CASE REPORT e-ISSN: 2349-0659 p-ISSN; 2350-0964

Surgical Management of Periapical Lesion: A Case Report

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Abstract

Traumatic injuries are among the most unexpected event that may cause no harm to a pulp or may led to pulpal necrosis and development of periapical pathosis. Treatment ranges from small conservative restoration to apical surgeries. The goal of apical surgery is to prevent leakage of bacteria and their byproducts from the root canal system into peri-radicular tissue. The modern technique utilizes the use of dental operating microscope for illumination and magnification, use of ultrasonics followed by restoration with biocompatible materials. Hence present study describes a case of retreatment successfully treated by periapical surgery.

Keywords: Biocompatible Materials, Periapical Radiolucency, Traumatic Injuries.

Asian Pac. J. Health Sci., (2020); DOI: 10.21276/apjhs.2020.7.2.7

Introduction

The objective of apical surgery is to surgically maintain a tooth that has an endodontic lesion, which cannot be resolved by conventional endodontic (re-) treatment on Arx, 2005.[1] It is the recommended therapy for endodontically treated teeth with unresolved periapical lesions when the prognosis of non-surgical root canal treatment is questionable.[2] The traditional surgical endodontics involves root resection (45˚ bevel), retrograde preparation of canal using burs. According to literature, this technique has a success rate of approx 60%.[3]

Modern endodontic surgery incorporates dental operating microscope (DOM) for magnification and illumination, use of ultrasonics and retrograde restoration with a biocompatible material. A number of studies evaluated contemporary microsurgical techniques and more biocompatible filling materials, which reported more consistent success in healing outcomes (88–96%). [4] Although prognosis depends on several factors such as different surgical procedures and materials, clinical and radiographic evaluation, systemic conditions, local factors such as involved teeth and their anatomy, previous treatment and its quality.[5]

Thus this case report aims to highlight a clinical case of surgical retreatment of periapical radiolucency with history of trauma.

Case Report

A 21 years old male patient reported to the department with the chief complaint of pain, recurrent swelling, and pus discharge from the upper front region of the jaw. Patients reported with a history of trauma 3 years ago (Figure 1). On examination, the tooth was tender to percussion and palpation. Radiographic examination revealed periapical radiolucency around root apex along with inadequate root canal therapy (Figure 2).

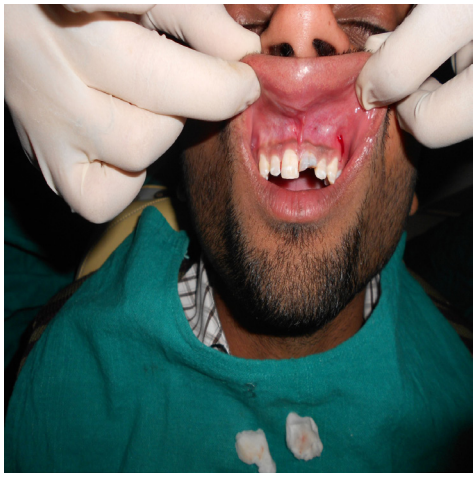

Figure 1: Showing discoloration and fracture of the tooth

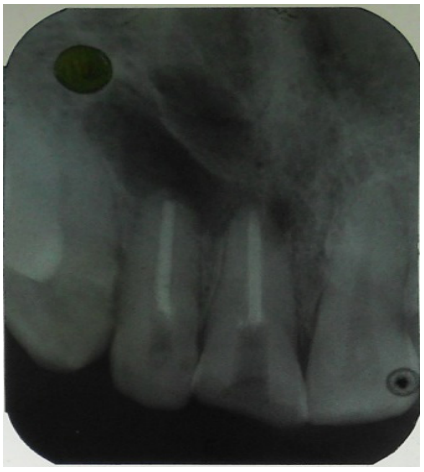

Figure 2: showing periapical radiolucency.

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How to cite this article: Bansal S, Negi K, Kumar A, Jain S. Surgical Management of Periapical Lesion: A Case Report. Asian Pac. J. Health Sci., 2020; 7(2):29-32

Source of support: Nil

Conflict of interest: None

Received: 15/03/2020 **Revised:** 10/05/2020 **Accepted:** 18/05/2020

Diagnosis

Based on clinical and radiographic examination, a diagnosis of the chronic periapical abscess was made.

Treatment Line

Retreatment was advised (Figure 3) along with a combination of surgical approach and retrograde restoration, respectively. Before surgery, hematological investigations were carried out. Also, written consent was taken from the patient. Chlorhexidine mouth wash was prescribed one day prior to surgery, along with antibiotics.

Surgical Intervention

Prior to surgery, anesthesia (2% lidocaine with 1: 100,000epinephrine) was administered. A sharp incision deep into bone was given by 15c blade and handle. Two vertical releasing incisions along with sulcular incision were given, and a full-thickness mucoperiosteal flap was raised. The incision technique and flap design should be chosen according to clinical and radiographic parameters (Von ArxandSalvi, 2008).[1]

Hard Tissue Management

Osteotomy

An assessment of the length of roots and its axis was made to ensure that bone was removed accurately from the desired site. The breach in the cortical plate was located with DG16 explorer, and a round steel bur or straight fissure carbide bur was used to enlarge bony defect to the buccal window under constant irrigation (Figure 4).

The osteotomy should be performed with light shaving motion to reduce heat generation and allow adequate visibility.[4] Granulation tissue was removed with the help of a curette to allow adequate visualization of root apex, and sterile gauzes were used to obtain the hemostasis.

Root Resection

A total of 170 tapered fissure bur was used in high-speed handpiece (under constant irrigation), and a root resection was performed at a right angle to the long axis of tooth. This helps to decrease dentin tubules peripheral micro infiltration.[6] The cut exposes gutta-percha, so excess gutta-percha was removed. To ensure minimal distortion of gutta-percha, care should be taken to use bur in the correct direction in relation to its direction of rotation. (Weston *et al*.;1999).[1]

The resected root was visualized with the help of a dental operating microscope to ensure complete resection, smooth root surface, and any canal irregularity.[4] Application of buffered and sterile dye helped identify cracks in root outline.

Root End Preparation and Restoration

Ultrasonic tips (KIS) were used to make retrograde preparation. The preparation should follow an original path of the tooth canal. The cavity was isolated before the placement of the restoration. MTA was chosen as the material for retrograde restoration due to a high success rate (Chong *et al*.,2003).[1] Also, it is osteo and cement inductive material. The restoration was placed into the preparation with the help of MTA delivery gun and plugger to ensure dense filling and minimal voids. Bone was trimmed with the help of bone trimmer to provide plane and blunt borders of bone (Figure 5).

Closure of Surgical Site

The surgical field was carefully evaluated and copiously rinsed with normal saline to ensure complete debridement of a hemostatic agent, root-end filling material, and debris, which can hinder the process of healing (Figure 6).

After slight suture compression was given with the help of a damp gauze piece to bring periosteal in contact with bone, single interrupted sutures were preferred (5-0, 6-0, 7-0).[1] Monofilament sutures were preferred as sutures left in place for time get infected by wicking. The selection of needle shape and radius is based on a combination of factors and varies case to case. Gutmann recommended the use of reverse cutting needle for periradicular surgery.[7]

Post-surgical considerations

Continue the use of chlorhexidine mouth wash to reduce plaque accumulation along with antibiotics and analgesics. Cold

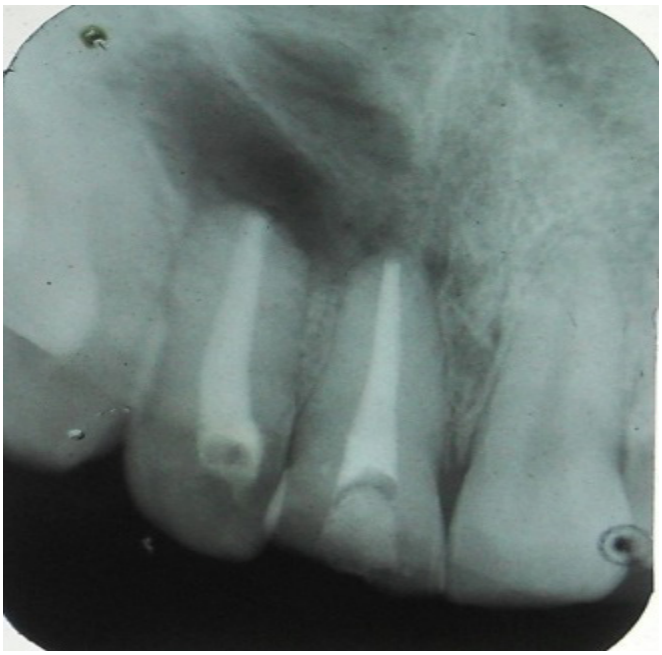

Figure 3: Showing retreatment done.

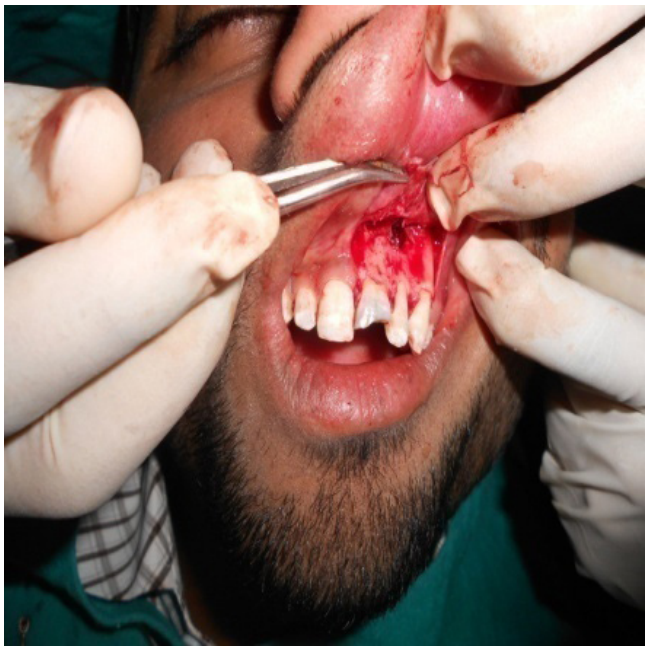

Figure 4: Flap raised and bony window created.

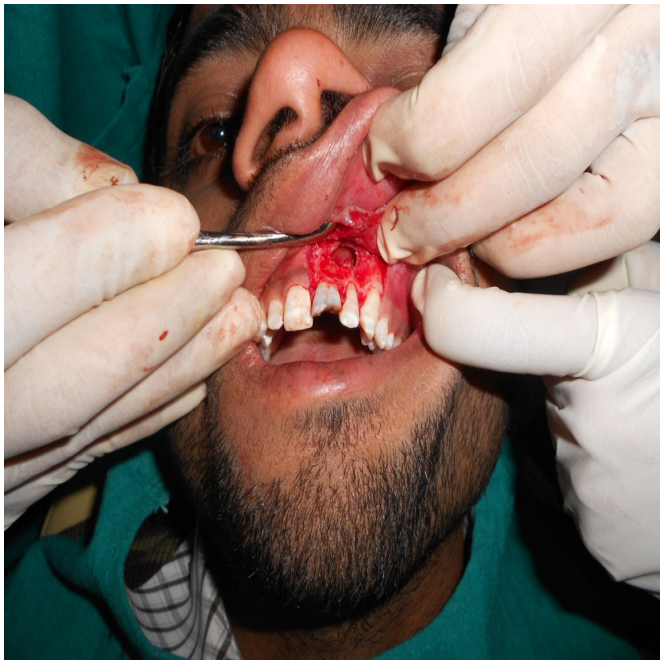

Figure 5: Removal of granulation tissue and bone was trimmed.

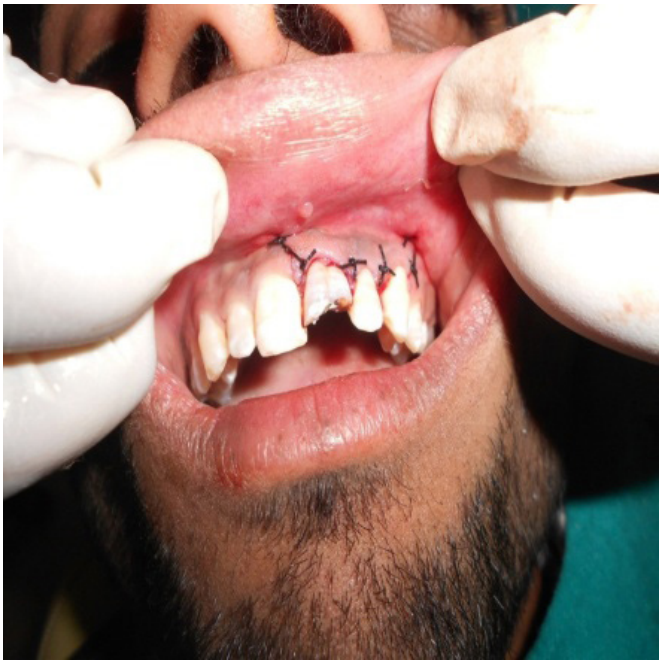

Figure 6: Flap repositioned and sutures placed.

compression with ice was advised for 4-6 hours after surgery. The patient instructed to report for any post-surgical complication. The patient was recalled after three days to access the site for healing and the absence of signs and symptoms such as pain and sinus tract. The sutures were removed five days following surgery.

Discussion

Endodontic failure is marked by bacteria and toxins in the canal system, requiring the need forfor retreatment. The advantage of surgical endodontics over non-surgical endodontics is the ability to address the entire root canal system and complete elimination of bacteria. In the present case, the presence of persistent symptoms such as swelling and pain led to surgical retreatment. Surgery provides the advantage of gaining access to any potential infection in an apical portion that can be removed. An apical root canal system can be sealed in the retrograde filling.[8] Kim and Kratchman (2006) argued that a surgical approach is more conservative than non-surgical treatment for certain cases.[1]Periapical surgery is successful in 25–99% cases and success is influenced by various factors such as tooth involved, quality of root filling, complex root anatomy, apical repair etc.[9]

Use of Dental Operating Microscope (DOM) allows inspection of the surgical field, removes a defect with great precision, greater illumination and magnification, and detection of microstructures such as isthmus and cracks and identification of adjacent anatomical structures thus minimizing error during surgery. Setzer *et al*. reported a positive effect of magnification and microsurgical technique on outcome.[4] Several authors have described the benefits of using a surgical microscope in apical surgery as well (Kim, 1997).[1] A sharp incision was given with a 15c blade and placed on the sound bone. A full-thickness mucoperiosteal flap was raised to allow access and visualization of a surgical site. Bleeding tags need not to be removed during the reflection of a flap as they help to promote healing.

Ostectomy helps in the removal of buccal cortical plate and exposes the pathological tissue. Straight fissure carbide bur was used to form a buccal window.[6] Jacquatte curette helps in the removal of defect. High torque and low speed along with coolant are required during bone cutting. The root resection was done perpendicular to long axis of the tooth. According to Nedderman *et al*.,1988 least amount of gutta-percha disturbance was produced with straight fissure bur in a low-speed handpiece. Another study reported that a multi-purpose bur produced the smoothest and most uniplanar resected root-end surface with the least root shattering compared to a Lindeman bur or a plain fissure bur (Morgan and Marshall, 1998). Followed resection, methylene blue was applied to inspect the presence of organic tissue, cracks as well as an outline of the root. With the help of KIS ultrasonics, root preparation was done. The advent of ultrasonic devices with surgical preparation tips allow conservative bony access cavities and deep retro-preparation which has further advanced the apicoectomy procedure.[5]

The MTA was chosen as the material for retrograde restoration as it has good sealing ability and a high degree of biocompatibility. Bonson *et al*. found that clinically derived human gingival and periodontal ligament fibroblasts survived and proliferated in direct contact with MTA particles. The above studies are also supported by Balto,[2] who found that human periodontal ligament fibroblasts attached to MTA within4 h and then spread out over the surface during the subsequent 20 hours.[9] Careful use of bone trimmer allows soft tissue juxtaposition and healing.[6] Before the closure site was rinsed with normal saline and sutures were placed. Some amount of hemorrhage helps in faster healing by primary intention. Moist gauze over flap helps to get back its elasticity, and physiological moistness.[7] Post-surgical instruction should be given and followed. Cold compression should be allowed to reduce inflammation, and holding of warm saline helps to improve circulation. Regular follow up should be maintained.

Conclusion

Hence, apical surgery is a predictable option to save the tooth and prevent further extensive options such as Implant placement. Also, the use of magnification, ultrasonics, and biocompatible material

such as MTA helps to improve the prognosis. Hence surgery is a great alternative to prevent tooth loss.

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