SUMMARY

APICAL LEAKAGE AT USAGE TWO KINDS OF MATERIAL MINERAL TRIOXIDE AGGREGATE AS RETROGRADE FILLING

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ABSTRACT

MTA is a relatively new material used for endodontic treatment such as a retrograde filling material. This study aimed to determine differences in apical leakage on the use of two different kinds materials, namely MTA:ProRoot MTA and BioMTA as retrograde filling.

Twenty subjects premolars with single root criteria and straight, cut the remaining coronal sections along 15mm. Apical root teeth canal treatment performed preparation with crown down pressureless technique with rotary instrument files (Protaper files) and obturation single cone technique using AH plus siler. Further apicoectomy 3mm from the apical and retrograde preparation class I 3mm deep with a micro bur. Subjects were divided into 2 treatment groups were as much at random, respectively – each group consisted of 10 teeth. Group I was given retrograde filling ProRoot MTA materials, Group II was given retrograde filling BioMTA and subjects kept in a incubator for 3 weeks. After that the subject is immersed in 2% methylene blue solution and centrifuged at 3000 rpm for 5 min. The whole tooth split longitudinally using a diamond bur disc and observed under stereomicroscopr (magnification 60x) furthest penetration of incoming methylene blue solution in root canal in mm by using a stereomiscope

Analysis using a t-test found difference in outcome retrograde filling materials apical leakage using BioMTA and ProRootMTA ($P<0,05$). The conclusion of this study is the ProRoot MTA materials is retrograde filling materials that has a higher leakage rate than the BioMTA material if it is used as an retrograde filling materials in apicoectomy.

Keywords: apicoectomy, retrograde filling materials: ProRoot MTA, BioMTA.

ANTECEDENT

Apikoektomy can be defined as action of surgical operation to throw away network patologis at the end of root as well as throwing away root tip along with its(the root channel and ramification infection at the same time at the time of at the same closes tip of the root to avoid infection is then by day.

Purpose of apikoektomy is compensation lacking of treatment of conventional endodontik causing is got admission filling of root channel which meeting which can prevent the entry of bekteri cause of infection.

Various techniques apikoektomy has been reported in literature. Generally applied is the existing is conventional apikoektomi technique either by using bur and also by using technique bone windowing and technique apikoektomy surgical operation of micro (mikrosurgery) by using microscope endodontik and fairish equipments of other micro. Admission filling of root channel can be done in good orthograd of intraoperatif (when operation) and also preoperatif (before operation). Admission filling of root channel in intraoperatif has advantage is dibangdingkan with admission filling of root channel in preoperatif because operator has better viewpoint causing facilitates to do of admission filling of solid root channel and solid.

Mineral Trioxide Aggregate (MTA) and up to now has been applied widely in area endodontik clinic like repair of perforation and cover?conclusion material tip of root at surgical operation endodontik, also as pulp capping, apeksification and repair of resorption of root eksternal. MTA has character which biokompatibel to repair of area radikular tooth and can be applied in repair case of perforation with surgical operation and also non surgical operation or earns as component of apical filler of tooth at surgical operation case endodontik. The research, known that usage of MTA can stimulate repair area of around as of mentum and followed [by] growth of attachment apparatus which either around tooth tooth (Ingle and Backland, 2008).

Now material MTA which often applied to operate on endodontik is ProRoot Mineral Trioxide Aggregate. ProRoot MTA is solid of retrograde having ability to improve;repair root channel. Solid of this retrograde can be applied at double root channel or single and within sufficiently long at place of damp. Admission filling success of apex with ProRoot MTA good, because ProRoot MTA can form as of new mentum in apex followed by healing of network periapikal (Torabinejad dkk., 1995).

Development now from material MTA so called Bio Mineral Trioxide Aggregate . this BioMTA is material grafting root channel in first hydrophilic retrograde. Ability fisiokimiawi, stability, handling better than ProRoot MTA. this BioMTA has modern production system and on unique, including filtration by Mastersizer granolometer, what ascertains height of quality of powder MTA (filter by Mastersizer granolometer). this BioMTA free of shrinkage postendodontik grafting operation and ion Cr6+ carcinogenic, and is heavy metal (Chang dkk, 2011). Usage of powder BioMTA at grafting root channel in retrograde introduced by Dr Yoo the year 2009 (Chang dkk, 2011). To increase prognosis success of from grafting root channel in retrograde with BioMTA, hence BioMTA concentrates on development of material grafting root channel in retrograde.

This research aim to know apical leakage difference between material ProRoot MTA and BioMTA as component of solid of retrograde at action apikoektomy.

This research expected can become inside information of medical area of tooth especially surgical operation area endodontik for election of material ProRoot MTA and BioMTA as component of solid of retrograde.

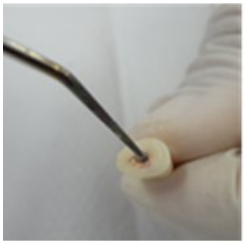
RESEARCH METHOD

This research is research of eksperimental laboratoris in vitro to know apical leakage difference of material ProRoot MTA and BioMTA applied as component of retrograde filler with number of samples 20 tooths (every group = 10 tooths).

Research subject applied at this research is twenty mandible premolar tooths post extraction with unique root criterion , diametrical and has one root channels. Tooth cleaned and cut at part of cemento enamel junction (CEJ) leaves over 15 mm in direction apikoservikal.

Done treatment of root channel with technique crown down pressureless with instrument rotary of file (Protaper file). preparation of Root channel is started with file S1 and file S2 along the length of 2/3 according to job(activity length. Step hereinafter admission at process finishing, file F1 and F2 is enterred along the length of job(activity length and last enterred file F3 with job activity length 14 mm.

Root channel is dried by using cartridge point and obturasi applies technique single cone with guta rags # 30/0,06 and siler AH Plus. After gutaperca packed into root channel which has been preparation and cut with plugger which has been temperature while in condensation to apical to a point is under orifice. Then is covered with solid cemented glass ionomer. Then tooth kept in incubator with temperature 37˚C during 48 hours to maximize ossification siler.



Gbr1. Guttaperca cut and compacted with plugger.

Action apikoektomi is done at all of tooth applied in this research (n=20) (picture 20). Apikoektomi from apex is done along the length of vertical 3mm with tooth axis beforehandly is given line drawing around apical of tooth which will be cut (picture 21). Apical of tooth is cut to applies carborundum disc according to the line boundary (picture 22). Then is done preparation of class kavity retrograde I by

using micro bur is in the form of pear in 3 mm with diameter 0,12 mm (picture 23), irrigation with saline counted 2 ml (picture 24) and dried with cartridge point. Bur applied for preparation of retrograde root channel is changed with the same bur type after 6 times usage bur.

Gbr 2. apical Penampang after done by apikoektomy.

Gbr 3. preparation of Retrograde applies micro bur in 3 mm so that is formed class kavity I at apical of tooth.

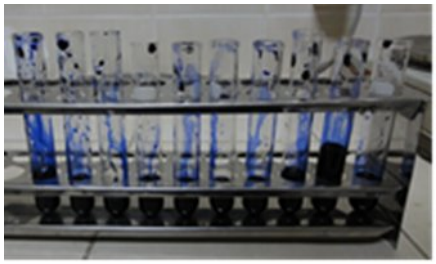
At group I (n=10) done admission filling of retrograde with material ProRoot MTA. Preparation of retrograde filler at ProRoot MTA by preparing powder and dilution of comparison of 3:1 to place of MAP (apical Micro of placement system) then is swirled by using instrument of cement of finite spatel concentration of like putty. ProRoot MTA which has is in the form of putty packed into kavity which has been preparation as thick 3mm from apical direction with ProRoot MTA Gun, then is adapted and compacted with plugger. Excess of ProRoot MTA is smoothed down with plastis instrument, then is put down cotton wet pellet during 24 hours at apical part (picture 4).

Gbr 4. ProRoot MTA is enterred by into retrograde kavity and excess is smoothed down by plastis instrument.

At group II (n=10) done admission filling of retrograde applies BioMTA. Preparation of retrograde filler at BioMTA in packaging of small orbicular plastic box containing small sachet of powder BioMTA and liquid in packaging of small plastic (according to factory guide). Sachet opened and mixed with dilution BioMTA in packaging of small plastic to glass plate, then is swirled by using instrument of cement of finite spatel concentration of like pasta. Pasta BioMTA is enterred [by] kedalam needle BioMTA carrier and pushs slowly pasta BioMTA into kavity which has been preparation as thick 3mm from apical direction. Then plugger applied to assist enters pasta BioMTA into root channel giving light pressure. Excess of BioMTA is smoothed down with plastis instrument, then is put down cotton wet pellet during 24 hours at apical part (picture 5).

Gbr 5. Bio *MTA* dimasukkan kedalam kavitas retrograd dan kelebihan diratakan plastis instrumen.

The tooth (n=20) put down in place of plastic and packed into incubator during 28 days. Then released from incubator and given [by] nail enamel. Nail enamel the application of 2 times with paintbrush at all surface of tooth except its apical part. Between applications that is first and second is be awaited formerly so drought, has just been done the application of second nail enamel. After drought nail enamel, hence arranged in layers with adhesive night equaly at all surface of tooth except 2mm from direction of apical foramen. Purpose of this treatment was to prevent blue condensation of penetration methylene kedalam tooth except only pass 2 mm from direction of apical foramen. Each tooth packed into glass reagent tube and given by blue condensation of methylene 2% masing - masing is deliberated by weighing 15 ml (Picture 6). Then is done centrifugation during 5 minute with speed of 3000 rpm (Picture 7). Hereinafter research subject released from equipment centrifugation and cleaned by the way of cleaned under lotic water until cleanness then nail enamel and nail enamel glue night is cleaned by using crown mess and after dried tooth is planted into gypsum log for fairish stabilization of 2 x 4 cm, height 3 cm (Picture 8) so that tooth earns dibelah longitudinally applies carborundum disc until apart root two following the incision.

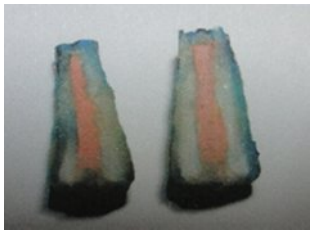


Gbr 6. Masing - masing tooth packed into glass reagent tube and given [by] blue condensation of methylene 2% is deliberated by weighing 15 ml.

Picture 7. Tooth is done by centrifugation during 5 minute with speed 3000 rpm.

Picture 8. Tooth is planted into gyps block for stabilization.

Every group of tooth premolar under the is cut by longitude by using disc diamond bur, so that every tooth will divided to become 2 the same part big (Picture 9). Part of tooth which dibelah becomes two the is expected by there is no fracture, especially at apical part of tooth.

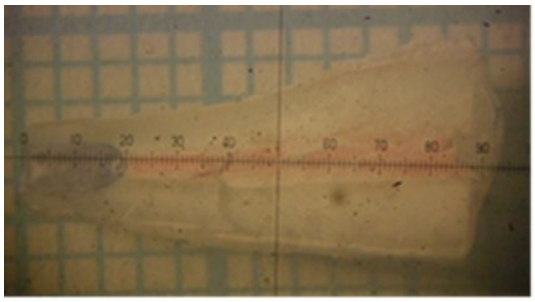


Gbr 9. Tooth is done bisection longitudinally so that is gotten 2 tooth cutting of equal size.

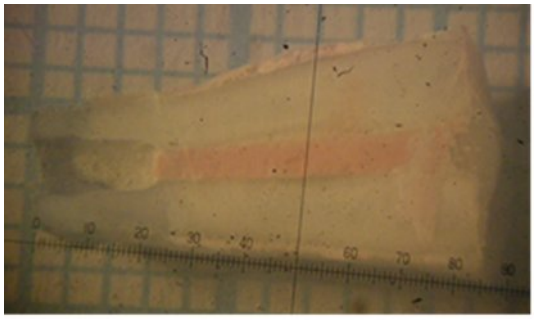
Tooth cutting which will be observed is penetrating tooth cutting of blue condensation of its(the methylene is farther penetration of admission through retrograde filler comes into root channel.

Result of research

Tooth cutting result of longitudinal cleft is seen under stereomicroscope with magnification of 60 times to observe leakage. measurement of Apical leakage by observing penetration of blue condensation of methylene at gap between MTA and channel wall root of apical direction to servikal with measurement scale every 1 (one) the ruler stripe in equivalent microscope with 120 µm, penetration depth of dye assessed in set of mm (picture 10,11).



Gbr 10. Depth of penetration of blue condensation of methylene with material ProRoot MTA observed and noted with scale mm.



Gbr 11 . Depth of penetration of blue condensation of methylene with material Bio MTA observed and noted with scale mm.

Gotten apical leakage average yield from material ProRootMTA and BioMTA as component of retrograde at action apikoektomi seen at tables 1.

Tables 1. Measurement average yield of Solid apical leakage of retrograde

No	Material	n	$\bar{x}$ ± SD
1	ProRootMTA	10	2,4 ± 0,282
2	BioMTA	10	0,912 ± 0,197

Research data is analysed with test t-test with ? = 5% to know difference result of measurement of apical leakage from material ProRootMTA and BioMTA as component of retrograde. Condition which must be fulfilled in testing t-test is normality test and homogeneity test at research data.

Data normality is done to applies test Shapiro-Wilk and gotten [by] value p=0,351 (p> 0,05) (enclosure). Data homogeneity test applies Levene's Test and gotten [by] value p=0,600 equal (p > 0,05) so that data - this data expressed homogen. Normality test and homogeneity in this research has fufilled, causing can be continued to test t-test (tables 2).

Tables 2. Test result t-test measurement of solid apical leakage of retrograde

	df	Sig. (2-tailed
Level of leakage	18	.00

Test result t-test shows there are difference which signifikan/ haves a meaning (of) result of measurement of apical leakage from material ProRootMTA with BioMTA as component of retrograde. The thing shown by signifikansi 0,000 (

p < 0,05). The result express there are apical leakage difference from material ProRootMTA with BioMTA as component of retrograde at action of acceptable apikoektomi of itsthe truth.

Solution

At treatment failure case of non surgical operation like at re- treatment is root channel, dissected treatment with solid material of retrograde can become good choice. In vitro research often done to evaluate apical closing leakage, but correlation between leakages happened around solid material of retrograde and effect in klinis still be questioned and butuh further research (Roux dkk., 2002).

Apical leakage of tooth post apikoektomi can cause the entry of its(the pathogenic bacteria and product into root channel system causing causes the happening of reinfection. Apical closing is a real important factor in operating on endodontik (Torabinejad dkk., 2010).

Intention of this research is to compare apical leakage of material ProRootMTA and material BioMTA as component of solid of retrograde at action apikoektomi. Both this material checked by the way of seeing apical leakage at equipment of stereo microscope. Test result t-test applied at calculation result of statistic shows difference having a meaning (of) between leakage averages from material ProRootMTA with leakage average from material BioMTA as component of solid of retrograde at action apikoektomi. Result of observation microscopically seen that solid of retrograde applies material ProRootMTA and material BioMTA proves that material BioMTA experiences apical leakage smaller than material

ProRoot MTA. The result as according to opinion Song. IS (2011) what indicates that apical leakage of material BioMTA smaller than material ProRootMTA.

Existence of apical leakage at MTA is caused [by] composition difference, particle size, powder ratio and water, ossification stripper, condition of damp, temperature and srinkage at solid of retrograde material (Lee dkk., 1993; Torabinejad dkk., 1995). Apical leakage difference happened at second usage of the retrograde material because of difference of base furnish. Base Goods ProRoot MTA contains portland cement and calsium sulfate dihidrate or gypsum while at BioMTA is reagent purified and doesn't contain portland cement and calsium sulfate dihidrate or gypsum. Elementary furnish from ProRoot MTA and BioMTA influences polimerisasi/ setting from masing - masing MTA material. Polimerisasi/ setting material BioMTA experiences srinkage or smaller expansion. On the contrary at material ProRoot MTA which base barium portland cement and gypsum causes srinkage or expansion larger ones at the time of abundant Ekspansi polymerize will increase the happening of root fracture. so result of this examination as according to opinion Chang dkk (2011).

Smaller material particle size MTA will yield mixing which more homogen, meminimalisir trap of air and lowers porosity. Particle Size ProRoot MTA before done [by] mixing 6,9 ? m. Smaller compiler particle size, will increase surface contact and will water down in mingling it. While BioMTA is circulating now has measure which 2,0 ? m. This smaller measure than diameter measures tululus dentinalis, so that inferential that MTA has ability to close tululus dentine (Pariokh dkk., 2010; Sarkar dkk., 2005).

Difference of concentration of between powders and dilution when done mixing will have an in with difference of level of condensation. Concentration of powder and dilution of material ProRoot MTA has comparison of powder and water 3:1 according to its(the factory guide with packaging of powder 1 gram (0,035 ounce) and dilution 1cc but at the time of research of number of powders ProRoot MTA only be taken thinks - thinks as of tip of cement spatel and dilution decanted by kedalam place of MAP the numbers only thought - thinks finite of konsentasi like putty. While concentration of powder and dilution of material BioMTA has stayed in packaging of 0,2 grams and dilution 0,1 cc with comparison of 1:1 in swirling above place of glass plate for once usage so that number of powders and dilution can be controlled. More and more comparison height of dilution to powder will result its(the rising level of condensation and material porusity. Material porusity happened because snare of air so that is formed bubble when mixing (Pariokh dkk., 2010).

Condition of area place of where MTA is application must in condition of damp causing can increase adaptation with root channel wall. At this research condition of dampness of ProRoot MTA and BioMTA taken care of its(the dampness by placing cotton wet palette during 24 hours. If condition of area run dry hence will have an effect on to compression strength, strength of Fleksural and strength pushs from MTA will go down. This thing can cause escaping it MTA after application so that result of his(its less maximum (Pariokh dkk., 2010).

Influencing environmental temperature is time setting MTA, with higher level area of its(the temperature, hence time setting will become quicker, that is having an in with when condensation process or release of H2O and polymer former (Aggrawal dkk., 2011). At this research, all sample which has been solid material ProRoot MTA and BioMTA kept in incubator with temperature 37oC, so that its(the setting time much the same to with practice of in medical of tooth which in the application of his(its using temperature in buccal cavity with body temperature around 37˚C.

According To Lee dkk (1993) ossification stripper of ProRoot MTA is assumed by equal to ossification process of cement portland. This because of existence of cement content potland and gypsum, but because the low of sulphuric content and number of its(the aluminas a few, hence reaction of calciums aluminate and calcium sulphate formed also very few and this influences ossification stripper of strength and tying initially. Ossification start of ProRoot MTA 74 minutes while at BioMTA 180 minutes and ossification end of time ProRoot MTA 210 minutes while at BioMTA 360 minutes.

Bio MTA is material grafting root channel which reagent base barium purified forms tying fisikokimiawi happened at the time of this penetrating pasta into root channel wall, supported by hydrophilic so that is not affected by condition of damp root channel like blood or exudate and doesn't cause srinkage because of its(the expansion coefficient 0,09 smaller compared to ProRootMTA 2,78. This thing causes time setting BioMTA to become shorter compared to ProRoot MTA.

Closeness character of BioMTA is influenced by particle size with granulation 2,0 μm which is softer compared to ProRoot MTA so that BioMTA can be penetrating into tubuli dentine and merges x'self at surface where BioMTA is application and can prevent micro leakage by forming layer interfacing hydroxyapatite (Hap) thicker patchs at root channel dentine wall between both the surfaces compared to ProRoot MTA of the size particle 6,9 μm (Chang dkk , 2011; Song., 2011). Therefore material BioMTA has better apical closing closeness compared to material ProRoot MTA because earning is lax goodness with root channel wall.

CONCLUSION AND SUGGESTION

Conclusion

1. There is apical leakage difference of solid material of retrograde by using material Bio MTA and material ProRoot MTA. Solid material of retrograde applies Bio MTA and or ProRoot MTA to give different result if it is seen from the angle of apical leakage applies blue of methylene in set of mm.

2. Material ProRoot MTA had higher leakage number at material Bio MTA if it is applied as component of solid of retrograde at action apikoektomi.

Suggestion

Need to be performed a research of continuation to get material and or way of operation of volume to increase ossification time , biokompability and physical character required by material Pro Root MTA and Bio MTA in clinic.

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