Treatment of dental perforation during endodontic retreatment using a novel MTA-based reparing material.

Prof. Dr. Mario Luis Zuolo

Root perforation is defined as a mechanical or pathological communication between the periodontal apparatus of the tooth and the root canal system and they are caused by iatrogenic events in most cases.

There has not been any available evidence-based guidelines for the most effective way to manage this form of iatrogenic complication (1). According to Siew et al 2015, a favorable prognosis may be obtained by reparing the perforated root nonsurgically, with an overall chance of success of about 80,9%, when using MTA based material. However, MTA also has some disadvantages. Because of its consistency, its manipulation and placement in the site of repair can be challenging. Additionally, its use can cause discoloration of the tooth (2). A new material MTA REPAIR HP – "High Plasticity" MTA (Angelus®,Brazil) has recently been introduced with the intent to improve some of those characteristics (3). This new formula maintains all the chemical and biological properties of the original MTA. Nevertheless, it changes its physical properties of manipulation, resulting in a greater plasticity, facilitating manipulation and insertion. Additionally, its formula uses a different radiopacier calcium tungstate ($CaWO_4$) instead of bismuth oxide, that according to the manufacturer, does not cause staining of the root or dental crown.

The purpose of this report was to present the results of 2 dental perforation cases treated during endodontic retreatment using a new MTA-based repairing material.

Materials and Methods

Selection, diagnosis and retreatment protocol

The experimental study was conducted on 2 teeth of 2 adult patients aged between 33 a 55 years who were referred to our private practice, São Paulo, Brazil, from December 2014 to August 2015 for endodontic retreatment. The diagnosis of perforation was confirmed by clinical visualization using dental operating microscope (DOM) during retreatment of the teeth. The retreatment approach used represents the standard technique in all cases (4). All the teeth showed a radiolucent lesion associated to the defect. Location of each perforation was determined and recorded using a calibrated periodontal probe.

Perforation Repair Protocol

The treatment approach used represents the standard technique (4):

i) endodontic retreatment: the perforation was filled prior to obturation of the canals so as to prevent filling material from being forced into the region of the defect;

ii) heat cautery was used to removal of granulation tissue;

iii) decontamination of the perforation with an ultrasonic tip E3D (Helse, Brazil) and irrigation using chlorhexidine 2% (Formula & Ação, Brazil) and physiological saline solution was used (Fig 1);

iv) Preparation of MTA Repair HP was done according to the manufacturer's recommendations. The material was gently guided into the defect using an endodontic explorer and condensed with an appropriately sized endodontic condenser (Fig 2);

v) hardening of the MTA Repair occurred after 10-15 minute

vi) a small amount of glass ionomer was used to cover and protect the material after the curing of the MTA Repair.

The provisional restoration was performed in such a manner that it was well adapted to canal walls and with adequate proximal contacts, preventing dislodging between operative sessions. The final restorations were performed in a period of 7-14 days later. A final x-ray was taken immediately after the endodontic procedure.

Follow-up Examination

The findings of clinical controls were performed by the two authors 12 months after retreatment in order to check the absence of periodontal defect in the area of perforation, of pain, of swelling, of sinus tract . The type and quality of restoration were also verified. The quality of the coronal restoration was assessed clinically by visual and tactile inspection by DOM as well as by x-ray. Radiographs were coded, stored and subsequently assessed by designated examiners. Preoperative, post-treatment, and follow-up radiographs were examined independently in a random sequence. Clinical and radiographic criteria to categorize each tooth was done using the following criteria: healing - grouped in into two types, i) complete (absence of periapical radiolucency and absence of signs/symptoms), ii) incomplete (advanced reduction of periapical radiolucency size and absence of signs/symptoms), or treatment failure (presence of pain, swelling, a sinus tract, periodontal pocket, and unchanged periapical radiolucency) (4).

Results

At the 12 month recall radiographic evaluation showed that 2 cases exhibited complete healing (Fig 3, 4) with intact PDL space .

Discussion

These cases report show that perforations can be repaired successfully with MTA Repair HP. In these clinical report, precise identification of the location of a perforation with the use of DOM can help to enhance disinfection and the achievement of a good sealing at the defect region . The use of a modified MTA (MTA-BIOCERAMICS-based high- plasticity reparative cement) has shown positive clinical results considering the short follow-up period observed. From a clinical point of view, the handling and placement of the MTA REPAIR HP was easier than the conventional MTA. Adequate restoration of the tooth after endodontic reintervention is fundamental in the healing process of periradicular tissues. In all cases of this study a final restoration was in place in the follow up with no clinical/radiography signs of leakage.

The importance of clinical cases is to show that it is possible to repair perforations defects using scientific-based clinical protocols of treatment. Reports from dentists have played important roles in the field of dentistry but should be validated using adequate laboratory and clinical research studies. In conclusion, the clinical protocol using the new MTA REPAIR HP described in these case reports was effective to repair for root perforations, suggesting it is a worthwhile attempt to save the affected teeth.

References

1. Siew K, Lee AHC, Cheung GSP. Treatment outcome of repaired root perforation: A systematic review and meta-analysis. J Endod. 2015;41(11):1795-1803.

2. Felman D, Parashos P. Coronal tooth discoloration and white mineral trioxide aggregate. J Endod. 2013; 39(4):484-7

3. Angelus. MTA REPAIR HP. http://angelus.ind.br/MTA-REPAIR- HP-292.html. Accessed April 4, 2016

4. Zuolo ML, Kherlakian D, de Mello JE, Fagundes MIRC, Carvalho MCC. Reintervention in Endodontics. Quintessence ed Ltda 2014, pp:205-238

Figure 1 - Initial x-ray with perforation of the palatal wall

Figure 2 - Visualization of the defect after removal of the granulation tissue and decontamination

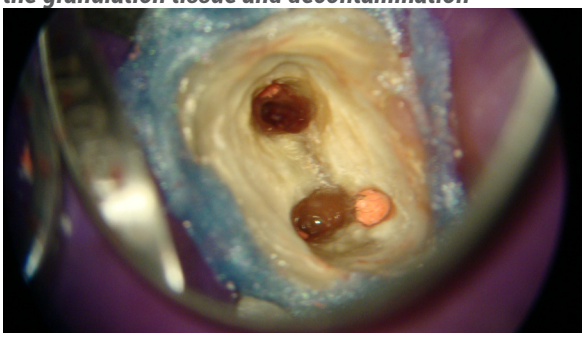

Figure 3 - MTA Repair HP positioning

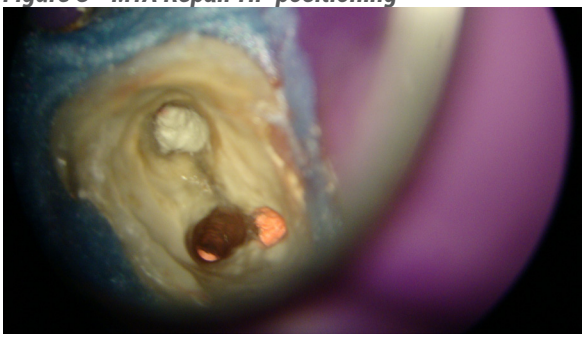

Figure 4 - Retreatment and repair of post preparation perforation (palatal wall)

Figure 5 - Complete cure (control for 1 year). Note bone neoformation and the integrity of the periodontal ligament space

Figure 6 - Initial radiograph of a mandibular molar showing furcal bone loss at furcation

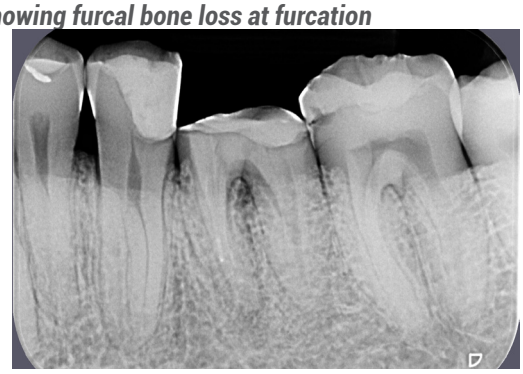

Figure 7 - Retreatment and repair of a lateral root perforation (mesial-strip perforation)

Figure 8 - 12 months follow up showing bone repair