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RETROGRADE POTENCY USING MTA PLUS IN MAXILLARY LEFT LATERAL INCISOR- A CASE REPORT

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Abstract:
This case report represents an endodontic surgery of a maxillary left lateral incisor in which MTA Plus was used as a root end filling material which resulted in healing of the lesion at 1 year with absence of clinical symptoms and radiographic evidence and regeneration of the periapical tissues. The follow up was taken and recorded properly using radiovisographic and cone beam computed tomographic evaluation at 6months-9months - 12months respectively.
Keywords; Apicoectomy, Retrograde filling material, MTA Plus, Cone beam computed tomography

Introduction

In the modern era, many factors contribute to the success of endodontic surgery such as case selection, instrumentation technique, type of obturating material. By Surgical Endodontics, one refers to that branch of dentistry that is concerned with the diagnosis and treatment of lesions of endodontic origin that do not respond to conventional endodontic therapy or that cannot be treated by conventional endodontic therapy. The scope of surgical endodontics is to achieve the three dimensional cleaning, shaping and obturation of the apical portion of the root canal system which cannot be treated via an access cavity, but only via a surgical flap. Apical surgery belongs to the field of endodontic surgery that includes incision, drainage, closure of perforations, and tooth or root resections. The objective of apical surgery is to surgically maintain a tooth that has an endodontic lesion which cannot be resolved by conventional endodontic retreatment which is achieved by root end resection, root end cavity preparation, and a bacterial tight closure of the root canal system at the cut root end with a retrograde filling. To do this it is necessary to resect the apical part of the root to gain access to the root canal. The aim of resection is to present the surface of the root so that the apical limit of the canal can be visually examined and to provide access for retrograde cavity preparation. Approximately 3 mm of root is removed which will include almost all lateral canals.[1,2,3]

Kim and Kratchman classified periradicular lesion into categories A-F;

- Type A, B and C-represents lesion of endodontic origin and are ranked according to increasing size of periradicular radiolucency lesion type.

Type D,E and F-represent lesion of combined endodontic-periodontal origin and are ranked according to the magnitude of periradicular breakdown[4]

Retrograde filling materials such as amalgam, gutta percha, zinc-oxide eugenol cements (IRM, Super-EBA),Glass ionomer cements, composite resins, compomers, diaket, Ceramicrete, Bioaggregate, etc.

are commonly used in endodontic surgical procedures.

The properties of the ideal root-end filling material are as follows:

- ✓ Biocompatibility,
- ✓ Promotion of tissue regeneration without causing inflammation,
- ✓ Ease of handling,
- ✓ Low solubility in tissue fluids,
- ✓ Bonding to dental tissue,
- ✓ Non-absorbable,
- ✓ Dimensional stability,
- ✓ Radio-opacity and
- ✓ No staining of surrounding tissues.

Mineral trioxide aggregate (MTA) was developed for use as a dental root repair material by Dr. Mahmoud Torabinejad, it is based on portland cement combined with bismuth dioxide powder for radiopacity. MTA is used for creating an apical plug during apexification, repairing root perforations during root canal therapy and treating internal root resorption and can be used as both a root-end filling material and pulp-capping material. Originally, MTA was dark gray in color, but white versions have been on the market since 2002.

MTA is composed of 1. tricalcium silicate, 2. dicalcium silicate, 3. tricalcium aluminate, 4. tetracalcium aluminoferrite, 5. calcium sulfate and 6. bismuth oxide. The later 4 phases vary among the commercial products available.

Newly developed fast set MTA Plus was developed by Pozzolan Cement or Zeolite Cement. These were used by pozzolanic reaction. Pozzolan Cement is a mineral aggregate with watery calcium silicate hydration. MTA Plus is washout resistant. .[5,6]

This case report describes the apicoectomy of a maxillary left lateral incisor using MTA Plus as a retrograde filling material.

CASE REPORT

A 32 year old male patient reported to the Department of Conservative Dentistry & Endodontics with a chief complaint of pain in the upper left front tooth region. On clinical examination, the teeth responded positive to percussion and radiological examination revealed periapical radiolucency with extrusion of gutta percha in the apical portion. A preoperative cone beam computed tomographic examination of the patient was done to identify the accurate location and measurement of the lesion.(Fig.1,2)

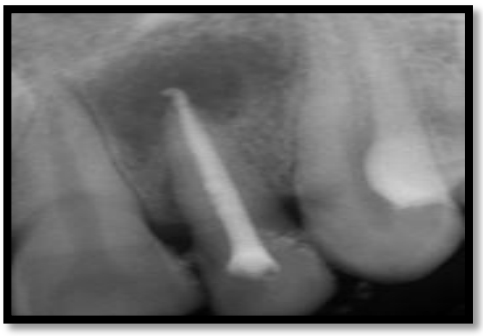

Figure 1: Pre-operative radiograph

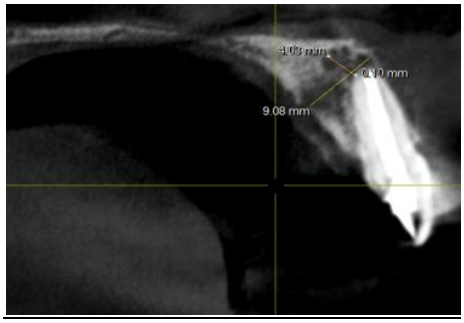

Figure 2: Preoperative cbct

SURGICAL PROCEDURE

Oral antimicrobials were prescribed to prevent systematic disease and also to prevent postoperative infection.The patient was anesthetized with 2% Lignocaine with 1:80,000 adrenaline.Surgical procedures like flap design and elevation was done. Relieving incisions were made on sound bone i.e, a sulcular and mucogingival incisions were made with Surgical Blade (SM-64 and SM-67), Flap elevation was done using Elevator (DISC SHAPED ELEVATOR OR DISSECTOR).An assessment of the length of the root and its axis was done radiographically to remove bone from the desired site. Osteotomy was performed by using no-4 and 6 round carbide bur with Impact Micro-motor handpiece and curette (DISK SHAPED CURETTE-1.5mm) was used for periradicular curettage. The apicoectomy was simulated by cutting the apical 2 mm of the roots with a diamond fissure burr size 1.0 mm using sterile saline for cooling. The root-end cavities were prepared to a depth of 3 mm with a tungsten carbide fissure bur with a diameter of 0.8 mm, parallel to the canal, leaving a 3 mm deep root-end cavity free of gutta percha. Sterile saline in a syringe was used for cooling.

Prepared root end cavity was dried with irrigator/drier and filled with material such as Mineral Trioxide Aggregate Angelus, followed by placement of a bone graft to induce bone

regeneration. Adaptation of filling material was confirmed by using radiograph. A careful debridement of the bony crypt was made to ensure that haemostatic agents, root-end filling material and debris are removed.

Radiographic verification of the quality of the root end filling is appropriate before wound closure. The soft tissue flap was then re-apposed with sutures as optimum healing is being achieved with primary closure. After suturing, the tissues were compressed with damp gauze for 3–5 minutes The patient was then asked to follow post operative instructions such as to apply cold compresses with an ice pack for the first 4–6 hours after surgery, followed by mouth rinses to maintain a good oral hygiene. The patient was also prescribed antimicrobials for 5 days.. Sutures were then removed after 4-7days post-operatively (providing the wound was stable), i.e when reattachment of the periodontal fibres at the gingival margin had taken place. In addition, the healing progress was checked and recorded properly. After whole procedure, the patients were then recalled at 6 months-9 months-1year to assess the clinical and radiographic signs of healing by use of Cone Beam Computed Tomography (FIG.3,4,5)

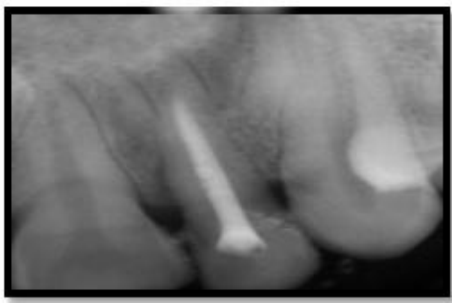

Figure 3: 6months follow up

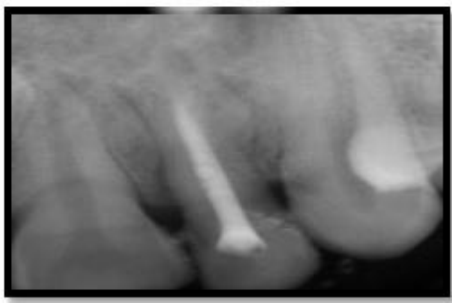

Figure 4: 9 months follow up

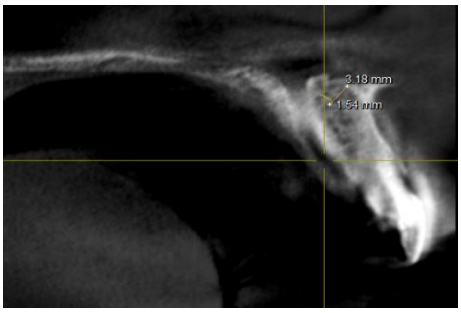

Figure 5: 12months follow up

DISCUSSION

The scope of surgical endodontics is to achieve three dimensional cleaning, shaping, and obturation of the apical portion of the root canal system, which is not treatable via an access cavity, but only accessible via a surgical flap. Apical surgery is not a substitute for incomplete debridement or poor endodontics, Nygaard-Ostby in 2010 have also agreed and said that surgical endodontics must be reserved for those cases in which preparation and obturation of the root canal appear impossible from the beginning or when nonsurgical retreatment attempts have failed. The only difference between surgery and conventional therapy is the approach; cleaning, shaping, sterilizing, filling, and sealing the canal are the same. In endodontic surgery, these procedures are simply conducted at the end of the root instead of the crown.[7]

The quality and durability of any dental material are a key component for the survival of a restoration in clinical conditions; the marginal adaptation and the intimate contact at the interface with the surrounding tissues (dentine and enamel) are determinative features. MTA is a biocompatible cement with several clinical applications in endodontics. The major components of MTA are tricalcium silicate, dicalcium silicate, gypsum, and tricalcium aluminate. When mixed with water, tricalcium silicate and dicalcium silicate hydrate to form alkaline calcium silicate hydrate gel, which sets in a few hours.Calcium hydroxide in silicate matrix accounts for the high alkalinity and biocompatibility. Several studies have demonstrated the excellent physicochemical properties of MTA including the high sealing ability and adaptation to the dentinal walls, high radiopacity, and excellent tissue response. However, despite its good properties, MTA presented some undesirable characteristics such as long setting time, difficult manipulation, and insertion.[6,7,]

In addition a new imaging technique i.e, Cone-beam computed tomography (CBCT was used to assess the measurement of lesions at regular intervals. It is a new medical imaging technique that generates 3-D images at a lower cost and absorbed dose compared with conventional computed tomography (CT). CBCT images can be used to differentiate between apical granulomas and apical cysts by measuring the lesion's density[7]

The purpose of this study after apicoectomy was to establish an effective barrier between the root canal and the periapical tissues when a conventional orthograde seal was not possible. At 6 months of follow up, the radiographic evaluation showed blending of the surrounding bone which indicated osseous ingrowth in the hydroxyapatite material. At 9 months of follow up, the radiographic evaluation displayed uniform radiopacity followed by the follow up of 12 months.

CONCLUSION

MTA is an excellent biocompatible material.It has various exciting clinical applications as it has numerous qualities mandatory for an ideal dental material. MTA is required to be further explored by clinicians so that its advantageous properties can be practiced.

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