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10.2478/AMB-2024-0063

CASE REPORT

DRAIN AND TREAT: A RUBBER DAM TECHNIQUE FOR ACUTE PERIAPICAL ABSCESS

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Abstract. *Patients often report to the dental hospital with a complaint of toothache with extraoral swelling. Worried patients visit the dentist with a lot of apprehension. Acute dental infections with intraoral and extraoral swellings can be emergency and challenging to manage. Reduced mouth opening and severe pain may not allow the dentist to create an orthograde access to root canals. It ensues when the bacteria spread from the dental pulp to the surrounding periapical tissues accompanied by the formation of pus. If left untreated, these infections can be excruciatingly painful and pose a severe risk of spreading to facial spaces and finally, they may propagate to deep neck areas or ascend to intracranial sinuses. Hence, knowledge of its clinical management is of utmost importance. An acute periapical abscess has to be accurately diagnosed to render proper management of these maladies. Treating dentists should have a basic understanding of the pathophysiology, the suitable usage of antibiotics, the medical history of the patient, and standard treatment protocols. Therefore, this case report describes the management of an acute periapical abscess which was an emergency, and its conservative management.*

Key words: *rubber dam, periapical abscess, drainage, facial asymmetry, dental emergency*

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Received: *31 July 2023;* ***Revised/Accepted:*** *14 November 2023*

INTRODUCTION

When a patient makes an unscheduled urgent visit to the dental clinic, it could indicate a dental emergency. The most common concerns of these visits are pain, tenderness, swelling, trauma of the surrounding alveolar bone, and infection. Though dental emergencies may not be life-threatening, if the infection spreads to facial spaces and creates Ludwig's angina, it not only can be painful and bring cosmetological changes but also can be dangerous. A periapical abscess is one of the most common emergencies an endodontist may encounter. In a study by Quinonez et al., it was found that around 54% of dental emergencies were associated with periapical abscess and tooth pain [1].

According to the American Association of Endodontics (AAE), acute periapical abscess (APA) is an "Inflammatory reaction to pulpal infection and necrosis characterized by rapid onset, spontaneous pain, tenderness of the tooth to pressure, pus formation, and swelling of associated tissues." The APA is a simultaneous infection of the root canal and periradicular structure. It is a microbial infection caused by species belonging to diverse genera (Table 1). Among these, Firmicutes and Bacteroidetes contribute to more than 70% of the species found in periapical ab-

scesses along with a group of gram-negative bacteria (Prevotella, Porphyromonas, and Fusobacterium) and gram-positive bacteria (Peptostreptococci and Streptococci) [2].

Table 1. Microorganisms associated with acute periapical abscess

Bacterial species	Examples
Firmicutes	Genera *Streptococcus, Eubacterium, Dialister, Lachnospiraceae, Filifactor, Peptostreptococcus*
Bacteriodes	Genera *Porphyromonas, Prevotella, Tannerella*
Spirochaetes	Genera *Treponema*
Synergistetes	Genera *Pyramidobacter and some as-yet-uncultivated phylotypes*
Proteobacteria	Genera *Campylobacter and Eikenella*
Fusobacteria	Genera *Fusobacterium and Leptotrichia*
Actinobacteria	Genera *Actinomyces and Propionibacterium*

Immediate treatment for pain relief, along with treating the cause, is of paramount importance. Early detection, the introduction of empirical antibiotic therapy, and prompt surgical intervention can be considered the key elements of an effective care strategy for the complications of acute periapical abscess [2].

Case 1

A 54-year-old male patient came to the Department of Conservative Dentistry with a complaint of throbbing pain in the lower right back tooth region, 4 days prior to his visit. The patient gave a history of progressive swelling for 2 days which aggravated while sleeping and did not subside even after taking analgesics or anti-inflammatories. On extraoral examination, facial asymmetry and enlarged, palpable submandibular lymph nodes were observed in the right cheek region (Figure 1A).

Intraorally, a diffuse swelling was seen in the vestibular region with tooth 46, the tooth was tender on percussion and palpation. There was no response to pulp sensibility tests. Radiographic examination revealed loss of lamina dura with widening of the periodontal ligament (PDL) space. The case was diagnosed as acute periapical abscess with symptomatic apical periodontitis (according to the AAE guidelines). A non-surgical endodontic therapy was planned (Figure 3).

Case 2

A 59-year-old male patient reported to the Department of Conservative Dentistry with a complaint of throbbing pain and progressive swelling in the lower right region for 2 days which aggravated while sleeping and did not subside with anti-inflammatories or analgesics. The patient also gave a history of fever and malaise. On extraoral examination, facial asymmetry was observed on the right side of the cheek; the swelling was tender on palpation, and the lymph nodes were not enlarged (Figure 2A). Intraorally, a

Fig. 1. Facial photographs: (A) Preoperative. (B) and (C) Incision and drainage using rubber dam drain. (D) Postoperative. Radiographs: a) Preoperative b) Working length c) Master cone d) Postoperative e) 3-months follow up

diffuse swelling was seen in the vestibular region corresponding to 43, 44, and extending to the mesial of 45 (Figure 2B).

After performing sensibility tests, 43 and 44 showed no response, however, 45 showed a normal response. Radiographic examination revealed loss of lamina dura with widening of the PDL space of 43 and 44. The diagnosis was given as acute periapical abscess with symptomatic apical periodontitis (according to the AAE guidelines). A non-surgical endodontic therapy was planned (Figure 3).

Fig. 2. Facial photographs: (A) Preoperative. (B) Intraoral swelling seen in the area of 43 and 44 (C) Incision and Drainage using rubber dam drain. (D, E) The incision site after 4 days. (F) Extraoral postoperative after 4 days. Radiographs: a) Preoperative b) Working length c) Master cone d) Postoperative

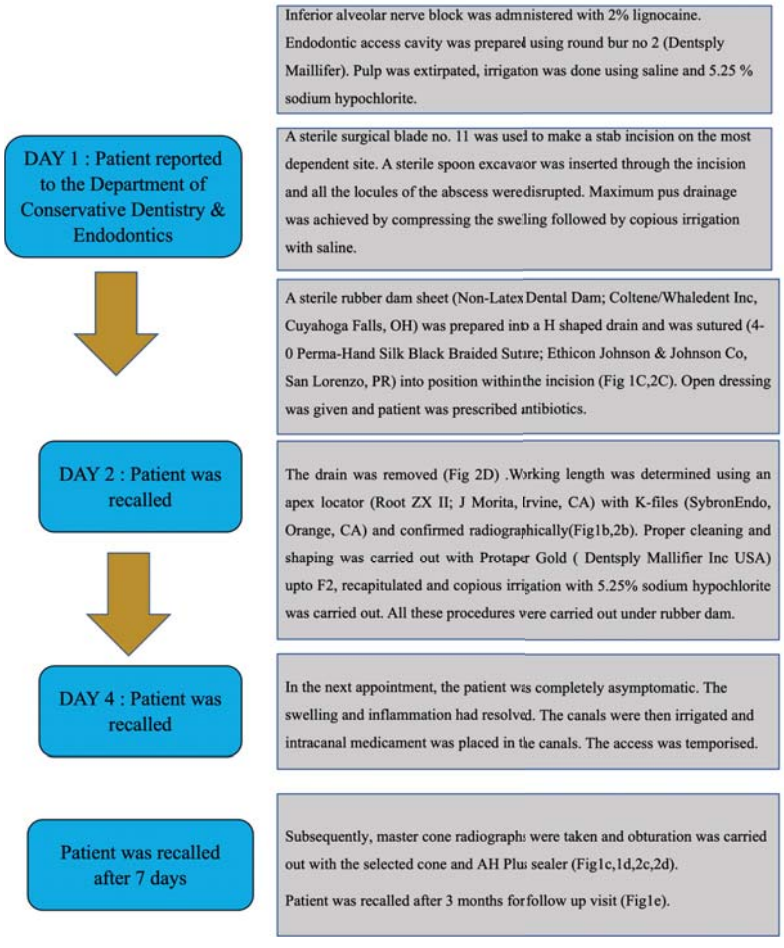

Fig. 3. The treatment protocol followed

DISCUSSION

Only teeth with necrotic pulp can develop endodontic infections. Necrosis of dental pulp may be due to a deep carious lesion encroaching the pulp or to a trauma. If the root canal gets infected by bacteria or other microbes, the infection can reach the peri-radicular tissues from the root canal through the apical or lateral foramina, or any other endodontic-periodontal communication. It can lead to an acute inflammatory condition that causes pain and swelling or may remain as a chronic condition, which being asymptomatic, may lead to bone resorption around the apex [2]. Early diagnosis and proper treatment planning are recommended for the resolution of symptoms and timely management [3]. The cardinal rule for managing all these infections involves draining the abscess to relieve the pressure at the periapical area either through the root canal or by incising the fluctuant swelling supplemented with appropriate antibiotic support [4].

Unresponsiveness to the pulp sensibility test, exaggerated response to vertical percussion, presence of edema in the alveolar mucosa and/or subcutaneous region (either localized or extending into the spaces), and spontaneous pain are the most frequent clinical manifestations [2]. Keeping in mind the signs and clinical symptoms, the phases of the infection can be classified as (a) periradicular or first phase; (b) intraosseous or second phase; (c) submucosal/subcutaneous or third phase [5].

In certain phases of this acute infection like the submucosal phase, as in this case report, it is a challenge to eliminate the infection either by nonsurgical endodontic treatment or by establishing appropriate drainage (Fig. 1C, 2C) [6, 7]. Discharge through drains has proven to be beneficial in alleviating the symptoms immediately. Though they may not hasten the wound healing but are imperative to drain the accumulated body fluid which can act as a focus of infection [8,9]. Types of drainage such as: (1) serous (clear and thin), (2) serosanguineous (containing blood), (3) sanguineous (primarily blood), or (4) purulent (thick, white, and pus-like) can act as diagnostic indicators and can aid in formulating an appropriate treatment plan. In this case report, the purulent discharge was drained with a sterile rubber dam sheet which is available in most of the dental operatories [10]. The size and shape of this drain can be customized according to the requirements of each case. This is neither a very technique-sensitive nor a time-consuming procedure, moreover, it is cost-effective. Rubber dam material is soft, easily mouldable, easy to insert, and there is no need for special equipment to place it. Examples of drains such as the rubber dam drains which can be shaped into I, H, and T-drain in which the bar of I, H, or T is inserted into the incision to prevent the closure of the incision which could reform into an abscess cavity [7,11].

Other commercially available drains, in addition to their limited usage (similar drains cannot be used for each case), possess other disadvantages. For instance, the Penrose drain has a major complication of fistula formation thus preventing the recovery period [12]. Also, there are increased chances of the drain being clogged along with infection of the drain itself. It was found in an experimental study that rubber drains did not create significant tissue reactions [8] (Table 2).

Several studies discuss different treatment modalities a clinician can render to their patients in terms of choice of a number of appointments, intracanal medicaments, and antibiotics since pathosis includes a wide spectrum of microorganisms [13]. In this case report, triple antibiotic paste and calcium hydroxide were used in both cases for their advantages [14, 15, 16]. Studies have shown that antibiotics are not required in uncomplicated and localized abscess cases. Empirical antibiotic therapy is advised when there are other signs and symptoms like fever, malaise, and lymphadenopathy, cellulitis, diffuse swelling, trismus, in immunocompromised patients who are more prone to develop a secondary infection following bacteremia or septicemia [17]. In certain situ-

Table 2. Various intraoral drains

Passive Drains (Made up of latex, polypropylene, or silastic rubber.)	Active Drains (These drains are closed systems that collect fluid in a reservoir.)
Corrugated rubber drain	Redivac Drain
Yate's drain	Shirly Wound Drain
Penrose Drain	
H OR I SHAPED RUBBER DAM DRAIN *	

*used in the management of acute periapical abscess in these case reports

Table 3. Clinical situations where antibiotics are indicated

Antibiotic indicated	Contraindicated
Acute apical abscess in medically compromised patients	Symptomatic reversible pulpitis
Progressive infection: rapid onset in less than 24 hours.	Symptomatic irreversible pulpitis
Persistent infection after root canal treatment	Pulp necrosis.
	Symptomatic apical periodontitis
	Chronic apical abscess
	Acute apical abscess without systemic involvement or in a normal immunocompetent patient

ations, antibiotics cannot be negated in the treatment of endodontic infections (Table 3) [18, 19]. In the present case, antibiotics were prescribed since the patient presented with lymphadenopathy and a history of fever along with the abscess. When the acute condition subsides, healing will take place. Teeth will be kept under observation for following-up.

CONCLUSION

The acute periapical abscess should be treated as an emergency to prevent the infection from spreading further down the fascial spaces, which can be life-threatening. The first line of treatment for submucosal abscess should be incision and drainage followed by root canal therapy. Incision and drainage provide immediate relief to the patient and reduction of swelling within 24 hours. To minimize the spread of infection and reduce microbial virulence, a short-term broad-spectrum antibiotic prescription should be considered, especially in medically compromised patients.

Disclosure Summary: *The authors have nothing to disclose.*

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