



ORIGINAL RESEARCH PAPER

Dentistry

POST-ENDODONTIC FLARE UP : IT'S CAUSES, PREVENTION AND MANAGEMENT STRATEGIES(A REVIEW)

KEY WORDS: Endodontic flare up, microbial factors, Root canal treatment

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ABSTRACT

Post-endodontic flare-up represent a challenging aspect of endodontic practice, causing distress for both dentists and patients. Microbial, mechanical, and chemical factors contribute to flare-ups, with microbial imbalance being a primary cause. Mechanical issues such as over-instrumentation and improper working length measurement can exacerbate symptoms, while chemical irritants in filling materials and irrigants can induce inflammation. Risk factors include patient demographics and treatment procedures. Management strategies include localized measures like re-instrumentation, relief of occlusion, and establishment of drainage, along with intracanal medicaments and pharmacotherapeutics. Psychological management is crucial in alleviating patient anxiety. Prevention strategies focus on asepsis, proper instrumentation techniques, and preoperative medications. Understanding these factors and adopting evidence-based strategies can enhance endodontic treatment outcomes and minimize flare-up occurrences. This comprehensive review explores the causes, prevention, and management strategies of post-endodontic flare-ups.

INTRODUCTION

Endodontic therapy, a cornerstone of modern dentistry, is a highly effective procedure for preserving teeth compromised by pulpal pathologies. While the majority of cases progress smoothly, post-endodontic flare-ups represent a notable concern that warrants careful consideration. A post-endodontic flare-up refers to an unexpected and often distressing exacerbation of pain or discomfort following root canal treatment which is a nightmare for both Dentist and Patients. Its incidence can vary from 1.4% to 50%. (1). According to American association of endodontists, An endodontic flare up is defined as, An acute exacerbation of an asymptomatic pulpal and /or periradicular pathoses, after initiation or continuation of root canal treatment. The primary reason of pain or the unscheduled appointment is the development of acute inflammation in the periradicular tissues(2). Post-endodontic flare-ups, though infrequent, remain a challenging aspect of endodontic practice, requiring careful consideration and effective management strategies. Despite advancements in endodontic techniques and technologies, some patients may experience a transient exacerbation of symptoms following root canal therapy.. Flare-ups are also associated with gender, age, preoperative pain, tooth type, number of visits, irrigation procedures, and the use of intracanal medication(3). It is particularly concerning when the patient was previously asymptomatic. Fortunately, the occurrence of flare-ups has little to no impact on the prognosis for treatment(4). As dental professionals continually strive for enhanced treatment outcomes and patient satisfaction, understanding the nuances of post-endodontic flare-ups becomes paramount. This comprehensive review aims to delve into the multifaceted nature of post-endodontic flare-ups, exploring the underlying causes, associated risk factors, and the latest insights into preventive measures and management protocols. By gaining a deeper understanding of these phenomena, practitioners can enhance their ability to provide successful and comfortable endodontic outcomes while minimizing the impact of post-operative challenges on patient well-being.

Causative Factors

- Microbial factors
- Mechanical factors
- Chemical factors

Microbial Factors

Of all the reasons listed above, the microorganisms are likely the main one causing this(2). Since root canal therapy involves cleaning the tooth's canals, as is generally understood, the primary goal of the procedure is to get rid of the microbes that causes the condition(2). There is a equilibrium between the microflora and the human immune system known as the "local adaptation syndrome" (Gondim et al., 2010). This balance can sometimes get disrupted during endodontic treatment, after the extrusion of infected debris in the periradicular tissues favouring the microbial aggression that results in an acute peri radicular inflammation(1). Or in other words, when we are doing the root canal treatment if the peri radicular tissues are damaged during manipulation of the root canal, an acute inflammatory response develops called as flare up(2). Therefore, the quantity and pathogenicity of microorganisms in the periodontal tissues influence the intensity of flare-ups(6). The factors that affect the development of pain associated with endodontic infections include specific pathogenic strains, virulent clonal types, cell count, and microbial interactions (Siqueira 2003). According to some research ,Certain peri-radicular disorders may be more closely linked to the presence of specific bacterial species. (1) Prevotella, Fusobacterium nucleatum, Porphyromonas gingivalis, and Porphyromonas endodontalis are the bacteria primarily linked to flare-ups in symptomatic endodontic infections including acute abscess (3). The imbalance between bacterial aggression and the host's defense mechanisms primarily occurs due to the apical extrusion of infected debris, alterations in the root canal microflora, and environmental changes resulting from incomplete chemo-mechanical preparation. Additionally, secondary intraradicular infections and an elevation in the oxidation-reduction potential within the root canal contribute to creating conditions conducive to the growth of facultative bacteria(1).

Mechanical Factors

Debris and microbes may be forced into the periradicular space by mechanical causes, which can cause pain and swelling (flare-ups)(2). Earlier research demonstrated that employing the crown-down technique in conjunction with engine-driven nickel titanium Ni-Ti systems results in minimal extrusion of debris (6). As opposed to NiTi rotating mechanical instruments (0.5 mg) with crown-down approach, Reddy and Hicks' research demonstrated that cleaning canals with Manuel devices employing step-back technique results in a greater amount of debris extrusion (2.58 mg) into the

periradicular tissues (7). These findings support prior research demonstrating that the use of rotating instruments during endodontic treatment (1). While performing the root canal procedure which is a chemo mechanical process, we reach the end of the root canal or the apex which is the physiological apex. During this procedure the over instrumentation of the canal cause irritation to the peri radicular tissue and extrusion of the material through the apical foramen(2)

Working length :

The working length is the distance between the highest point in the coronal part of the tooth and the conjunction of cementum and dentin called as the physiological apex of the root. This is the place where the canal preparation and the obturation terminate. During the time of root canal treatment if the working length is not measured properly this also leads to postoperative endodontic flare up(2). Ensuring patency is crucial for improved apical cleaning, irrigation, and the effectiveness of intracanal medicament. However, this approach may contribute to periapical inflammation through the apical pushing of debris by K files. Periapical enlargement can also result in debris pushing and the occurrence of flare-ups(8,5).

Chemical Factors

The root canal filling materials, intracanal medications, and irrigative fluids used in endodontic treatments have varying compositions. This also results in post-operative pain, sensitivity, and chemical irritation(2). The quantity of chemicals extruded directly correlates with the extent of the inflammatory reaction(9). Flare-ups in endodontic retreatment are frequently associated with the use of resorcinol-formaldehyde resin in obturation. Furthermore, formaldehyde, known for its cytotoxic effects leading to tissue necrosis, can cause pain and swelling if extruded into the periradicular area (Moline, 2006). Notably, Onay et al. (2015) reported that it does not affect the incidence of flare-ups(5). The type of solution used in the irrigation has no effect in the postoperative flare-up(2). Flare-up occurrences are reduced with 5.25% NaOCl in comparison to 2.5% NaOCl (3). A recent study in 2020 revealed that 1.3% NaOCL is associated with less intense and less frequent post-endodontic pain than 5.25% NaOCl (Mostafa et al., 2020). However, these findings contrast with those of Verma et al., who, in 2019, found no significant difference in postoperative pain when comparing two concentrations of sodium hypochlorite (1% and 5%) (13).

Risk Factors For Post Endodontic Flare Ups

There are two categories of risk factors for postoperative endodontic flare-up: First, it is reliant upon the following: patient demographics; state of pulp and apical periodontal tissues; clinical manifestations; overall health status; and the tooth under treatment. The second is that it relies on the therapeutic procedures (i.e., the treatments require multiple visits), as well as whether the therapy is an intracanal medicine and/or retreatment in addition to original endodontic treatment(2). Several factors, such as female gender, necrotic pulp, acute apical abscess, acute apical periodontitis, substantial periapical radiolucency, and pre-operative discomfort and swelling, have been associated with an elevated risk of developing an endodontic flare-up(14). A pulp that is vital, a tooth with a sinus tract, and an obturated tooth exhibit diminished likelihood of experiencing flare-ups(15). Treatment factors encompass elements within the dentist's control, including the treatment plan and specific approaches employed by the clinician during the procedure. (4)

Prevention

Flare-ups result from various factors, necessitating the consideration of preventive strategies. Certain approaches aim to minimize flare-ups, with asepsis being a crucial

requirement in root canal treatment to prevent their occurrence(3). One of these conditions is the utilization of a rubber dam during treatment (6). It is imperative not to leave access cavities open between appointments, as this may lead to the potential development of secondary peri-radicular infections. Additionally, using compressed air to dry access cavities should be avoided to prevent debris extrusion; instead, cotton pellets can be used for this purpose(1). Utilizing rotary-driven NiTi instruments with the crown-down technique and proper irrigation can decrease flare-up occurrences (3). The administration of preoperative medications, such as Ibuprofen, dexamethasone, diclofenac sodium, piroxicam, deflazacort, ketorolac, or prednisolone, is particularly beneficial in cases of symptomatic irreversible pulpitis (Praveen et al., 2017) (Veitzand Ferraiolo, 2018) (Konagala et al., 2019) (Aksoy and Ege, 2020) (1). Enhanced delivery of irrigants can be achieved through various devices. Utilizing intracanal medicaments between appointments and opting for single-visit treatment increases the likelihood of reducing flare-ups. (3). Patients presenting with pain on percussion during the initial visit should receive occlusal relief (1). The effective management of postoperative pain can be achieved through the prescription of medications such as corticosteroids, NSAIDs, or paracetamol (31,32,33).

Treatment Plan

- 1) Localized treatment measures
 - Re instrumentation
 - Relief of occlusion
 - Establishment of drainage
- 2) Intracanal medicament
- 3) Psychological management
- 4) Pharmacotherapeutics
 - Antibiotic
 - Analgesics
 - Corticosteroids

Localized Treatment Measures:

These measures include re-instrumentation, relief of occlusion, placement of intra canal medicament and establishment of drainage

Re Instrumentation

The access opening need to be reopened in case there was a flare-up in between the appointments. Reevaluating the working length is necessary, as is checking the patency and irrigating the area extensively to get rid of harmful microbes and toxic products(3). Inadequate debridement occurs when working shorter than the apex, leaving uncleansed residual necrotic pulp tissues in the apex, potentially leading to flare-ups(1). Extrusion of the diseased material, irrigants, and medications peri-apically inducing an inflammatory response are all occurring near the apex. When a patient presents with a flare-up, the appropriate working length is determined, and then the intracanal medication is placed, the debridement is carefully completed with frequent and abundant irrigation, and a temporary restoration is placed (16). To rule out the possibility of any missing canals, radiographs should be performed at various angles (17,1)

Relief Of Occlusion

The dental literature's minimal agreement for preventing post-endodontic discomfort is occlusal reduction(2). Postoperative formation of acute abscesses results in the tooth protruding from its socket, causing pain during biting and percussion. It is advisable to judiciously relieve occlusion, particularly on the functional cusp, for such teeth. But in cases when apical periodontitis is reported, certain authors recommend a preventive occlusal reduction (18).

Establishment Of Drainage

Incision and drainage are a procedure in which all the pus, toxic microorganisms, toxic products are removed from the peri apical area(2). Incision and drainage (I&D) lead to the

release of periradicular pressure, providing effective pain relief(3).In cases such as the abscess had occurred after the obturation procedure, incision of the tissue is the only emergency procedure(2).In cases where root canal treatment (RCT) is satisfactorily obturated and a flare-up occurs post-completion, an incision is made at the most fluctuant area, followed by the establishment of drainage(19).In cases such as cellulitis additional incision for drainage is done(2)

Intracanal Medicament

Certain medications, such as steroids, sulfa compounds, irrigating solutions, and antimicrobial medicines, have been reported to relieve symptoms during the acute exacerbation(1). There are no adverse reactions or side effects from intracanal medication administration.(4) The impact of calcium hydroxide Ca(OH)2 on postoperative pain was observed to be limited, despite its effectiveness against microorganisms (Georgopoulou et al., 1993)(20). In 2014, Triple Antibiotic Paste was identified as more effective than calcium hydroxide in preventing flare-up occurrences (21). Sinhal et al. showed in 2017 that, when compared to calcium hydroxide paste, 2% chlorhexidine gel and triple antibiotic paste reduce interappointment flare-ups and postoperative symptoms in individuals with diabetes (22).After pulpectomy, placing ketorolac and dexamethasone in the root canal of significant teeth substantially decreased pain within 12 hours(2).There is a significant reduction in postoperative pain following endodontic treatment when photobiomodulation therapy is used(2).It has been observed that the use of sulfa compounds inside root canals lowers the incidence of discomfort following surgery. According to some research, sulphonamides are no more effective than placebos (23)

Psychological Management

It is important to let the patient know that flare-ups are normal, manageable, and have no bearing on how well the treatment works(1).Pain can be effectively handled if there is a decrease in the level of fear and anxiety because they are directly linked to perception. The patient has to be informed of the issue and given an explanation of the potential causes of the discomfort and swelling. Breaking the cycle of pain is the most crucial stage (15,16).

Pharmacotherapeutics

Antibiotics

When microbes are the source of the illness, antibiotics work well. Generally speaking, penicillin is used to treat tooth infections. Antibiotics are frequently administered to treat anaerobic infections due to the polymicrobial nature of oral infections (24).

Analgesics

Acetaminophen, NSAIDS, and non-narcotic analgesics have all been successfully utilized to alleviate endodontic pain. They act in areas of the brain and spinal cord as well as in peripherally inflammatory tissues to generate analgesia(2). NSAIDs are frequently used to manage flare-up pain. When treating pain with periradicular and pulpal origins, they are quite successful (3) . For mild to moderate cases, NSAIDs are employed in treatment, while severe cases or those unresponsive to NSAIDs are managed with opioids and steroids (16). Preoperative NSAIDs can notably decrease Prostaglandin E2 (PGE2) levels in individuals with symptomatic irreversible pulpitis, effectively lowering the likelihood of flare-ups (3).

Corticosteroids

Pain and swelling of dental origin have been effectively treated with systemic corticosteroids (Messer and Keller 1976;Williamson et al 1980).When steroids were given prior to the procedure, there was a lower incidence of postoperative pain.(1)

CONCLUSION

In conclusion, the review of endodontic flare-ups emphasizes the multifactorial nature of these incidents, ranging from microbial factors to procedural complexities. Understanding the risk factors and adopting evidence-based strategies for prevention is crucial in enhancing the success of endodontic treatments. Additionally, continued research and advancements in endodontic techniques will contribute to minimizing flare-up occurrences, ensuring improved patient outcomes in the field of endodontics.

Conflict Of Interest

The author declares no conflict of interest.

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