (AWDM). ZOE sealer had the highest antimicrobial activity against the tested bacteria, while MTA showed the lowest antimicrobial activity. The ascending sequence of microbial growth inhibition zones was as follows AH 26 > ZOE > MTA.[11] Camps *et al* stated that ISO standards lead us to accept the cytotoxicity of endodontic sealers that were rated noncytotoxic when tested with the root-dipping technique. For example, Sealapex showed a high cytotoxicity ranging from 91 to 96% of cell death when evaluated with ISO standards, whereas a cytotoxicity ranging from 0 to 9% was observed when working with the other technique.[11, 12]

CONCLUSION

From the above results, the authors concluded that AH Plus root canal sealers had the maximum strength in comparison to MTA Fillapex. However; further studies are recommended.

REFERENCES

1. Kumar RV, Shruthi C. Evaluation of the sealing ability of resin cement used as a root canal sealer: An *in vitro* study. J Conserv Dent. 2012;15:274–7.
2. De Almeida WA, Leonardo MR, Tanomaru Filho M, Silva LAB. Evaluation of apical sealing of three endodontic sealers. Int Endod J. 2000;33:25–27.
3. Garberoglio R, Bassa S. O dente transparente. ARS CVRANDI Odontologia. 1983;9:5–7.
4. Sundqvist G, Figdor D, Persson S, Sjögren U. Microbiologic analysis of teeth with failed endodontic treatment and the outcome of conservative re-treatment. Oral Surg Oral Med Oral Pathol. 1988;85:86–93.
5. Swanson K, Madison S. An evaluation of coronal microleakage in endodontically treated teeth. Part I: time periods. J Endod. 1987;13:56–59.
6. Patil SA, Dodwad PK, Patil AA. An *in vitro* comparison of bond strengths of Gutta-percha/AH Plus, Resilon/Epiphany self-etch and EndoREZ obturation system to intraradicular dentin using a push-out test design. J Conserv Dent. 2013;16:238–42.

7. Barrieshi KM, Walton RE, Johnson WT, Drake DR. Coronal leakage of mixed anaerobic bacteria after obturation and post space preparation. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1997;84:310–314
8. Çobankara FK, Adanir N, Belli S, Pashley DH. A quantitative evaluation of apical leakage of four root-canal sealers. Int Endod J. 2002;35:979–984.
9. Spanberg LS, Haapasalo M. Rationale and efficacy of root canal medicaments and root filling materials with emphasis on treatment outcome. Endod Topics. 2002;2:35–58.
10. Bhat SS, Hegde SK, Rao A, Mohammed AKS. Evaluation of resistance of teeth subjected to fracture after endodontic treatment using different root canal sealers: An in vitro study. Journal of Indian Society of Pedodontics and Preventive Dentistry, Vol. 30, No. 4, October-December, 2012, pp. 305-309.
11. Monajemzadeh A, Ahmadi Asoor S, Aslani S, Sadeghi-Nejad B. In vitro antimicrobial effect of different root canal sealers against oral pathogens. Curr Med Mycol. 2017;3(2):7-12.
12. Camps J, About I. Cytotoxicity testing of endodontic sealers: A new method. J Endod. 2003;29:583–6