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Combined endodontic therapy in periapical surgery with Mineral Trioxide Aggregate (MTA) and bone graft: A case report

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***Abstract*— A successful endodontic therapy depends upon complete knowledge of the anatomy and the variations present in the human dentition. C-shaped canals with different configuration are common in single rooted mandibular second molars. This case report presents the successful endodontic management of mandibular second molar tooth with a single root and a single canal.**

***Keywords*—Root Canal Therapy, Periradicular Surgery, MTA, Bone Graft.**

I. INTRODUCTION

Inspite of advancements in the field of dentistry, treatment of endodontically involved teeth with large periapical defect still remains a difficult task for a dental surgeon. Periradicular surgery is the treatment of choice to preserve a tooth when endodontic treatment is impossible/failed. Associated disruption of the cortical plate and existence of dentoalveolar sinus tract results in poor prognosis of the involved tooth[1].

The technique and type of root-end filling materials used are of great importance in this treatment; using an optimum root-end filling material has a critical effect on the success of endodontic surgery.

The main goal of using root-end filling is to achieve an apical seal, preventing egression of infectious content of root canal toward the surrounding tissues. In such cases, repair process is dictated not only by a hermetically sealed retrograde obturation, but also the hard tissue dimensions of the remaining marginal and periapical bone tissue[2]. Delay or alterations in healing have been reported when lesion size is greater than 5 mm[3]. The concept of regenerative therapy entails utilization of periosteal grafts with the potential to stimulate bone formation. It allows cellular regrowth of defects caused by pathosis or surgical trauma[4].

Likewise, different studies have demonstrated that this technique can also be successfully applied in endodontic surgery as these materials act as reservoir and matrix for deposition of new bone[5]. Thus this case report presents the successful management of periapical lesion with MTA and Bone graft.

II. CASE REPORT

A 20 year old male patient reported to the Department of Conservative dentistry and Endodontics, with the chief complaint of recurrent discharge of pus in relation to upper left anterior tooth since 4 to 5 months. He gave a history of trauma 2 years back. No contributory medical history was reported with the same. An intraoral examination showed presence of sinus with pus discharge in maxillary left lateral incisor region (Figure 1). There was no pain on percussion and no tenderness in the periapical region. A non-vital response was elicited from left maxillary central and lateral incisors on using thermal and electric pulp tester. Intra oral periapical radiograph revealed an oval shaped periapical radiolucency involving the periapical area and apical two-third of roots of left central and lateral incisors (Figure 2).

The case was diagnosed as periapical abscess with maxillary left central and lateral incisors. The treatment planned was Root canal therapy followed by periapical surgery, as there was constant pus discharge. Access opening was done after placement of rubber dam and working length was determined radiographically. Cleaning and shaping was done till # 50 H file (Dentsply Maillefer Ballaigues, Switzerland) in left central incisor and # 70 H file (Dentsply Maillefer Ballaigues, Switzerland) in left lateral incisor. Post operative radiograph revealed that a 20 no. 0.02 taper GP cone (Dentsply Maillefer Ballaigues, Switzerland) was extruded periapically in lateral incisor (Figure 3).

Routine blood investigations and oral prophylaxis were carried out before surgery. A trapezoidal mucoperiosteal flap was reflected using crevicular incisions with limiting vertical incision on distal aspect of right cental incisor and left first premolar under local anesthesia (1:200000 adrenaline, DJ Lab, India). After thorough curettage of the granulomatous tissue, the area was thoroughly irrigated using betadine solution (Nicholas Pvt. Ltd. India). Root end resection and retrograde filling was done using Mineral Trioxide Aggregate (Pro Root MTA; Dentsply, Tulsa; USA) (Figure 4 and Figure 5). Bleeding was induced from the bony cavity

and Biograft ® HA ceramic crystals (IFGL Bioceramics Ltd. Kolkata, India) were directly compacted into the bony defect (Figure 6). The mucoperiosteal flap was approximated with using 3-0 black silk suture material (Sutures India Pvt. Ltd, Karnataka, India). Periopack (Coe Pak GC Europe, Belgium) was applied on the surgical area.

Immediate postoperative radiograph revealed satisfactory bone fill in the defect area (Figure 7). Sutures were removed by the end of first week and there was uneventful soft tissue healing. Clinically, by end of first month there was absence of pus discharge and complete healing of the sinus tract (Figure 8). Subsequently, radiographs were taken at 1 month (Figure 9), 3 months (Figure 10) and 6 months (Figure 11) interval which demonstrated increasing levels of radiopacity signifying successful uptake of graft and positive bone regeneration.

III. Discussion

This Bone grafts can be used to achieve favorable healing and regeneration of the periapical defect area after degranulation[6]. In endodontic surgical sites these materials are employed with the intention to act as bone fills and scaffolds which facilitate wound healing, normal trabecular bone formation and prevent proliferation of the oral epithelium into such defects ensuring healthy clinical outcome[7]. Bone grafts are indicated in endodontic surgery as the high turnover rate of cells and rich blood supply warrants quick healing.

Biograft® HA is a bioactive glass composed primarily of silica, calcium, sodium and phosphorous. It is an amorphous, crystalline and completely absorbable material. Its principle mode of action is by osteostimulation which stimulates and accelerates new bone formation in an osseous defect. In addition the osteoconductive effect leads to new bone formation at the defect margin which penetrates to center of the graft[8]. Adjunctive effects include antimicrobial, anti inflammatory and haemostatic effect. These are a result of alkaline nature of cations released by the graft which ensures rapid healing. Biograft® HA has shown greater amount of new cementum and alveolar bone formation than other materials[9].

Assessment of success or failure after periradicular surgery is based on clinical and radiographic criteria. Post surgery patient showed uneventful healing and improvement in the status of tooth supporting structures. The positive effect of bone graft was clearly observed in succeeding radiographs. Results were in accordance to guidelines given by Wood NK, Goaz PW[10].

The present case report thus highlights the positive effect of bone grafting when used in conjugation with endodontic surgical procedure. It showed good clinical and radiographic signs of healing and may contribute to successful treatment of such cases.

IV. Conclusion

- The use of bone substitutes helps in rapid and qualitative bone regeneration when compared to natural healing.
- Hydroxyapatite crystals facilitated bone regeneration.
- In a clinical situation the use of bone substitutes will definitely enhance periapical regeneration.

Figure 1. Pre Operative Photograph with Sinus Tract

Figure 2. Pre-Operative Radiograph

Figure 3. Periapically Extruded Gutta Percha In Lateral Incisor

Figure 4. Retrograde Cavity Preparation

Figure 5. Retrograde MTA Filling

Figure 6.Bone Graft Placement

Figure 7. Retrograde MTA With Bone Graft

Figure 8. After 1 Month

Figure 9. After 1 Month

Figure 10. After 3 Months

Figure 11. After 6 Months

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