International Journal Dental and Medical Sciences Research
Volume 4, Issue 3, May-June 2022 pp 248-253 www.ijdmsrjournal.com ISSN: 2582-6018

Apicoectomy: An Infallible Solution to Failed Root Canal Treatment

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Submitted: 15-05-2022 Accepted: 25-05-2022

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 abscess formation on palate.

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

I. INTRODUCTION

Pathological lesion of alveolar bone constitutes the periapical lesion which mainly involves the apex of the tooth root, periodontal membrane and alveolar bone. Mainly they are the sequelae of pulpal inflammation or necrosis with inflammatory mediators spreading through the apical foramen to initiate a periapical lesion[1].Management depends upon the root canal disinfection in which the manual/automated instruments remove the microorganisms mechanically and the auxiliary chemical substances act chemically.[2]Moreover some complementary techniques also used to provide favourable decontaminationas photodynamic therapy ,passive ultrasonic irrigation and the endodontic irrigants.[2]Many teeth do not respond to root canal treatment is because of procedural errors that prevent the control and prevention of intracanal endodontic infection. Procedural errors, such as broken instruments, perforations, overfilling, underfilling, ledges and so on are the direct cause of endodontic failure.[3]The last resort to overcome the failure is the surgical management such Apicoectomy which 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).It has originated as a treatment for "pyorrhoea alveolaris" complicated by a dental abscess as an alternative to dental extraction. Apical surgery constitutes tissue regeneration which is achieved by root-end resection,root cavity preparation,bacteria tight closure of root canal system at the root end with a retrograde filling followed by the removal of source of infection by complete debridement and curettage of periapical pathology.[4]

The following article mainly aims to report a clinical case depicting apicoectomy due to failure of root canal treatment.

II. CASE REPORT

A 16 -year-old male patient reported to the department of paediatric dentistry with palatal abscess and pain in the upper front region in relation to 21 and 22 (Fig 1).Patient presented with the history of root canal treatment being done in relation to 21 five years ago.Clinical examination revealed palatal abscess with pus discharge in relation to 21 which re-occur after certain period of time. Tenderness on percussion waspositive.Radiographic examination revealed endodontic treatment, periapical abscess with sinus, periodontal space widening loss of lamina dura,bone loss with respect to 21 and 22 (Fig 2). Re- RCT followed by apicoectomy was planned with respect to 21 and 22.Blood investigations were carried out and the reports were normal. To carry out re- RCT, as the access opening was already donethen firstly,we will go for working length determinationfollowed by biomechanical preparation (Fig 3a,3b).Afterwards dressing of triple antibiotic paste has given to resolve the abscess and periapical pathology. When the intraoral abscess and periapical pathology gets resolved to some extent thenobturation was done (Fig 4,5). After completion of endodontic procedure apicoectomy was performed to fully resolve the periapical pathology. To carry out the surgical procedure topical anaesthetic used was benzocaine and the local anaesthetic with epinephrine 1:100000 because its anaesthetic salt has the biggest anaesthesia potential and duration followed by anterior superior alveolar,nasopalatine nerveblock.Preoperatively patient was asked to rinse his mouth with 0.15% chlorhexidine.

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Tissue flap design

According to the literature most commonly used mucoperiosteal flap for the access to apical region in the anterior part of maxilla is the trapezoidal flap and rectangular flap. In order to have the better periapical exposure trapezoidal flap was planned followed by full mucoperiosteal incision.In the procedure two vertical releasing incision with 11 no. blade supervened by clavicular incision with 12 no. blade was made through periosteum to the bone (Fig 6). Flap was reflected with sharp periosteal elevator and the elevator contacted the bone while tissue was raised. Full thickness flap was raised from distal of 23 to distal of 12 (Fig7).

Procedure involving Root End Resection, Root End Preparation and Retrograde Filling

Surgical site was exposed to have a good clinical access.On exposure by raising the flap the granulation tissue and the fibres attached was removed with the help of curette followed by copious irrigation. Bony window was elevated at the surgical site with the help of conventional burs (Fig 8). Further,straight fissure carbide bur was used along the long axis of the tooth in order to cut the apical 3mm of the root and a bevel of 10 degree was made in the buccolingual direction(Fig 9).After the sectioning of the root a trough was created surrounding the apex with the help of round bur and inverted cone bur with the help of heated ball burnisher gutta percha was heated at the root end and inserted inside to create space for the placement of biodentin which was used as aretrograde filling material in order to seal the apex.

Copious irrigation was done with the adequate amount of sterile saline to remove soft and hard tissue debris, haemorrhage, blood clots and excess root end filling material.Bone graft material used was alloplastic hydroxyapatite to compact on the root(Fig 10).Flap was repositioned with moderate digital pressure followed by moistening with guaze piece.4-0 silk sutures were placed after repositioning the flap followed by placement of coe pack (Fig 11,12).Patient was prescribed with amoxicillin 500mg every 8 hours for 7 days in therapeutic regime, tramadol 50mg every 6 hours for 3 days and dipyrone 500mg for analgesia every 6 hours during 3 days. 0.12% chlorhexidine solution was prescribed twice a day.Sutures were removed after 7 days. Patient was recalled after 20 days and there was absence of pain and no further complication was seen. On radiographic examination periapical healing was seen (Fig.13). Thus, the treatment was successful without any recurrence of abscess.

Fig.1: Pre-operative photographFig. 2: Pre-operative radiograph

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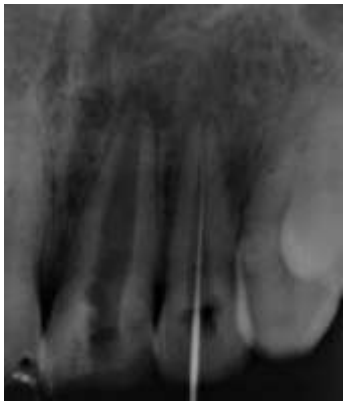

FIG.3(a),(b): Working length determination

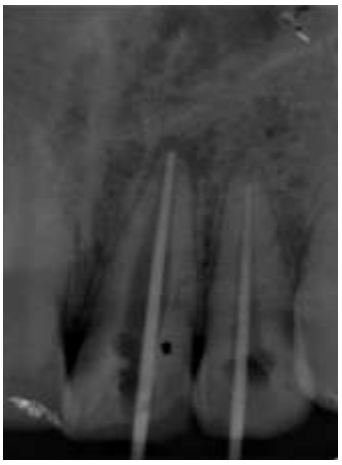
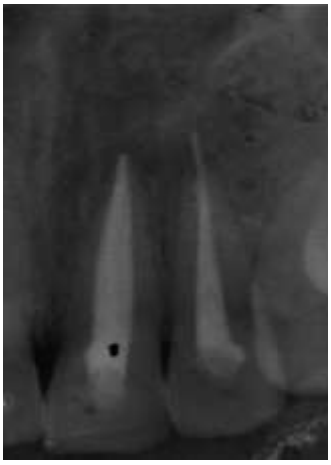

Fig.4: Master cone placed Fig 5: Obturation done

FIG.6 Incision placed

FIG.7Flap raised

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FIG.8 Window created

FIG.9 Resection of root end

FIG.10 Bone graft placed

FIG: 11Suture placed

FIG.12 Coe pack given FIG.13follow-up radiographafter 20 days

III. DISCUSSION

Apical surgery is a streamer surgery in the field of dentistry,that inculcates the procedure of incision, drainage and perforations closure followed by tooth root's resection. Apical surgery mainly maintains endodontic lesion that cannot be resolved by conventional (re-) endodontic treatment. In order to perform apical surgery clinical and radiographic examination should be kept into consideration.[5]

The indications of apical surgery according to ESE (European Society of Endodontology, 2006) and include the following:

The radiographic findings of apical periodontitis and obstructed canal should be kept into consideration

Extrusion of material with clinical and radiological findings of apical periodontitis which is continued over a long period of time.

Persistence of disease even after complete root canal treatment.

Perforation of root or floor of the pulp chamber.[5]

Diagnosis was done by intra oral radiograph, in order to have a good extent of bone loss CBCT was done, as has been useful in detecting periapical lesions in the maxillary region.[6]

A study revealed that 34% of the lesions detected with CBCT were missed with IOPA radiography in maxillary premolars and molars.[6]

Other modality is use of surgical microscope which allows inspection at high magnification with focused illumination.[4]

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.[4]

To have better infection control, reduce dentinal tubules exposure, minimize microleakage and enhance remaining tooth tissue,3mm of root end is being removed with resection plane perpendicular to the long axis of the tooth .[7]

Root bevel angle should be in the range of 30 degree to 45 degree to 10 degree in the line of the sight. The inclination of 10 degree allows a prompt exposure of root surface and reduce the dentinal tubules exposure.4The inspection of cut root surface should be done prior to further procedure, thus 1-2% methylene blue is recommended which identifies the areas of leakage such as root fractures, un-negotiated accessory canals and gaps between the existing root-canal filling and the root-canal walls.[4]

The root -end preparation is of utmost importance .To control microleakage ultrasonic tips are being used and great success rate has been reported with ultrasonic tips rather than rotary burs.8 Rotary instrument have the minimal use in root end cavity preparation as they cause surgical emphysema.4Different variety of materials such as:amalgam, Gutta percha, Composite resins, Carboxylate cements, Zinc phosphate cements, Zinc oxide eugenol cements have been used as root end filling materials earlier,but due to the various shortcomings they were not considered as an ideal material for retrograde filling.[4]

Hence,the materials which are most promptly used as root end filling materials now-a-days are: mineral trioxide aggregate (MTA) and biodentine.

MTA has been used in paediatric dentistry as an apical barrier in immature non vital tooth, in coronal fragment of fractured roots,pulpotomy medicament, pulp capping agent in young permanent teeth and as a repair material for the perforations and the resorptive defects.[9]

MTA is mainly used to a less extent now due to the discolouration potential, presence of toxic elements,difficult handling characteristics,prolong setting time, high material cost, absence of a known solvent,and removal after setting is also difficult.[10]

In the present case biodentin has been used as an apical plug which how-ever revealed the better results than MTA.Biodentin powder is composed of tricalcium silicate, calcium carbonate and zirconium oxide as the radio-pacifier, whilst Biodentine liquid contains calcium chloride as the setting accelerator and water as reducing agent.it moreover shows apatite formation after its immersion in phosphate solution,which indicated bioactivity. Elemental calcium and silicon uptake in root canal dentin is more prominent.[10]

Han and okiji et al. concluded in his study that biomineralization ability of biodentine is more than that of MTA with a wider calcium and silicon rich layer at material dentin interface.[11]

Advantage of biodentine is fast setting time as compared to MTA whose setting time is 170 minutes.The delayed setting time leads to increased risk of partial material loss and alteration of interface during finishing4.Thus in the present case as the biodentine served the purpose and no further symptoms of pain,pus discharge,inflammationwasseen. On the follow up radiographic analysis the periapical healing and formation of bone was an evident, better changed and gave good indication of healing. Hence, this treatment served the purpose where the endodontic failure occurs.

IV. CONCLUSION

To save a tooth and to overcome the apical pathology which cannot be resolved conventionally or by non-surgical endodontics apical surgery is being performed as in case reported.in order to suffice and stimulate the healing in the case mentioned, retrograde filling materials are used and the material used here is biodentine.

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