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Apicoectomy for Periapical Lesion Treatment after Post Endodontic Failure on First Maxillary Premolar (Case Study)

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Abstract

Introduction. Factors that cause failure of endodontic therapy include incomplete cleaning and shaping of root canals and unhermetic obturation. Endodontic failure can lead to periapical lesions. Apicoectomy is one of endodontic surgery treatment choice to preserving the tooth with endodontic treatment failure. **Aim.** The aim of this report was to show that in cases of failure of root canal treatment could be treat without extraction, however there was an alternative treatments such as apicoectomy that could be used to preserve the tooth and its function in the oral cavity.**Case.** A male 32 years old patient came to dentist with persistent pain on upper left first premolar. The tooth had been endodontically treated for ten years. Clinical examination tooth #24 had porcelain fused to metal on it, percussion test (+), bite test (+), pain on palpation. Radiographic examination showed that tooth #24 had fabricated post without gutta percha obturation on apical third. There was 3 mm round periapical lesion on the distal side of the tooth. **Procedure** Apicoectomy and retrograde filling with Mineral Trioxide Aggregate (MTA) and bone graft was performed to eliminate that periapical lesion. **Conclusion** Apicoectomy is one of main choice to preserve post endodontic tooth with periapical lesion and post core crown on it, as long as possible in oral cavity

Keywords : Apicoectomy, Periapical lesion, Post endodontic treatment failure

INTRODUCTION

Purpose of root canal treatment is cleaning the pulp tissue or microorganisms contained in the root canal system so that root canal filling can be carried out properly and periapical tissue repair occurs.[1] The causes of root canal treatment failure are many, including incomplete obturation, root perforation, external root resorption, periradicular - periodontal lesions, overfilling, residual root canal, periapical cysts, broken instruments in the root canal, perforation of the base of the nasal foramen and coronal leakage.[2]

As a result of failure of root canal treatment could cause apical lesions. Most periapical lesions (more than 90%) are classified as granulomas, radicular cysts or abscesses. There is clinical evidence that the larger the size of the lesion, the more likely it is a radicular cyst. However, some extensive lesions may be granulomas or abscesses. A definitive diagnosis can only be confirmed by histological analysis.[3] Recommended treatment for large periapical lesion is endodontic surgical treatment because conventional root canal treatment of nonvital teeth with widespread periapical lesions has a high failure rate.[1,4]

Endodontic surgery indications are persistent pain and a root canal system that cannot be filled orthogradically. Apicoectomy or apical resection is a procedure to reduce the root tip of the tooth with periapical curettage, which is indicated in post-root canal treatment teeth with developing periapical inflammation. The inflammation that develops can be characterized by symptomatic complaints in the patient and a wider periapical radiolucent area than before root canal treatment was started. Apicoectomy is usually followed by retrograde filling to seal the root canal ends.[5]

Aim of this report was to show that in cases of failure of root canal treatment could be treat without extraction, however there was an alternative treatments such as apicoectomy that could be used to preserve the tooth and its function in the oral cavity

CASE REPORT

A male 32 years old patient came to conservative dentistry specialist with persistent pain on upper left first premolar. Tooth #24 had been treated with conventional endodontic treatment for 10 years, however for the past three months patient felt continous and persistent dull pain.Pain increased when chewing food.

Clinical examination tooth #24 had porcelain fused to metal on it, percussion test (+), bite test (+), pain on palpation (Fig 1).Radiographic examination showed that tooth #24 had fabricated post without gutta percha obturation on apical third. There was 3 mm round periapical lesion on the distal side of the tooth (Fig. 2).

Fig 1. Clinical examination tooth #24

Fig 2. Radiographic examination tooth #24

After the patient signed the informed consent, the surgical area was disinfected using iodine. Infiltration anesthesia was performed on the posterior superior alveolar nerve and the nasopalatine nerve with Lidocaine 2%. Incision was done with semilunar flap design (Fig 3) located at the apical region of the tooth using a #15 scalpel blade pressed right against the periosteum of the alveolus bone, then the flap was opened using a raspatorium (Fig 4)

Fig 3. Incision with semilunar flap design

Fig 4. Flap was opened with rasparatorium

Cortical bone was removed around the root tip of tooth #24 with a form bone bur and irrigated with saline. After that, the reduction was continued with a fissure-shaped bone bur so that the periapical area was opened and a clear view was obtained to the apex area of tooth #24. Extraction of the lesion, enucleation, and curettage were performed at the tip of the tooth root with irrigation using saline. The apex of tooth #24 was resected and smoothed with a horizontal carbide fissure bur in the buccal palatal direction (Fig 5)

Fig 5. Apex of tooth #24 was resected and smoothed with a horizontal carbide fissure bur

Root canal was prepared retrogradely using ultrasonic in the middle with a depth of 2 mm to place the MTA (Mineral Trioxide Aggregate) material. The operating area was irrigated with saline until the operating area was clean. The MTA filler was stirred until homogeneous and then applied to the prepared and condensed parts (Fig 6). Bone graft was applied to the affected area (Fig 7).

Fig 6. MTA was applied retrogradely on resected root canal

Figure 7: Bone graft was applied on affected area

After repositioning the flap, the suturing procedure was performed using an atraumatic needle with silk thread (Fig 8). Prescription of antibiotics (Clindamycin 300 mg, taken twice a day for 5 days), analgesics (cataflam 50 mg taken twice a day for 3 days), and it is recommended to always maintain oral hygiene. Patients were given control instructions 1 week postoperatively to remove suturing thread. Afer suturing removal, the patient moved to another city so unfortunatelly we couldn't follow up our surgery treatment.

Fig 8. Flap reposition with suturing procedure

DISCUSSION

The success of root canal treatment is obtained from good root canal preparation and filling, especially in the apical third. The filling must be hermetic so that there is no empty space so that microorganisms cannot live there.[6]

The cause of the failure of root canal treatment in this case showed that the obturation of the root canal was lost when gutta-percha was taken in the fabricated post manufacturing process. Failure of root canal treatment can be overcome by root canal retreatment or surgical endodontic treatment. Root canal retreatment aims to repair pathological damage caused by failure of previous root canal treatment.[4]

Apicoectomy is one of alternative treatment in cases of failure of conventional endodontic treatment. In the case report of Pedroche, *et. al* the patient had retreatment with conventional endodontic treatment on the maxillary left molar but the patient still felt persistent pain and on radiographic examination there was a periapical lesion at the mesiobuccal root apex. After apicoectomy treatment and then control after 7 months, it showed on clinical examination and radiography the fistula had healed.[7]

Another comparative case was the case report by Irwandana,. *et al* which showed endodontic treatment failure because of an overfilling root canal filling on the maxillary right incisor and the presence of a radicular cyst around the tooth. The treatment was apicoectomy with retrograde filling using Mineral Trioxide Aggregate (MTA). After 6 months, on clinical examination there was no lumps on the palatum and on radiographic examination the lesion had shrunk. [8]

Cavity preparation at the apical tip of tooth #24 was performed for placement of retrograde filling material using MTA. Retrograde placement of the filling material should be prepared at the apical end in a direction parallel to the occlusal plane until the tip of the gutta-percha is visible. MTA has many advantages, which is it has excellent biocompatibility, has a bactericidal effect with a pH of 12.5, is non-cytotoxic, and is non-mutagenic.[9] The ingredients contained in MTA are calcium silicate, bismuth oxide, calcium carbonate. Calcium sulfate, and calcium aluminate. Mixing MTA with water will form amorphous calcium oxide crystals consisting of 49% phosphate, 33% calcium, 6% silica, 3% chloride, and 2% carbon.[6,10]

Witasari, et. al analized inflammatory reaction of the pulp tissue with direct pul pcapping agents calcium hydroxide, MTA, and Portland cement for 7, 14, 42 and 90 days. On day 42, calcium hydroxide showed an inflammatory reaction whereas the MTA and Portland cement materials reaction have been seen since day 7th. This could be assumed that the work system MTA and Portland Cement induced tissue faster than calcium hydroxide. This was consistence with the statement that the MTA had effects that work faster in forming the hard tissue than calcium hydroxide.[11]

Bonegraft administration in this case aimed to accelerate bone healing. Giving bone grafts to the surgical site, in addition to accelerating healing, also induced host cells to form lost bone.[11] The process of bone formation or osteogenesis involves osteoblasts or progenitor cells present in the graft material and osteoinduction, the ability of bonegraft material to stimulate the formation of a scaffold or scaffold for host stem cells to grow, in the process of osteoinduction many growth factors influence the change of host stem cells into osteoblasts. Growth factors that play a role in this process include platelet-derived growth factors (PDGFs), fibroblast growth factors (FGFs) and transforming growth factor-β (TGFs-β). These four materials serve as basic properties in the formation of new bone which occurs in direct parallel with the interconnections between bones.[12]

The use of bone substitution materials such as bone graft is an alternative to regenerate damaged bone tissue. Bone graft is one of the scaffolds that plays a role in tissue engineering for bone tissue regeneration. It is necessary to design a bone graft as an appropriate and appropriate scaffold so that new bone growth can be generated. Regeneration of bone tissue requires various factors between the appropriate scaffold design with mechanical strength, porosity, speed of degradation involving the release of appropriate molecular signals, biocompatible materials are the alloys needed in regenerating bone tissue so that bone defects can be restored.[13] Bone graft material selection depend on its biocompatibility, bioresistability, sterility, structural integrity, and adequate porosity for the growth of new blood vessels, compressive strength, cost factor, and ease of manipulation of the material.[14]

Suturing was performed using an atraumatic needle with silk thread by sewing the flap to its original position. The purpose of flap repositioning is that the wound can be completely closed, and to prevent secondary infection during the wound healing process.[15]

CONCLUSION

Treatment of tooth 24 with a diagnosis of previously treated teeth with dental granuloma could be performed with endodontic surgery. The use of MTA material in this case was the right choice and bone graft application was needed for alveolar bone regeneration.

CONFLICT OF INTEREST

There was no conflict of interest between authors

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