

COMPARISON OF MINERAL TRIOXIDE AGGREGATE (MTA) AND ZINC FREE AMALGAM AS RETROGRADE FILLING MATERIALS IN THE SURGICAL ENDODONTICS

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ABSTRACT

The aim of this study was to compare the success rate of root end filling material using mineral trioxide aggregate and zinc free amalgam in apicectomized teeth. In the present study, (30 patients having previously failed or incomplete endodontic treatment). The sample was divided into 2 groups, 1st group was treated with MTA root end filling, while the 2nd group was treated with Zinc free amalgam. The patients were followed up for one year to assess the periapical area both clinically and radiographically. There was no significant difference between the success rates of MTA treated group and that of zinc free amalgam treated group, although MTA has a higher success rate than amalgam treated group in some other studies. The success rate of MTA treated group was (86.6 %), and of zinc free amalgam treated group was (66.6%). It was concluded that MTA can be a good alternative to amalgam as a retro grade filling material, but amalgam is inexpensive, easily available and most of the dentists are familiar with its use.

Key Words: Mineral trioxide aggregate, retrograde filling, surgical endodontic. Amalgam as retrograde filling.

INTRODUCTION

Three-dimensional obturation of the root canal is essential for the long term success of endodontic treatment, so the root canal system should be sealed apically, coronally and laterally.¹ Periapical surgery is an option to avoid tooth extractions when conventional endodontic therapy has failed.¹⁻³

The success of an apicectomy is depended on the apical seal.^{2,5-7} Numerous materials were investigated as root end filling including amalgam, MTA (mineral trioxide aggregate), polycarboxylate cement, zinc phosphate cement and zinc oxide eugenol.⁸ The best retrograde filling material should provide good apical seal, be dimensionally stable, not affected by the moisture, easily manipulated and radio opaque on the radio-graph.^{9,10}

Amalgam is commonly used as a retrograde filling material² and is therefore commonly used as the control when testing new root end materials.¹¹ Its advantages are low cost, dentists are familiar with amalgam, readily available, easy to manipulate, radiopaque and successful in its clinical application. The disadvantages with amalgam such as corrosion, dimensional changes and amalgam tattoos.¹²

MTA have been studied to replace amalgam.² MTA was developed by Mahmoud Torabinejad at Loma Linda University in California at 1993. It has been used to seal communication between the tooth and external surfaces.¹⁴ MTA was originally designed for application in endodontic surgery as a root end filling material.

The purpose of this study was to compare the success rate of two root end filling materials both clinically and radiographically using MTA and zinc free amalgam as retrograde filling in surgical endodontic.

METHODOLOGY

Thirty patients attended the Oral and Maxillofacial Surgery Department in Peshawar Dental College, Peshawar with failed non surgical endodontic treatment were selected for present study. The study Period was two year from 2010 to 2012. Informed consent was

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TABLE 1: PATIENTS AND TEETH IN MINERAL TRIOXIDE AGGREGATE (MTA) AND ZINC FREE AMALGAM

	Male	Female	Upper incisors	Lower incisors	Upper canine and premolars	Mean age/year
MTA/15 patients	7	8	9	3	3	23.5±8
Zinc free Amalgam/15 patients	6	9	10	2	3	27.5±6

TABLE 2: THE CLINICAL AND RADIOGRAPHIC HEALING CRITERIA ACCORDING TO VON ARX AND KURT

Rank Group	Success	Failure
MTA	13	2
Zinc free amalgam	12	3

taken from all patients. Inclusion criteria for the study were all those patient who visited OMFS department of Peshawar Dental College with failed non surgical endodontic treatment in upper or lower anterior and premolars. The clinical criteria for failure were swelling, sinus and pus discharge in the labiobuccal vestibule and tenderness to percussion. Radiographically there was a radiolucency surrounding the root apex of the offending tooth. The study sample was randomly divided into two groups, 15 patients in each group. One group was treated with MTA and the other group was treated with zinc free amalgam as a retrograde filling.

All operations were carried out by same oral and maxillofacial surgeon under local anesthesia of Xylocain 2% with adrenalin 1:80 000. Mucoperiosteal flaps were raised. Bone was removed by using round bur with copious external irrigation. The apical one third of the root was resected. The cavity for retrograde filling was prepared with small carbide round bur. The cavity was isolated before placement of material.

MTA was placed into the root end cavity of one group and the excess material from the root end cavity was clean with a slightly moistened cotton swab. The other group received amalgam as retrograde filling. Periapical radiographs were taken to confirm extra material was not lying in wound area before suturing.

The quality of the root end filling was confirmed by taking a periapical radiograph before suturing of the mucoperiosteal flap. Evaluation of healing for success was done every six months for one year of endodontic surgery:

The clinical and radiographical criteria of von Arx and Kurt was followed to determine over all evolution.¹⁶

Success: When bone regeneration was $\geq 90\%$ and without pain or clinical symptoms.

Improvement: When bone regeneration was between 50% and 90% and without pain or clinical symptoms.

Failure: When bone regeneration was less than 50% or there were clinical symptoms, such as pain, swelling or draining fistula.

In the follow up visit radiographs were taken every six month for one year for the assessment of healing. The assessment was done by clinical and radiographical examination.

The data were collected on a well structured Proforma. Data were analyzed by using SPSS version 16 by determining the frequency and Chi-square test was applied. Results with $p < 0.05$ were considered significant.

RESULTS

The study sample included 13 males and 17 females, with an age range from 18-35 years. The details of results are shown in Table 1 and 2. The success rate (bone regeneration was $\geq 90\%$ and without pain or clinical symptoms) of MTA treated group was 86.6% to that of zinc free amalgam treated group was 66.6%. There was no statistically significant difference.

DISCUSSION

The development or persistence of a periapical radiolucency following endodontic treatment associated with clinical signs and symptoms of periapical infection is often regarded as a criterion of failure. Endodontic failures are most frequently associated with defective root canal obturation and the presence of bacteria in the root canal system. Hence, retreatment had been proposed in such cases.¹⁷ The purpose of root end filling is to establish an apical seal of the resected root.^{3,6,12,18,19} Numerous substances have been used as root end filling materials. The choice of the root end filling material could be governed by biocompatibility, the cost, handling properties and long term clinical success.^{5,19}

In the present study, molars were excluded to have a homogenous study sample and to avoid superimposition of root apices in the periapical radiograph. Study showed the success rate of apicectomy with root end filling was 66.6% (amalgam treated group) and

86.6% (MTA treated group) after a follow up for every 6 months for one year. These results are similar to the result of the meta analysis study of Sanchez et al, in which the success rate of treatment with silver amalgam was found to be 76.5% after a minimal period of three months.^{4,20,21} this also agree with result of Dorn and Gartner where the success rate of root end filing ranged from 75% to 95% depending on the material used i.e. amalgam, super EBA and MTA.²² While Chong et al reported a success rate of 84- 92%.²³

In the present study the success rate of treatment with MTA is higher than that with amalgam, but, there is no statistically significant difference between them. So MTA can be used as an alternative to amalgam for root end filling.

MTA has superior results than amalgam due to many causes, like that MTA is indicated when moisture control is inadequate, without loss of its properties.¹³ The PH of MTA is 12.5, which, biologically, make it similar to calcium hydroxide, as well as it having antibacterial action.²²

CONCLUSION

MTA is good alternative to amalgam, but amalgam is inexpensive, easily available, and most of the dentists are familiar with its use. While MTA represent the saving solution for cases thought to be untreatable.

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