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PULPOTOMY;

ASSESSMENT OF CLINICAL OUTCOME IN MATURE PERMANENT TEETH USING MINERAL TRIOXIDE AGGREGATE.

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ABSTRACT... Objectives: To assess the efficacy of mineral trioxide aggregate (MTA) pulpotomy in mature permanent teeth with irreversible pulpitis due to carious exposure. **Place and Duration:** The study was conducted in the Department of Operative Dentistry, Altamash Institute of Dental Medicine from 05-01-2016 to 05-07-2016. **Methodology:** A total of 70 teeth of 70 patients with irreversible pulpitis were treated with mineral trioxide aggregate (MTA) pulpotomy. The patients were re-evaluated after 2 months. All patients were asked whether they had experienced spontaneous pain, pain on chewing or pain stimulated by hot/cold and the treatment was counted as successful in case of no post-operative symptoms. **Results:** Efficacy of pulpotomy treatment with mineral trioxide aggregate in symptomatic mature permanent teeth with irreversible pulpitis and normal periapical periodontium was 88.57%. **Conclusion:** MTA pulputomy is a good alternative treatment for cases of irreversible pulpitis in permanent teeth with mature roots and normal apical periodontium. However, long term clinical trials and histological assessment is desirable.

Key words: Pulpotomy, Mineral Trioxide Aggregate, Symptomatic Mature Permanent Teeth.

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INTRODUCTION

Vital pulp therapy is established to maintain tooth vitality, functionality and to keep the tooth asymptomatic.[1] Pulpotomy is a type of vital pulp therapy in which after removing coronal pulp surgically, the vitality of radicular pulp is maintained by sealing the canals orifice with material which promotes healing and protect it from further damage.[2] It's a treatment of choice for immature teeth in which the coronal pulp tissue is inflamed but for mature permanent teeth root canal treatment is indicated because the prognosis for pulpotomy in such cases is unpredictable.[3] Despite the advancement in root canal treatment instruments and equiptments, conventional root canal treatment is still challenging, tedious and expensive procedure. Moreover, variations in root canal morphology, dilaceration, unusual number of canals or calcification in the root canal make it more complicated.

In recent era, Mineral trioxide aggregate (MTA) has taken attention in pulpotomy of mature permanent tooth because of its excellent sealing ability[4], biocompatibility[5], dentin bridge formation[6,7] properties. Few studies were performed regarding the clinical and radiographic evaluation of MTA as a pulpotomy agent in mature permanent teeth with irreversible pulpitis, stating that the probability of survival without any other intervention after MTA pulpotomy in mature permanent teeth is around 82%[8] and 100%.[9] This means that survival without root canal treatment after MTA pulpotomy is possible in cases of irreversible pulpitis.

The purpose of this study was to evaluate the clinical outcomes of pulpotomy in mature permanent teeth with irreversible pulpitis by using MTA on large sample size as previous studies were performed on short scale and to see if it can be used as an alternative to root canal treatment

in cases of irreversible pulpitis and help to save time, cost for both patient and dentist.

METHODOLOGY

The study was conducted after the ethical permission sought from the institutional ethical review committee. It was performed in the Department of Operative Dentistry, Altamash Institute of Dental Medicine, from 05-01-2016 to 05-07-2016. The sampling technique was Non-probability consecutive technique and the sample size was 70 teeth which was calculated using Raosoft sample size calculator by considering the reference article.[8,9] Informed verbal consent were taken from each patient and those who refused to give consent, were excluded from the study. The inclusion criteria were, either gender of age 16 to 30 years with deeply carious or heavily restored posterior teethalong with history of intense pain on sweets or cold drinks intake, lasting for minutes to hours (VAS should be ≥1) and pulp should be vital as determined by cold test/electric pulp test. The exclusion criteria were traumatic tooth, root resorption, calcified canals, apical radiolucency or ligament enlargement on the radiograph and tenderness to percussion. Following local anesthesia with 2% lidocaine 1:80000 epinephrine and rubber dam isolation was done followed by caries/ restoration removal using a high-speed air motor with water coolant. The roof of the pulp chamber along with coronal pulpal tissue was removed using high speed air motor with water coolant. Afterwards bleeding was controlled using a small piece of sterile cotton pellet for about 5 minutes. After successful hemostasis, MTA (ProRoot; Dentsply,) was used by manufacturer`s protocol and applied on the floor of the pulp chamber with a thickness of approximately 2-3 mm and root canal orifices; then covered with moist cotton pellet over MTA and restored with temporary filling till the next appointment after 2 days. On follow up, the patients were asked for discomfort and initiation of pain with cold and/or sweet food/ drinks. MTA was checked to confirm setting using a small rounded burnisher. Then, accordingly, restorations were employed.

The patients were re-evaluated after 2 months. All patients were asked whether they had experienced spontaneous pain, pain on chewing or pain stimulated by hot/cold. Efficacy was labeled positive if there was no such pain on VAS scale after 2 months.

Post stratification Chi- square test was applied to check the efficacy of mineral trioxide aggregate (MTA) pulpotomy in mature permanent teeth with irreversible pulpitis due to carious exposure, with respect to pain. The level of statistical significance was set at $P \leq .05$ at 95% confidence interval.

RESULTS

A total of 70 teeth of 70 patients were included per study inclusion criteria. The average age of the patients was 23.59±3.86 years. Pre-operative pain was assessed on VAS (Figure-1) in which most of the patients had moderate pain.

After two months, post-operative pain and tenderness were assessed and found that 8(11.43%) had mild to moderate pain in which 5(7.14%) had tenderness while the efficacy of pulpotomy treatment with mineral trioxide aggregate was 88.57% as shown in Figure-2 and 3 respectively.

Stratification analysis was performed and observed that efficacy was similar in all age groups and p value =0.694 showed insignificant difference as shown in Table-I. However, efficacy was not significant with respect to duration of preoperative pain as shown in Table-II while efficacy was significant high in those cases who had mild and moderate pre-operative pain (p=0.03) as shown in Table-III.

Efficacy of pulpotomy treatment with mineral trioxide aggregate in symptomatic mature permanent teeth with carious exposure and signs of irreversible pulpitis with respect to age groups.

Efficacy of pulpotomy treatment with mineral trioxide aggregate in symptomatic mature permanent teeth with carious exposure and signs of irreversible pulpitis with respect to pain.

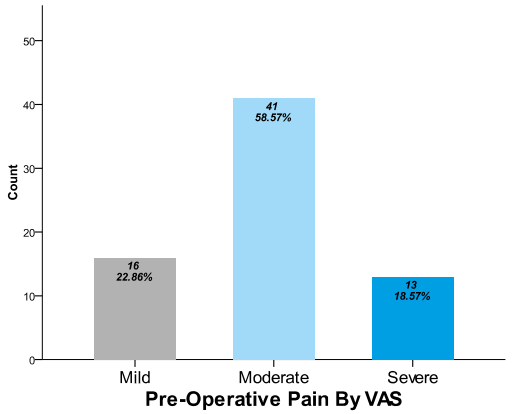

Figure-1. Pre operative pain score of the patients n= 70

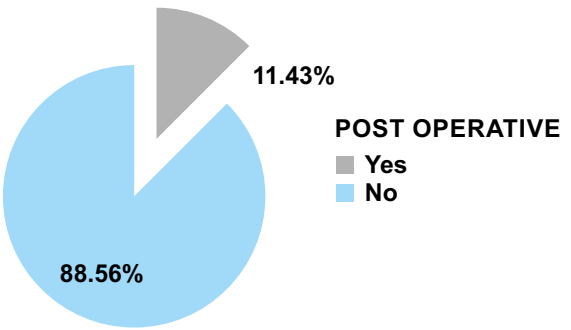

Figure-2. Post operative pain score n= 70 yes=8 no=62

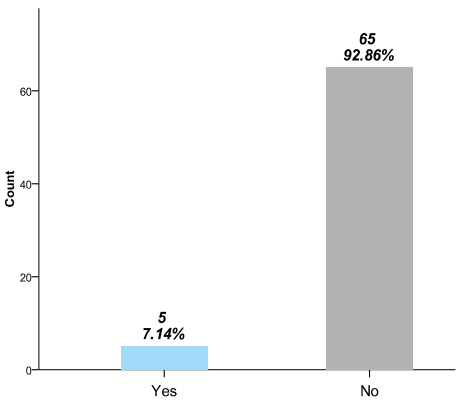

Figure-3. Post operative tenderness to percussion n= 70

Age Groups (Years)	Efficacy		Total
	Yes n= 62	No n=8	
≤ 20 Years	15(83.3%)	3(16.7%)	18
21 to 25 Years	22(91.7%)	2(8.3%)	24
26 to 30 Years	25(89.3%)	3(10.7%)	28

Table-I
Chi-Square=0.729; p=0.694

Pre-operative pain	Efficacy		Total
	Yes n= 62	No n=8	
Mild	16(100%)	0(%)	16
Moderate	37(90.2%)	4(9.8%)	41
Severity	9(69.2%)	4(30.8%)	13

Table-II
Chi-Square=6.98; p=0.03

Efficacy of pulpotomy treatment with mineral trioxide aggregate in symptomatic mature permanent teeth with carious exposure and signs of irreversible pulpitis with respect to post operative analgesia.

Post Operative Analgesia	Effectiveness		Total
	Yes n= 62	No n=8	
Yes	1(16.7%)	5(83.3%)	6
No	61(95.3%)	3(4.7%)	64

Table-III
Chi-Square=33.52; p=0.005

DISCUSSION

The success for vital pulp therapy is based on careful case selection. One of the main issues in vital pulp therapy is the status of the pulp tissue which is normally judge clinically based on hemostasis achieved after removal of inflamed coronal pulp. However, other factor may also influence prognosis such as isolation by rubber dam, pre-operative presence of a healthy periodontium and appropriate coronal seal following vital pulp therapy completion. Regular follow ups are also mandatory to ensure maintained periapical and pulpal health.

The result of present study showed that the efficacy of pulpotomy treatment with mineral trioxide aggregate was 88.57% which are in agreement with the results of other studies on pulpotomy in permanent teeth using MTA.[10-12]

Studies performed in Europe, state that the probability of survival without any other intervention after MTA pulpotomy in mature permanent teeth is around 82%.[8] This means that survival without root canal treatment after MTA pulpotomy is possible in cases of irreversible pulpitis.

Witherspoon et al.[13], revealed good clinical and

radiographic outcomes of MTA pulpotomy for 19 symptomatic permanent teeth in 14 patients. Although, the mean follow-up period was somewhat long (19.7 months), only 4 teeth were mature since the patients were young (age ranged 7-16 years). The influence of the patient's age on the treatment outcome is a matter of controversy. In contrast to Aguilar and Linsuwanont[14] Bjorndal et al.[15] observed that younger patients were associated with a higher successful rate of vital pulp therapy.

In this study, clinical success was evaluated based on short term clinical signs and symptoms however nature and health of normal pulp tissue underneath MTA can only be evaluated histologically which is possible in rare cases. In case of pulpotomy failure, removal of MTA for root canal treatment may be more challenging and hard tissue barrier formed may have tunnel defect which would jeopardize the treatment. Hence success evaluation based on long term clinical and histological assessment is desirable.

CONCLUSION

In conclusion, MTA pulputomy is a good alternative treatment for cases of irreversible pulpitis in permanent teeth with mature roots and healthy apical periodontium. However, long term clinical trials and histological assessment is desirable.

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