Case Report

International Journal of Dental and Health Sciences
Volume 05,Issue 04

PERFORATION AND STRIPPING REPAIR WITH MINERAL TRIOXIDE AGGREGATE AND BIODENTINE : 2 CASE REPORTS

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ABSTRACT:

Abstract: the main objective of these 2 case reports is to highlight the choice making between Mineral Trioxide aggregate and Biodentine in management of root canal stripping and root canal perforation with consideration of clinical and histological previous findings. In the 2 case reports stripping and perforation were iatrogenic errors that occurred within endodontic treatment performed by students.

Key words: root perforation, stripping, Mineral trioxide aggregate, Biodentine

INTRODUCTION:

Endodontic perforation is a pathologic or iatrogenic communication between the root canal system to the supporting tissues of teeth or to oral cavity [1]. It can occur accidentally during access cavity preparation, search for root canal orifices in calcified root canals or following an excessive instrumentation of the root canal walls resulting in loss of radicular dentin in the coronal two-thirds of the tooth known as stripping perforation [2,3].

Root canal stripping and perforation predispose root to fracture and lead to inflammatory processes in the tooth periodontal attachments with proliferation of granulomatous tissue. Immediate sealing of the perforation site is required to control bacterial infection and to maintain periodontal health of the tooth. Perforations close to crestal bone show a greater bacterial contamination risk from the oral environment along the gingival sulcus and this worsens prognosis of treatment [4,5].

The introduction of bioactive materials such as Mineral Trioxide aggregate (MTA) provided a repair possibility of undesirable pathways of communication between root canal and periradicular tissues. Biodentine is a relatively new calcium-silicate based material recommended used for root perforation repair [6,7].

MTA and Biodentine are two bioactive and biocompatible materials with reported good outcomes in perforation seal and healing of periodontal tissues. Eventough, conflicting findings about each material behavior in relation to endodontic procedures were reported, therefore selection of the adequate root canal material repair must be decided

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function of perforation location, inflammatory conditions, one or many appointments required for endodontic treatment. [8,9]

CASE DETAILS:

Case report 1

A 40 year old male patient was referred for acute spontaneous pain in relation to the maxillary left first molar #26. The tooth showed sensitive response to cold, percussion test was negative. Diagnosis was acute pulpitis. Pulp extirpation was achieved under local anesthesia and rubber dam isolation. The first mesio-buccal (MB1), the second mesio-buccal (MB2), the distal and the platal root canals were instrumented using Protaper Universal system (Dentsply, Maillefer, Baillagues, Switzerland) in association with sodium hypochlorite and Ethylene Diamine tetra acetic Acid (EDTA) irrigations.

While drying the second mesio-buccal root canal (MB2), a continuous bleeding was visible along the absorbent paper point. A pre-curved K file 15 was introduced into the coronal third of (MB2) and periapical radiography was taken to investigate bleeding origin. An iatrogenic communication with peridontum in furcation area was confirmed.

All root canals were filled with lateral condensation technique of gutta-percha points combined with zinc oxide-eugenol sealer. The perforation site was protected from filling materials contamination using sterile cotton pellets. Bleeding in the perforation site was controlled with copious irrigation with 2% sodium hypochlorite(NaOCL) and compressive application of sterile cotton pellet for 5minutes.

calcium hydroxide was left for 7days in contact with the perforation site. In the second appointment, calcium hydroxide was carefully removed with sodium hypochlorite rinse, the perforation site was assessed and dried with sterile absorbent paper points, there was no blood or exudation before the Biodentine was applied. Biodentine (Septodont, St Maur-des –Fossés, France) was mixed according to manufacturers instructions, the material was compacted into the defect , and a periapical radiography was taken to control marginal adaptation of the repair material.

The tooth was temporary filled with Biodentine, definitive coronal restoration was performed with resine composite. At the 6-month and the 1 year recalls, the tooth remained asymptomatic with no pain, no response to percussion and palapation, periodontal probing depth remained normal and no radiolucency was detected in the furcation area around the repaired perforation.

Case report 2

A healthy 22 years-old female was referred for management of the mandibular right second molar #47. Clinical examination of #47 revealed presence of an extensive occluso-buccal decay , the tooth was asymptomatic at the time of consultation, cold test was positive. Radiographic examination revealed a penetrating decay in the pulp

chamber and no modification in the bone aspect around tooth #47.The tooth was not tender to percussion, palpation or biting. tooth#47 was with irreversible pulpitis.

The working length of the distal, the mesio-buccal and the mesio-lingual canal was determined radiographically, the root canals were cleaned and shaped using a crown-down technique with Nickel-Titanium Protaper instruments. While drying the mesio-buccal canal, blood impregnation of the paper points was observed at the coronal third of the same canal. A manual K-File 15 was introduced in the mesio-buccal canal revealed that the root-canal curvature was not maintained, and a thickening of the mesio-bucal canal wall close to furcation area.

At the same appointment, the mesio-lingual and the distal canal were filled using the lateral condensation technique. Calcium hydroxide was used as a temporary dressing in the mesio-buccal canal. After 7days canal medication was removed, the mesio-buccal root canal was re-entered and irrigated with 2% sodium hypochlorite.

After been dried, the mesio-buccal root canal was filled with cold lateral condensation of gutta-percha with zinc oxide-eugenol sealer. Gutta- percha was thermally removed from the coronal third of the mesio-buccal canal with the use of a heated vertical plugger. Mineral Trioxide aggregate (Pro Root MTA, Tulsa, DentsplyMaillefer, USA) has been applied with an amalgam carrier, and carefully compacted along the empty space in the coronal third, no marginal defect was detected on periapical radiography.

A moist cotton pellet was placed in the pulp chamber to stimulate MTA setting. The access cavity was temporarily sealed with Cavit, glass-ionomer and composite filling was placed in a different appointment.

At the 1year and the 3years follow-up, tooth #47 remained asymptomatic, with no periodontal probing depth. Radiographic evaluation showed no radiolucency or desmodontal space enlargement in relation to the furcation area.

DISCUSSION:

Root canal perforations require an immediate closure to ensure a better treatment prognosis, non surgical approach can provide good results if adopted for small and conventionally accessible perforations. [10]

Success of perforation repair depends as well on a good seal of the perforated site with a biocompatible material that contributes to the well-being of the periodontal ligament. favorable outcome of perforation repair is identified by a maintain of the periodontal health in juxtaposition with the perforation site, and absence of any persistent inflammation or bacterial infection, therefore proper disinfection and achievement of good seal for the perforation site are important in ensuring a successful outcome. [11, 12]

Both of MTA and Biodentine provided good histologic results in relation to

furcation perforation repair, however MTA showed a greater tickeness of induced mineralized tissue. conflicting results exist about bacterial leakage of MTA and Biodentine, a study conducted on furcal perforations seal in primary molars revealed that Biodentine showed lesser microleakage compared to MTA, whereas another In Vitro study reported that there was no notable difference between the two materials. [13, 14]

The major disadvantage of MTA is its long setting time wich results in a washout of newly placed MTA by immediate irrigation procedure. In addition, sodium hypochlorite might have an effect on the higher push-out bond strength values of MTA, therefore sodium hypochlorite can be considered for single-visit procedures if MTA is for perforation repair. In contrast, resistance to dislodgment of Biodentine is not influenced by endodontic irrigants. [15,16]

In the light of these findings the stripping perforation repair was performed with MTA because of the location in the coronal third of the stripping wich allow the use of repair material after achievement of the root canal disinfection and filling.

MTA showed altered microstructure and physicochemical properties in a low-pH environment, this condition is encountred when the material is in contact with inflamed tissues. Perforations in communication with crestal bone in the furcation area have the worst prognosis, potential of the supporting tissues breakdown and subsequent pocket formation are higher. [17, 18]

It was suggested that Biodentine is a promising biomaterial for the furcation perforation repair, this is argued by the greater amount of mineralized tissue formation in this area. Sealing the perforation with Biodentine in the case report 1 was with favorable outcomes, wich joins the previous findings. [19]

CONCLUSION:

Mineral trioxide aggregate (MTA) and Biodentine are both used for root canal perforation repair, previous studies revealed dome differences in the two materials behavior in relation to stripping and perforation conditions. The two case reports detailed above allow to practitioner a better comprehensive attitude toward these iatrogenic communications and illustrate the decision making between MTA and Biodentine function of the encountered situation.

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FIGURES:

Case report 1

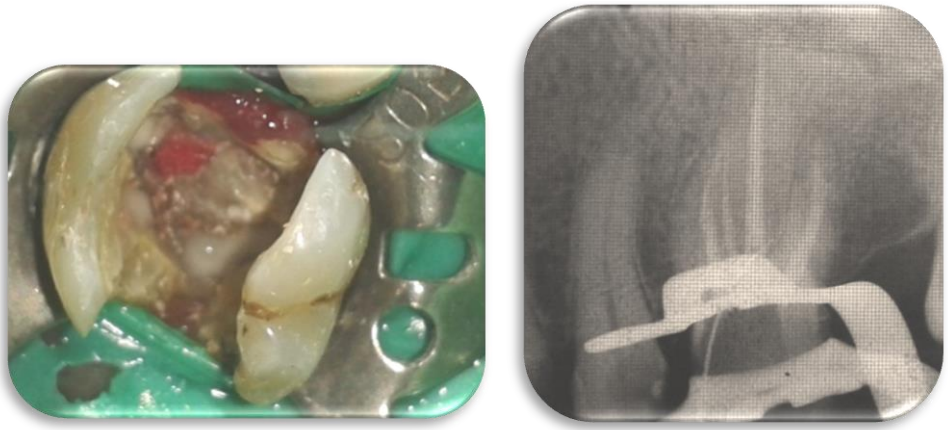

Figure 1: Photography showing bleeding in the entrance of the MB1 canal of #26. K-file 15introduced in the bleeding site confirms presence of an iatrogenic communication with periodontum in the furcation area.

Figure 2: perforation repair with Biodentine.

Figure 3: 1year later radiograph shows no periodontal attachment loss in the furcation area.

Case report 2

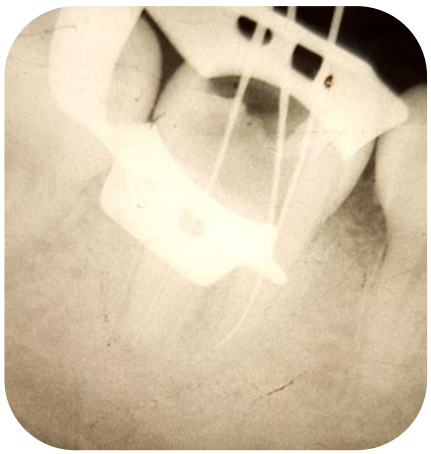

Figure 4: intra-operative X-ray for working lengths of #47.

Figure 5: intra-operative X-ray for gutta-percha master cones adjustment control confirms presence of stripping in the mesio-buccal canal of #47.

Figure 6: radiographic control of root canal fillings of #47.

Figure 7: Stripping repair with MTA in the mesio-buccal canal after thermal section of gutta-percha to allow deep insertion of the repair material.

Figure 8: A 2 years recall radiograph showing absence of insertion loss of #47.