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Surgical intervention: Saviour of a failed root canal treatment

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Abstract

Endodontic surgery is a safe option when teeth are not responding to traditional endodontic therapy and don't acquire favourable outcomes. Apicoectomy involves surgical management of a tooth with a periapical lesion which cannot be resolved by routine endodontic treatment. This paper reports a case of surgical removal of a periapical pathology due to failure of conventional endodontic treatment, persistence of pathology and fistula formation.

Keywords: Apicoectomy, mucoperiosteal flap, root end resection, retrograde filling, biodentin

Introduction

Apicoectomy involves the surgical management of a tooth with a periapical lesion which cannot be resolved by conventional endodontic treatment (root canal therapy or endodontic retreatment) [1]. Apicoectomy or root-resection technique (amputation of the root apex) has originated as a treatment for "pyorrhea alveolaris" complicated by a dental abscess as an alternative to dental extraction in the 19th century [2]. The decision to perform surgery is often debatable. Apical surgery is often the last hope to save an endodontically treated tooth with a periapical lesion. According to the updated guidelines by the European Society of Endodontology, indications for apical surgery comprise (1) radiological findings of apical periodontitis and/or symptoms associated with an obstructed canal (the obstruction proved not to be removable, displacement did not seem feasible or the risk of damage was too great), (2) extruded material with clinical or radiological findings of apical periodontitis and/or symptoms continuing over a prolonged period, (3) persisting or emerging disease following root-canal treatment when root canal retreatment is inappropriate, and (4) perforation of the root or the floor of the pulp chamber and where it is impossible to treat from within the pulp cavity [3].

The goal of apical surgery is to obtain tissue regeneration. This goal should be achieved by root-end resection, root-end cavity preparation, and a bacteria-tight closure of the root-canal system at the cut root end with a retrograde filling, completely debridement of the periapical pathology by curettage in order to remove any source of infection [1].

This article aims to report a clinical case of apicoectomy indicated due to conventional endodontic treatment failure.

Case Report

A 17 year old female reported to the department with pus discharge in relation to 11. The patient presented with a history of root canal treatment being done in relation to 11 followed by placement of PFM crown seven months back. Clinical examination revealed sinus, pus discharge and fenestration irt 11 (Fig. 1). On manual palpation of this area, active yellowish discharge oozed out and the tooth was tender on percussion. Radiographic examination showed the presence of endodontic treatment apparently well filled post and core and a radiolucent periapical area irt 11 PDL space widening with loss of lamina dura and bone loss irt 11 (Fig. 2). Apicoectomy was planned for the patient irt 11 and patient was informed about it. Blood investigations were done and reports were normal. To perform the surgical procedure, supraperiosteal and subperiosteal anesthetic techniques were adopted. The topical anesthetic used was benzocaine and the local anesthetic with epinephrine 1:100000 because its

anesthetic salt has the biggest anesthesia potential and duration. Patient was asked to complete one preoperative mouthrinse with 0.15% chlorhexidine.

Flap Design

According to the classic literature, the most commonly used mucoperiosteal flaps for apical access in the anterior part of the mandible are rectangular flap and trapezoidal flap. Considering the need for a better periapical exposure, trapezoidal flap was decided and full mucoperiosteal incision was planned. Two firm vertical releasing incisions were made distal to lateral incisor through periosteum to bone and a horizontal intrasulcular incision at obtuse angle was made which joined them. Reflection was done with a sharp periosteal elevator beginning in the vertical incisions, then raising the horizontal component. To reflect the periosteum the elevator firmly contacted the bone while the tissue was raised.

Root End Resection, Root End Preparation and Retrograde Filling

Reflection was done to a level adequate for access to the surgical site. On reflection it was found that cortical bone overlying the tooth had been resorbed exposing the root and soft tissue lesion (Fig. 3). Granulomatous and inflamed tissue surrounding the apex and root was removed with a curette. A straight fissure carbide bur was directed at acute angle to the long axis of the tooth to cut the apical 3 mm of the root and a bevel of 10 degree was made in faciolingual direction. After sectioning a trough was created around the apex with a round bur and inverted cone bur (Fig. 4) Biodentin was used to seal the apex. The surgical site was flushed with copious amounts of sterile saline to remove soft and hard tissue debris, hemorrhage, blood clots and excess root end filling material. Alloplastic Hydroxyapatite bone graft material was then compacted on the root (Fig 5). The flap was returned to its original position and held with moderate digital pressure and moistened gauze, vertical and horizontal sutures were given with 4-0 silk sutures (Fig. 6). Amoxicillin 500mg every 8 hours for 7 days in therapeutic regime, tramadol 50mg every 6 hours for 3 days and dipyron 500mg for analgesia every 6 hours during 3 days was prescribed for the patient. 0.12% chlorhexidine solution was prescribed twice a day. The patient returned after 7 days for suture removal.

The follow-up examinations were after 2 weeks, 4 weeks and 7 weeks. The 2 weeks follow up noted an absence of pain and slight pus discharge for the first week which resolved thereafter. X-ray revealed periapical healing (Fig. 7). The X-ray after 7 weeks showed periapical healing and the initial appearance of a thin layer of bone (Fig. 8). These criteria highlight the success of the treatment after 7 weeks. Therefore, after the previous failure of the endodontic treatment, we can consider this a valid treatment. After 8 weeks, the fenestration had reduced in size.

Discussion

Apicoectomy is the standard surgical procedure for cases with failed endodontic, due to several factors such as lesion location and the need to fully eliminate it^[2]. The presence of a post and core inside the canal, the tooth restored with a single crown and presence of pus discharge were influential factors to decide treating the periapical lesion by lifting a flap and performing retrograde filling after removal.

Since only intra oral perapical radiograph was done, the extent of bone loss was not predicted. In such cases CBCT is

a very important diagnostic tool. Hansen *et al.* (2007) compared CBCT with intraoral periapical radiography in the diagnosis of periapical pathology. In 32 of 46 cases, additional relevant information was obtained with CBCT, including presence and size of apical lesions or presence of an apico-marginal communication^[5].

The use of a surgical microscope is also strongly advocated in apical surgery since it allows inspection of the surgical field at high magnification with excellent and focused illumination^[1]. Root end resection has been debatable. Apical portion was cut at 10 degree related to tooth long axis. While some authors have discouraged root end resection since it leads to opening of dentinal tubules, other authors have encouraged this procedure since it leads to removal of accessory canals which might be responsible for failure of endodontic treatment. Angles for root bevels have been suggested to range from 30° to 45° to 10 degree in the line of sight. 10 degrees inclination bevel was made to allow good root surface exposure and minimize the exposure of dentinal tubules. While some authors have discouraged root end resection since it leads to opening of dentinal tubules, other authors have encouraged this procedure since it leads to removal of accessory canals which might be responsible for failure of endodontic treatment^[5].

The application of 1–2% methylene blue dye has also been recommended since it aids in the careful inspection of the cut root face. It is important to identify possible areas of leakage such as root-fractures, un-negotiated accessory canals or isthmuses, and gaps between the existing root-canal filling and the root-canal walls.

Root-end cavity preparation is nowadays performed with sonic- or ultrasonic driven microtips. The use of rotary instruments to prepare a root-end cavity is no longer recommended because it can lead to surgical emphysema.

Previously numerous materials had been suggested for use as root end fillings which include: amalgam, Gutta percha, Composite resins, Carboxylate cements, Zinc phosphate cements, Zinc oxide eugenol cements. Due to certain disadvantages, these materials were not found ideal for retrograde filling. The most commonly used materials now are mineral trioxide aggregate (MTA) and biodentine. Recent studies show that biodentin achieved the most favorable healing response, both radiographically and histologically. The choice of biodentin for apical sealing after surgery completion is convenient due to the physico-chemical and biological characteristics of the material. Biodentin used for retrograde filling proved to be effective in terms of stimulation of new healthy bone adjacent to the affected area. The primary clinical advantage of biodentine is its fast setting time (between 12-15 mins). This is an advantage when compared to the 170 mins of MTA since a delayed setting time leads to an increased risk of partial material loss and alteration of the interface during finishing^[6].

Kokate *et al.* conducted a study in which he compared the marginal seal of MTA, GIC and biodentine and found that biodentin showed the least marginal leakage^[7].

The successful outcome was determined by the absence of symptoms that include pain and pus charge. Radiographically, periapical healing and bone formation indicated the success of treatment. This procedure can be considered as a treatment option when conventional endodontic treatment fails.



Fig 1: Pre operative photograph



Fig 2: Pre operative IOPAR



Fig 3: Flap Elevation



Fig 4: Root end resection



Fig 5: Placement of bonegraft



Fig 6: Flap closure and sutures Placed



Fig 7: 2 week follow up



Fig 8: 7 week follow up

Conclusion

It is possible to achieve improvement in periradicular tissues after the appearance of a periapical granulomatous lesion as in the case reported. To make this possible, especially in cases where it is difficult to extract the cast pin and the crown, it is necessary to resort to surgical techniques and to use retrograde filling materials with ideal characteristics to stimulate the healing of affected tissues. In conclusion, apical surgery is suggested, followed by retrograde filling with biodentin in these cases.

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