INTRODUCTION

MTA can be a difficult material to use because it is perceived as coarse, sets slowly, and is easily washed out of a moist site.

OBJECTIVES

The purpose of this study was to evaluate the washout stability of the 4 MTAs to determine if they overcome the flow of water spray of the dental unit chair.

METHODS

4 types of MTA cements were used. Long setting MTAs: ProRoot MTA (Dentsply Tulsa Dental, Tulsa, OK) (PMTA), MTA-Angelus (Angelus Dental Solutions, Londrina, Brazil) (AMTA), Bioaggregate (Innovative BioCeramix, Vancouver, Canada) and short setting MTA: RetroMTA (BioMTA, Seoul, Republic of Korea). MTA cements were mixed with distilled water (DW) according to the each instruction. After 5 minutes, Five milliliters of water was sprayed perpendicular to the cavosurface with a flow rate of 0.33 mL/s using the water spray of the dental unit chair 5 cm from the sample. The samples were photographed at 10 before and after the washout testing.

RESULTS

The washout resistances of RetroMTA was significantly better than ProRoot MTA, MTA-Angelus and Bioaggregate. RetroMTA survived the washout test with no loss. The ProRoot MTA, MTA-Angelus and Bioaggregate samples had significant washout disrupting 80% to 100%.

CONCLUSIONS

Clinical handling of RetroMTA was superior to WMTA due to the short setting time (150 sec). This material had remarkable resistance to washout and were suitable for retrograde filling material in apicoectomy.

Reference

Biomineralization ability of OrthoMTA -in vitro, ex vivo and in vivo study-  
You-Sang Lee,DMD,MS. Jun-Sang Yoo,DDS,MS,PhD.  
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Abstract

The key factor of endodontic treatment success depends on a canal filling in a sterilized condition. But a complex canal morphology and strong survival ability of bacteria through a traditional canal filling material and method hinder endodontic treatment success. This study introduce a new method and a new canal filling material in a final endodontic procedure. An Internal space of a tooth canal is regarded as a grafting space surrounded by hard tissues, contacting with body fluid. This process may develop a new concept in sterilizing bacteria and a canal filling method. 

Methods

In vitro Assay
Ex vivo Assay
Dye Test-Sealability
In vivo Assay
OrthoMTA grating into Tooth of Human  
PBS+OrthoMTA  
Hydroxy Apatite  
SEM Analysis after 3 Months

Conclusions

1. OrthoMTA induced HA in phosphate ion condition  
2. OrthoMTA induced HA in dentinal tubules  
3. HA induction increased in time flow  
4. Bacteria in dentinal tubules were surrounded by HA after OrthoMTA canal grafting

Results and Discussion

Ex vivo Assay

An OrthoMTA grafting sample after a tooth cleaning treatment – sealing ability by Dye test

In vitro Assay

HA/Hydroxy Apatite Precipitation in Tube after OrthoMTA grafting

Ex vivo Assay

Dentinal tubules in E.faecalis cultured tooth after OrthoMTA Grafting

In vivo Assay

An extracted tooth for periodontal problem after 3 month OrthoMTA Grafting  
- HA formation in dentinal tubule

Apatite formation in dentinal tubule  
B. Hydroxy Apatite formation around bacteria in dentinal tubule
Cone beam CT in endodontics
Jin - Hee Park, DDS. Jun-Sang Yoo, DDS. MS. PhD.

ABSTRACT

Conventional radiographs have several shortcomings in diagnosis. CBCT have better diagnosis ability. So we show the advantages of CBCT in this poster by many clinical Case.

INTRODUCTION

Since, the main diagnostic experiment in dental area are panorama and standard x-ray, they have definite limit in diagnosis. So dentists should overcome that limit by abundant failed clinical trial and error. But limitations in conventional radiography promulgated a need For three-dimensional imaging, known as Cone beam computed tomography (CBCT).

Although a form of this technology has existed since the early 1980s, these devices first appeared specifically for use in dentistry in 1998. In now, the diagnostic experiment has improved greatly and machines have improved greatly so that diagnostic accuracy is developed.

In this poster, you can see many cases which shows the advantages of CT images. A great part of this poster suggest many endodontic case which can’t detect in conventional radio graph.

And compare gutta percha filled and orthograde MTA filled tooth canal which shows better sealability.

MATERIALS AND METHODS

We show the isthmus in tooth canal, internal resorption, root fracture, cyst and re-ends treated tooth.

Isthmus and internal resorption are space in tooth canal. This case show the isthmus and internal resorption filled with orthomta. Re-ends treated tooth was replaced by orthomta.

So we can compare the gutta percha filled tooth and the orthomta filled tooth which has better sealability.

We use Ondemand3D (Cybermed Inc.CA, USA) and cone beam computed tomography.

(VATEC Co., SEOUL,KOREA)

RESULTS

CBCT is better diagnosis machine than conventional radiographs. We show the better view like filled canal form, isthmus shape, fracture line, cyst shape, bone regeneration.

According to published articles (J Endod 2008;34:273–279), possibility of FND(false negative diagnosis) shows in panoramic radiographs 17.6%. Periapical radiographs 35.3%, CBCT 63.3%.

CBCT is available to find false negative images and for exact final diagnosis.

With that, 3D evaluation is mandatory in static analysis of endodontic treatment outcome.

Conclusions

REFERENCES

Curing light induced discoloration of MTA

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INTRODUCTION

In some clinical situations, MTA is used in a coronal position. In these situations, the color of MTA is key to the final esthetic result. WMTA was developed for application in esthetically sensitive areas; thus, if its color changes to gray, it may cause tooth discoloration. Given that Tsujimoto et al. observed discoloration of WMTA after treatment with light-activated bleaching agents, and that in clinical situations, a light-cured composite restoration is usually placed over WMTA.

OBJECTIVES

The aim of the present study was to evaluate the color stability of MTAs after irradiation with the curing light.

METHODS

4 types of MTA cements were used. Long setting MTAs: Proroot MTA (Dentsply Tulsa Dental, Tulsa, OK) (PMTA), MTA-Angelus (Angelus Dental Solutions, Londrina, Brazil) (AMTA), Bioaggregate (Innovative BioCeramix, Vancouver, Canada) and short setting MTA: RetroMTA (BioMTA, Seoul, Republic of Korea). MTA cements were mixed with distilled water (DW) according to each instruction. After mixing for 30 seconds, each cement was placed into a polyethylene mold (length = 3mm and diameter = 2 mm). The samples were immersed initially in pure glycerine for 15 min and then each mold containing the MTA cements was irradiated with the Optilux 501 (Kerr, Danbury, CT, USA) for 20, 60, and 120 sec.

RESULTS

The 2 experimental groups that were exposed to curing light showed discoloration of the WMTA surface, which increased with exposure time except RetroMTA and Bioaggregate. But Bioaggregate group showed wash out.

CONCLUSIONS

ProrootMTA and MTA Angelus showed dark discoloration after irradiation with a curing light. Bioaggregate had no discoloration but wash out. RetroMTA showed color stability and no wash out.

Reference

Color stability of white mineral trioxide aggregate
Marta Vallès & Montserrat Mercadé & Fernando Duran–Sindreu & Jose Luis Bourdelande & Miguel Roig
Clin Oral Invest DOI 10.1007/s00784-012-0794-1
Effect of pH on Hydroxy Apatite Formation obtained from OrthoMTA

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ABSTRACT
Calcium-silicate cements, such as MTAs(mineral trioxide aggregates) are hydraulic cements mainly composed of di- and tricalcium silicate, tricalcium-aluminate and gypsum. When hydrated these hydrophilic components undergo a series of physic-chemical reaction resulting in the formation of a nanoporous gel of calcium-silicate hydrates, a soluble fraction of calcium hydroxide , and calcium aluminate hydrate phases. They have the important property to set in humid and wet environments, such as water, blood and other fluids, being therefore useful for dental material.

A number of recent studies demonstrated that calcium silicate cements may process bioactivity properties when immersed in phosphate-based solution, such as simulated body fluid, and are able to induce the formation of apatite precipitates. However precipitation process and mechanism of apatite precipitates is not understood yet. In the present study the effects of papatie precipitates was invstigated. OrthoMTA(BioMTA) was used for experiments. The surface of OrthoMTA was studied using scanning electron microscope.

CONCLUSIONS
• Apatite precipitation is formed from orthoMTA in phosphate existing environment.
• Crystal growth of Apatite precipitation is formed on time deendant.
• Apatite is not formed at acid. pH effects on HA formation.
• There are three types of HA formation from OrthoMTA.

Further Study
• Apatite precipitates is investigated by FT-IR and XRD for more exact crystal structure.
• Other effects of apatite formation is investigated. pH,ionic strength, reaction time, temperature, etc.
INTRODUCTION

The compressive strength of MTA in contact with blood was significantly lower than that set in water and that blood or serum contamination had a detrimental effect on the surface microhardness of MTA. It is well known that contamination with blood or tissue fluid can affect the setting of MTA.

OBJECTIVES

A long setting time can also limit the use of MTA because mixed MTA can be affected by the tissue fluid until it sets completely. This study examined the effect of FBS on the setting of 4 white MTAs and determined if fast setting MTA (RetroMTA) can overcome the detrimental effect of tissue fluid contamination condition.

METHODS

4 types of MTA cements were used. Long setting MTAs: ProRootMTA (Dentsply Tulsa Dental, Tulsa, OK) (PMTA), MTA-Angelus (Angelus Dental Solutions, Londrina, Brazil) (AMTA), Bioaggregate (Innovative BioCeramic, Vancouver, Canada) and short setting MTA: RetroMTA (BioMTA, Seoul, Republic of Korea). MTA cements were mixed with distilled water (DW) according to each instruction. After mixing for 30 seconds, each cement was placed into a polyethylene mold (length = 5mm, diameter = 2 mm). Each mold containing the MTA cements was immediately soaked in FBS (Gibco, Tulsa, OK). Each mold in FBA was kept at 37°C and 100% humidity for 4 days. As another experiment, molds of RetroMTA soaked in FBS after 0 / 30 / 60 / 150 sec. and stored for same period. After 4 days, all samples were inspected for set quality.

RESULTS

ProrootMTA in FBS after 0 sec

MTA angelus in FBS after 0 sec

Bioaggregate in FBS after 0 sec

RetroMTA in FBS after 0 sec

Failure of setting after 0 sec

Failure of setting after 30 sec

Failure of setting after 60 sec

Complete setting setting after 150 sec

CONCLUSIONS

Short setting MTA (RetroMTA) was set in FBS.
Long setting MTAs were not set in FBS: may cause the wash out and microleakage.
Re-endo tx with OrthoMTA is very useful and successful process. Randomly sorted 20 cases show high success rate over 95%. 1 of 20 is apically involved tooth (the last case), so has moderate mobility until now. But the other symptoms is decreasing. 19 cases of 20 show very good development near to the 'Success'. For reference, The overall success rates for primary endodontic, nonsurgical retreatment, and surgical treatment with GP cone were (86.0%), (89.3%), and (65.4%). [Elefman RF, Pretty L. The University of Manchester, UK, June, 2011]

The process of filling with OrthoMTA is also easy. New method using MTA carrier, plugger, compactor, helps to fill apical portion perfectly. According my experience, obtaining apical patency was very important, and then the rest filling processes with OrthoMTA were simple. Because OrthoMTA is powder form, MAF is not strict factor. And because overfilled OrthoMTA is not problem, working length and apical stop is less strict matter than case of GP cone. Moreover, because OrthoMTA has bactericidal and bioactive effect, too many times of NaOCl soaking, application of CalOH is not necessary. In fact, almost cases can be done within 2 or 3 visits safely and easily.

Successful results of re-endo tx with OrthoMTA is encouraging our efforts to rescue more natural teeth. And I trust that New paradigm of endodontic tx by OrthoMTA can make significant development in dentistry.
This study was to investigate bacterial entombment by intratubular mineralization following OrthoMTA (OMTA) obturation through scanning electron microscopy (SEM) and transmission electron microscopy (TEM).

**OBJECTIVES**

After intra-canal grafting with hydraulic bio-ceramic cement, in dentinal tubules:
1. Crystalline Ca-P formation
2. Intratubular bacterial entombment
3. Identified it as Ca-P apatite crystal.

**METHODS**

- **Group I (n=10):** (-) control
  in phosphate buffered saline (PBS)
- **Group II (n=10):** (+) control
  inoculation with *Enterococcus faecalis* for 3 weeks
- **Group III (n=20):** (-) experiment
  obturation with OMTA-PBS paste
- **Group IV (n=20):** (+) experiment
  inoculation with *Enterococcus faecalis* for 3 weeks and obturation with OMTA-PBS paste

**RESULTS**

**SEM STUDY**

- Group I (-) control : PBS
- Group II (+) control : E. faecalis

**FIB-TEM & Electron Diffraction** (Group III (-) experiment : OMTA)

**CONCLUSIONS**

Intra canal grafting with hydraulic calcium silicate cement induces

1. A calcium phosphate apatite in dentinal tubules.
2. Eradication of E. faecalis in the infected dentinal tubules
The requirements, an ideal root canal filling material should be easy to remove. Safe, successful and effective removal of root filling materials is an integral component of non-surgical root canal retreatment. Access to the root canal system must be achieved in order to negotiate to the canal terminus so that deficiencies in the original treatment can be rectified. The unique properties of MTA contrast with many of the drawbacks of previously popular pastes/cements. However, since MTA also sets hard, removal may be difficult if not impossible. At present, there are no solvents available for dissolving MTA. There is currently no literature on the removal of MTA from curved canals; this is likely to be a very challenging and risky procedure.

INTRODUCTION

The solution of specially formulated chemicals can be effectively used as an adjunct to dissolve OrthoMTA. The results suggest that OrthoMTA can be completely removed from the root canal system by the solution.

METHODS

4 types of MTA cements were used. OrthoMTA (BioMTA, Seoul, Republic of Korea) (OMTA), ProRoot MTA (Dentsply Tulsa Dental, Tulsa, OK) (PMTA), MTA–Angelus (Angelus Dental Solutions, Londrina, Brazil) (AMTA), Bioaggregate (Innovative BioCeramix, Vancouver, Canada, (BA). Cements were mixed with distilled water (DW) according to the each instruction. After mixing for 30 seconds, each cement was placed into a polyethylene mold (length = 5 mm and diameter = 2 mm). Each mold containing the MTA cements was soaked in the solution of specially formulated chemicals in 1 day. Each mold in the solution was evaluated the amount of dissolution in 3 minutes.

RESULTS

CONCLUSIONS

The solution of specially formulated chemicals can be effectively used as an adjunct to dissolve OrthoMTA. The results suggest that OrthoMTA can be completely removed from the root canal system by the solution.

REFERENCE

Sealing ability of mineral trioxide aggregate (OrthoMTA) for file separation

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Introduction

There have been many different devices and techniques developed to retrieve instruments fractured during endodontic procedures, but none of them can consistently remove separated instruments from root canals. Iatrogenic accidents such as perforation and canal destruction has been reported during the removal of separated instruments. The file removal process becomes even more difficult when breakage occurs in a curved canal or in the apical third of the canal.

Mineral trioxide aggregate (MTA) has recently been investigated as a potential alternative restorative material to the presently used materials in endodontics. Several in vitro and in vivo studies have shown that MTA is biocompatible, promotes regeneration and prevents microleakage. Thus we have introduced a new approach for filling the space between separated file and canal wall using MTA.

Objective

The purpose of this study is to propose new approach to obtain successful endodontic treatment using the sealing ability of OrthoMTA, in the case with separated file in apical third of root canal system.

Materials and Methods

1) Access cavity of extracted mandibular and maxillary molar
2) Canal enlargement
3) Make a groove with a disk bur on 3mm apart from apex of file
4) Insert the grooved file into the apex, and check the file locked.
5) Rotate the file until it is separated intentionally.
6) X-ray taking
7) Canal enlargement to the separating point(#30)
8) NaOCl soaking(10-15 min)
9) Application watery OrthoMTA using indirect ultrasonic(10 min)
10) Dry the canal and orthograde canal filling
11) After keeping in distilled water for 24 hours, and section horizontally into 0.5-1.0mm slabs
12) Examine the cross section under microscope(×200)

Results

(1) Mandibular molar – MB/ML canal (type 2) #25K-file, #2SH-file

(2) Maxillary molar – MB canal #20K-file

(3) Maxillary molar – DB canal #15K-file

(4) Maxillary molar – P canal #35K-file

Conclusion

Within the limit of this pilot experiment, a small size(3-5μm) of OrthoMTA particles promotes the complete obturation of the root-canal space between fractured file and canal wall, and also the irregular canal system. Remnants of pulp tissue acts as a barrier interfering with penetration of MTA to root canal system. For dissolving remnants of pulp tissue, NaOCl solutions have been shown to be effective, and NaOCl solution with ultrasonic be more effective. OrthoMTA that is bacteriocidal has been expected to control of bacteria. And also the apical side of fractured file could be sealed with OrthoMTA particles regardless of a file shape. Although further studies are needed to evaluate the sealing ability and acceptability in clinical applications, this method has a great potential in successful endodontic treatment with separated instrument.
The effect of bone formation at periapical lesion by MTA Orthograde Biofilling

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Abstract
Mineral Trioxide aggregate/MTA has been used in dentistry for more than a decade. An experimental material, MTA has recently been investigated as a potential alternative restorative material to the presently used materials in endodontics. Several in vitro and in vivo studies have shown that MTA prevents microleakage, is bioactive, and promotes regeneration of the original tissues when it is placed in contact with the dental pulp or periapical tissues. This poster describes the clinical procedures and outcomes for application of MTA. We will present several cases in which MTA was used to manage clinical problems. All of these cases have included apical resorptive defect teeth. Among the patients the apical resorptive defect teeth which were treated with OrthoMTA (BorMTA Co., SEOUL, KOREA) OrthoMTA compacter. The dental records and radiographs were examined only for the patient who had follow-up examination at least 2.5 months after the treatment.

Definition
Biofilling - Orthograde filling the bioceramic material in the root canal

Clinical Procedures of MTA Biofilling
1. Hydration/PBS & Mixing
2. Making Puttylike MTA (W/P ratio 0.33, Remove any excess water by a 4X4 gauze and sterilized cotton swab.)
3. Loadinginto the OrthoMTA Carrier, gentle tapping motion)
4. Delivery - Premixed OrthoMTA paste is introduced into canal system by the OrthoMTA Carrier
5. Gently tapping
6. Spreading (with recirculating motion) & Spacing (0.02 tapered #25 file)
7. Inserting(OrthoMTA Compacter) & Ready to compact (Withdraw the compacter 0.5 mm from the working length and Rotate OrthoMTA Compacter at 60.R.P.M.)
8. Apical 1/3 compaction(by OrthoMTA Compacter, ‘Grasping’ sense means formation of the apical plug)
9. Middle 1/3 compaction(by OrthoMTA Compacter up and down, round motion)
10. Coronal 1/3 compaction(by the plugger)

The Outcomes of Clinical cases by MTA Biofilling

Case1 (26Y, Female)
C.C. : Facial swelling and pain
Pi : Mo(+), Per(+), pus discharge on #31,21,22
Tx. 12,21,22 area Widespread Apical Resorptive Defect with sinus tract
8 months after
Per(-), MO(-), lamina dura
Apical bone formation

Case2 (60Y, Male)
C.C. : lower teeth pain, mobility, foul smell
Pi : Mo(+), Per(+), pus discharge
#42 area Apical Resorptive Defect with sinus tract
11 months after
Per(-), MO(-), lamina dura
Apical bone formation

Case3 (9Y, Female)
C.C. : Fall forward 3 months ago
Pi : Mo(+), Per(+), pus discharge on #11,21
#11 area Apical Resorptive Defect
Tx. 11,21 with OrthoMTA Orthograde filling by OrthoMTA Compacter

Case4 (48Y, Male)
C.C. : lower teeth pain and mobility, Pt want extract on #43
Pi : Mo(+), Per(+), severe caries on #43
#43 area Apical Resorptive Defect
Tx. #43 with OrthoMTA Orthograde filling by OrthoMTA Compacter

Case5 (54Y, Female)
C.C. : lower teeth pain while biting, tooth mobility
Pi : Mo(+), Per(+), pus discharge on #33
#32,33 area Apical Resorptive Defect with sinus tract
#33 area Apical Resorptive Defect
Tx. #33 with OrthoMTA Orthograde filling by OrthoMTA Compacter

Case6 (38Y, Female)
C.C. : lower teeth pain, mobility, Pt want extract on #41
Pi : Mo(+), Per(+), pus discharge on #41
#41 area Apical Resorptive Defect with sinus tract
Tx. #41 with OrthoMTA Orthograde filling by OrthoMTA Compacter

Conclusion & Discussion
- In all cases, OrthoMTA allowed apical bone formation/healing) and elimination of clinical symptoms in a short period of time.
- OrthoMTA cases showed significantly high success rates. It may be MTA prevents microleakage, is bioactive, and promotes regeneration of the original tissues.
- Contacted OrthoMTA with periapical tissue was not affected healing. Because it allows the growth of cementum, alveolar bone and periodontal ligament.
- MTA may be an ideal material for certain endodontic procedure.

References
- BoriMTA (http://www.biomta.com)