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Periradicular Surgey the Conservative Approach - Case Report

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Abstract: ***The main objective of apical surgery is to create an optimal environment for periradicular tissue healing. the most common type of periradicular surgery is apicoectomy associated with root-end filling, in which a portion of the apical root third is removed (3– 4 mm), and a cavity with the characteristics of Black's Class I cavity design (1) is prepared (retropreparation) and filled (retrofilling).The placement of bone graft and use of a membrane technique in guided tissue regeneration (GTR) is widely applied in surgical dentistry. The GTR principle involves the use of a physiologic barrier over the bone defect to preclude the oral epithelium or gingival connective tissue from growing into the bone space so that cells with osteogenic potential can repopulate the defective area. Many approaches to root-end preparation have been advocated, with variations based on access, root anatomy, armamentarium, and surgeon expertise and philosophy. Recent studies have reported favorable outcome for treatment of periapical defects using GTR. All these factors highlight a positive prognosis for the tooth after periradicular surgery, which is now considered a valid treatment to keep the tooth as a functional unit in the oral cavity.***

1. Introduction

Dental pulp is in close contact with the periodontium, either due to the presence of the apical foramen, lateral canals, accessory canals, and apical delta and inter-radicular canal, or by root perforations. In 1884, John Farrar indicated that root surgery was "a bold act, which removes the entire cause and which will lead to a permanent cure, may not only be the best in the end, but the most humane." Since that time, contemporary endodontic surgical procedures have become major considerations in the management of tooth roots and associated periapical disease. Although the development and refinement of these procedures had a long and tumultuous history, present-day concepts of endodontic surgery are still based heavily on what occurred globally over the past 130 years in this treatment modality.[1]The reported success rate for endodontic surgery ranges from less than 50% to as high as 90%. The ultimate goal of any endodontic surgery is to create a perfect seal between root canal space and periodontium thereby aiding the regeneration of periapical tissues; including a complete repair of osseous defects.[2]

It is important for securing optimum functional and esthetic outcomes in periapical surgery: flap design and the suturing technique used. Flap design in periapical surgery should be adequate for the planned surgical procedure, offering good access to the zone surrounding the affected apex without altering the circulation in either the mobilized or nonmobilized soft tissue. It depends upon the location and extent of the apical lesion, the periodontal condition of the affected tooth and of the adjacent teeth.[3]

Root end preparation and root end filling is a method of sealing the apical extent of the root canal system through cavity preparation in the resected root end and placement of a restorative filling material.[4]

During the last decade, new techniques and materials have been especially developed. These innovations, among other aspects, include the placement of human and/or bovine lyophilized bone and the use of ultrasound devices with stainless steel or diamond tips for apical retropreparation.[5]

MTA was developed by Torabinejad et al.[6]as a retrofilling material with better chemical, physical, and biologic properties. Studies have shown that a mechanical barrier such as a membrane or bone graft over the bone defect can prevent the oral epithelium and gingival connective tissue from growing into these defects. This facilitates the repopulation of osteogenic cells in the defective area, thus promoting bony healing after surgery. Guided tissue regeneration (GTR) techniques have been widely used for bone and periodontal tissue regeneration. In endodontic surgery, GTR has been applied using different bone substitute materials or different barrier membranes. The principles of GTR are based on the concept that if epithelial cells, that they migrate approximately ten times faster than other periodontal cell types are excluded from the wound space long enough for other cell types (as osteoblasts) with regenerative potential to become established, epithelial down growth is prevented and regeneration can be achieved. This can be obtained by using various barrier membranes with or without bone grafts. The objectives of the application of a "space making technique" in endodontic surgery resemble those in periodontology and implantology: (i) facilitate tissue regeneration by creating an optimum environment (stable and protected wound); and (ii) exclude non-desired fast proliferating cells from interfering with tissue regeneration.[7]

2. Case Report

A 45-year-old male patient, in general good health, presented to department of Conservative Dentistry and Endodontics, with a maxillary central incisor exhibiting vague, non-specific symptoms. Clinical examination showed slight discoloration of tooth and sinus tract formation with the tooth.[Figure 1] Patient had given history of trauma before 7 years. Radiographic examination (radiovisuography) revealed the presence of a small periradicular lesion of endodontic origin as probing depths were within normal limit. [Figure 2]

Figure 1

Figure 2

After completing root canal treatment, persistent clinical symptoms lead us to make a decision for surgical approach, then Surgical procedure was carried out. Preoperative mouth rinse with 0.2% chlorhexidine mouthwash was used for 1 minute. Local anaesthesia with lidocaine 2% with epinephrine 1:80,000 was achieved. ALuebke – Ochsenbein flap[Figure 3] was made by giving horizontal incision in the attached gingival tissue about 3 mm above the gingival margin, with two vertical releasing incisions on either side of the flap was gently reflected towards the apical area by periosteal elevator. [Figure 4]

Figure 3

Figure 4

The flap was frequently irrigated with sterile saline to prevent dehydration of periosteal surface. After complete elevation of the flap, debridement (periradicular curettage – enucleation) of the bony lesion was performed (Fig. 2C). For additional hemostasis during surgery, cotton pellets soaked in 0.1% epinephrine was applied topically as required. A 2-3mm root tip with a 0º to 10º bevel angle was sectioned with cylindrical surgical carbide burs with micromotor and adequate coolant. Root end preparations extending 3mm into the canal space along the long axis of the root was made by using ultrasonic retrotips. (dentsply)

Figure 5

Figure 6

Root end filling was done with mineral trioxide aggregrate (MTA). [Figure 5,6] The adaptation of the filling material to the canal apical walls was confirmed with the aid of an operating microscope at high magnification. After MTA retrofilling, Hydroxyapetite based bone graft [Figure 7] was placed and resorbable collagen membrane was applied [Figure 8] on buccal side as such that the membrane extends 2-3 mm in apical, mesial and distal area of the defect, at the time of membrane application it was made sure that the operated area is not dried and bleeding was induced by irrigating the area with normal saline to keep the operated area wet. After cutting the membrane in proper shape and size membrane was stabilized by applying gentle pressure with finger.

Figure 7

Figure 8

The flap was re-approximated and sutured with 5-0 reverse cutting black silk suture. [Figure 9]

Post-operative instruction given and patient was kept under Antibiotics and Analgesics. Patient was recalled at intervals of 7 days, 3 months [Figure 10] and 8 months. [Figure 11, 12]

Figure 9

Figure 10

Figure 11

Figure 12

3. Discussion

The ultimate goal of periapical surgery is the predictable regeneration of periapical tissues including a complete repair of the osseous defects.[8] Inadequate bone healing is caused by in growth of connective tissue into the bone space, preventing osteogenesis. In order to prevent this soft tissue in growth, bone substitute can be used to fill the bony space. The regeneration of bone following periapical surgery can be facilitated by placing bone graft into the periapical defects. It will also help to obliterate dead space in case of large bony defects. Because of the evidence of early osseous healing, subsequent orthodontic and prosthodontic treatment can be readily performed.[4]

It is generally thought that endodontic lesions, even with large periapical radiolucencies, can heal or regress after complete removal of the intracanal irritants by conventional endodontic treatment alone. However, additional surgery may be required if nonsurgical root canal therapy is unsuccessful in resolving the periradicular pathosis.[9]

Arens[5] reported that only root-end cavities prepared with ultrasound devices and their specific tips were able to produce safe cavities, which preserved the mineralized surfaces of the remaining apical third. In addition to these cares, it is important to keep the surgical site dry and completely free of any kind of tissue fluid or blood. MTA was developed by Torabinejad et al[10]MTAas a retrofilling material with better chemical, physical, and biologic properties than the existing materials at the time such as amalgam, intermediate restorative material, and super EBA. MTA is still considered one of the best of such materials. It is reported to show good sealing ability and a high degree of biocompatibility. In addition to the elimination of pathological tissues, periradicular surgery usually comprises root resection, preparation of root-end cavity and placement of a root-end filling material.[11]The demineralised bone matrix acts as an osteoconductive and possibly osteoinductive material.[12]To achieve better tissue regeneration, GTR principles using a barrier membrane and/or an osseous graft were recently suggested as an adjunct to endodontic surgery for endodontic-related defects. Particularly, with through and through periapical defects, some animal and clinical studies demonstrated the effectiveness of GTR techniques.[13]

Tobon et[14] al demonstrated that the combined use of bone grafting material in GTR procedures enhanced periapical tissue regeneration. The ultimate goal of any endodontic surgery is to create a perfect seal between root canal space

and periodontium thereby aiding the regeneration of periapical tissues; including a complete repair of osseous defects.

4. Conclusion

The primary endodontic treatment of a tooth may lead to high successful rates. When performing this procedure, at the time of intervention, the Endodontics specialist is not aware of the histological status of the periapical lesion. The injury kind and treatment success are strongly related. Periapical surgery is a viable alternative and often a last resort to surgically maintain a tooth with a periapical lesion that cannot be managed with conventional endodontic treatment.

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