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Original Research

Comparative evaluation of microleakage of MTA and Biodentine after root end resection

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ABSTRACT

Background: Root-end cavity preparation is an important procedure in periapical surgery. The present study was conducted to compare microleakage after root end resection of the two materials ie MTA and Biodentine. **Materials & Methods:** The present study was conducted on 52 recently extracted single rooted teeth. The teeth were divided into 2 groups of 26 each. In group I, the apical cavity was prepared and retrofilling with biodentine was done. In group II, the apical cavity was prepared and ProRoot MTA material was used. The degree of penetration of the dye is measured in millimeters. **Results:** In group I, retrofilling with biodentine was done. In group II, ProRoot MTA material was used. The mean microleakage in group I was 0.14 mm and in group II was 0.21 mm. The difference was significant (P< 0.05). **Conclusion:** Significantly more microleakage was observed with retrograde filling done with MTA in comparison to biodentine.

Key words: Biodentine, MTA, Retrograde

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INTRODUCTION

Endodontic surgery involves four critical steps in elimination of persistent endodontic pathogens: 1. Surgical removal of the pathological tissues of the periapical area. 2. Resection of the root tip 3. Apical root canal preparation. 4. Retrograde filling of the root canal. It is reported that resection of 3 mm root tip reduced the apical ramification to 98% and lateral canals to 93%. In conventional techniques the resection is at an angle of 45 or 30 degrees. In modern techniques 0 - 10 degrees resection is recommended, which reduces the number of exposed dentinal tubules.[1]

Root-end cavity preparation is an important procedure in periapical surgery. In conventional techniques, the apical preparation was performed with a round bur. The primary goal in apical resection is to perform a hermetic sealing between the apical portion of the root canal and periapical tissue by retrograde root end filling.[2] Many materials have been used for root-end fillings in endodontic surgery - amalgam, glass ionomer cements, zinc oxide-eugenol based materials mineral trioxide aggregate - MTA, zinc - phosphate cements, calcium hydroxide cements sealer based on epoxy resins.[3] The present study was conducted to compare microleakage after root end resection of the two materials .i.e. MTA and Biodentine.

MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of 52 recently extracted single rooted teeth. The study protocol was approved from institutional ethical committee. The teeth were divided into 2 groups of 26 each. In group I, the apical cavity was prepared with stainless steel fissure bur #10 at 3 mm depth in the root canal parallel to the long axis of the tooth and retrofilling with biodentine was done. In group II, the apical cavity was prepared with a round bur at 3 mm depth with a concave shape and ProRoot MTA material was used. The outer surface of the root was covered with two layers of varnish, with the exception of the apical 3 mm, then immersed in 0.2% Rodamine B for 72 h. The degree of penetration of the dye is measured in

millimeters. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I shows that in group I, retrofilling with biodentine was done. In group II, ProRoot MTA material was used. Table II, graph I shows that mean microleakage in group I was 0.14 mm and in group II was 0.21 mm. The difference was significant (P< 0.05).

Table I Distribution of teeth

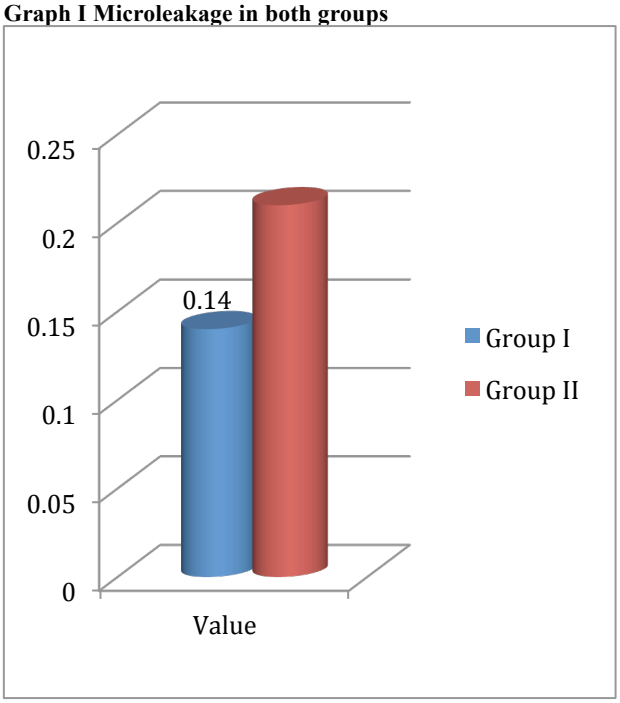
Total- 52

Group	Group I (biodentine)	Group II (ProRoot MTA)
No. of teeth	26	26

Table II Assessment of microleakage in both groups

Microleakage (mean)	Group I	Group II	P value
Value	0.14	0.21	0.01

Graph I Microleakage in both groups



DISCUSSION

There has always been a keen interest in the adaptation of dental restorative materials to the walls of the cavity and the retentive ability of a material to seal the cavity against ingress of oral fluids and microorganisms. Microleakage around dental restorative materials is a major problem in clinical dentistry. It may be defined as the clinically undetectable passage of bacteria, fluids, molecules or ions between a cavity wall and the restorative materials applied to it. This seepage can cause hypersensitivity of restored teeth, tooth discoloration, recurrent caries, pulpal injury and accelerated deterioration of some restorative materials.[4]

The relationship between marginal leakage in restorations and type of restorative materials used has been extensively studied both in clinical and laboratory experiments. In the absence of definitive clinical data, laboratory microleakage studies are a well accepted method of screening adhesive restorative materials for marginal seal. Microleakage investigation of compomers and their comparison with other materials have compared only a limited number of products but in general have shown adequately sealed restoration margins.[5] The present study was conducted to compare microleakage after root end resection of the two materials ie MTA and Biodentine for two different apical cavity preparation.

We included in group I, retrofilling with biodentine was done. In group II, ProRoot MTA material was used. Erkut et al[6] found that relative highest median value of penetration of the dye in mm is in the control group. MTA group has a higher value in mm versus the Biodentine. The apical preparation with a concave shape and cavity along the root canal with a depth of 3 mm after apicoectomy is important to reduce apical microleakage.

In present study, the mean microleakage in group I was 0.14 mm and in group II was 0.21 mm. Over the past fifty years, many changes have occurred in development and availability of restorative materials for children. Fluoride releasing and chemical bonding properties of glass ionomer cements are well known. However, poor physical properties such as tendency to undergo surface crazing, low fracture resistance, and esthetics limit its use. Composites on the other hand possess excellent physical and mechanical properties such as compressive, flexural and tensile strength as well as esthetics.[7]

The main cause of microleakage is poor adaptation between the restorative material and the original tooth structure. Another secondary cause is volume change in the restorative material due to cohesive shrinkage during restoration and oral thermal changes after restoration; such volume changes will cause a gap to appear between the restorative material and tooth that allows microleakage to occur. The methods available to evaluate microleakage include direct visual examination, microscopic examination, scanning electron microscopic examination, air pressure, dye penetration, the use of a chemical tracer, the use of radioactive isotope tracer, neutron activation analysis, electrochemical methodologies, measuring bacteria penetration, the artificial caries method, and three-dimensional image analysis.[8]

CONCLUSION

Under the light of above obtained results, the authors conclude that significantly more microleakage is associated with retrograde filling done with MTA in comparison to biodentine.

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