

## REVIEW ARTICLE

# Etiology and Management of Endodontic Pain

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## ABSTRACT

Pain management in endodontics includes important aspects for its control and prevention, such as reducing anxiety and pre-operative pain, control of intraoperative pain, and the treatment of post-operative pain. One of the effective strategies currently used in these cases is structured to evaluate the painful condition through a 3D approach which establishes a differential diagnosis, definitive treatment, and rational use of drugs, based on the most appropriate scientific evidence available in the literature.

**Keywords:** Anxiety, Endodontic pain, Odontogenic, Pharmacological intervention, Restoration

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## INTRODUCTION

The orofacial pain can be one of the worst human experiences, many times unbearable, leading the individual to experience physical and mental illness so that orofacial pain is considered as a serious public health problem in many countries.<sup>[1]</sup> Tooth pain is the main complaint of individuals who search for emergency dental care and involves many situations, such as tooth-bone fractures, tooth fracture with pulp exposure, acute tooth pain (pulpitis), apical abscesses, dilaceration in oral mucosa, and hemorrhages.<sup>[2,3]</sup>

The pain origin can be classified into odontogenic and non-odontogenic. Notwithstanding, most of the pain symptoms are related to the alterations in the pulp and periapical tissue, and endodontic treatment is generally indicated.<sup>[4]</sup> It is found that the pulp and periapical pathologies most prevalent in emergency care were pulp necrosis (69.3%), irreversible acute pulpitis (25%), reversible acute pulpitis (4.1%), acute apical periodontitis (30.4%), and acute apical (17.8%).<sup>[5]</sup> In endodontics, the management of pre- and post-operative pain

should include important aspects for its controlling and prevention, such as anxiety reduction and control of pre-/trans-operative pain through local anesthetic techniques and pharmacological drugs.<sup>[6]</sup> The effective strategy for managing the endodontic pain is based on the pain assessment through a 3D approach that consists of establishing the differential diagnosis, definitive treatment, and rational use of drugs.<sup>[7]</sup>

## ETIOLOGY OF ENDODONTIC PAIN

The endodontic pain arises as a result of the pulp tissue response to any causative agents such as dental caries or other irritants. The pulp tissue responds to any external stimuli such as dental caries, trauma, or even restorative procedures. The pulp tissue bacterial interaction plays a key role in pain progression. Dental caries has various microbial and other components which have the capacity to interact with pulp tissue and produce a response.<sup>[8,9]</sup> Various studies have shown that endodontic pain between two appointments can be due to pre-operative pain, absence of periapical lesions or cysts, fractured roots, and retreatment cases, and patients prescribed with analgesics.<sup>[10]</sup> Pain after endodontic treatment can also result from the acute exacerbation of chronic lesion, non-vital tooth, previously opened canal, extension of either the filling material or instrument beyond the apex of the tooth, and any leakage in temporary or permanent filling done after endodontic treatment.<sup>[11]</sup>

## DIAGNOSIS OF THE ENDODONTIC PAIN

The initial phase of treating the endodontic pain patient is diagnosis. Diagnosis must be the starting point for pain treatment since many conditions can mimic odontogenic pain but do not necessarily require endodontic treatment.<sup>[12]</sup> A classic example is the patient presenting with dull aching pain in the maxillary posterior teeth; obviously, the differential diagnosis must consider both sinusitis and odontogenic sources of pain. Thus, developing a differential diagnosis is an essential first step in effective pain management strategies. Although the majority of patients who present with a complaint of tooth pain actually suffer from odontogenic pain, it is clear that this is not always the case. The astute clinician will consider these alternative pathoses given the presenting signs, symptoms, and results from the clinical

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examination since, of course, the treatment strategies and prognoses depend on the diagnosis. Typically, the patient in need of endodontic evaluation is experiencing some sort of pain, has heard horror stories about “root canals,” and is in an anxious state of mind.<sup>[13-16]</sup> It is imperative, therefore, that the clinician should remain objective and perform the necessary diagnostic procedures in a methodical, consistent manner, so as not to be misled by the patient’s misperceptions.

## FACTORS AFFECTING TREATMENT

The patient’s levels of anxiety and pre-operative pain have been shown to influence levels of post-operative pain. Pre-operative pain and anxiety are predictors of incomplete local anesthesia and post-operative pain. While nerve block injections are successful in 75–90% of patients with clinically normal teeth, local anesthetics are much less effective when administered to patients with inflamed tissue.<sup>[17]</sup> The patient who is treated despite inadequate dental anesthesia typically experiences increased anxiety, a reduced pain threshold, and a less satisfactory post-operative result. One of the most common problems relating to inadequate local anesthesia is the confusion concerning dental and soft tissue anesthesia. A positive lip sign (i.e., a “numb lip”) is not an accurate predictor of successful dental anesthesia. Instead, the persistence of the patient’s chief complaint should be evaluated to determine the level of local anesthesia. Retesting thermally or with percussion is usually a more effective method of determining the level of dental anesthesia.<sup>[18-20]</sup> It is often beneficial to have the patient scheduled for a local anesthetic 20–30 min before their regular appointment. A recent comprehensive review of the management of local anesthesia failures provides a summary of the biologic reasons for local anesthetic failures in endodontic pain patients and suggested supplemental strategies.<sup>[21]</sup> It is only after the patient has satisfactory dental anesthesia that the appropriate procedure can be implemented.

## PULPOTOMY

A pulpotomy is often performed in cases of acute pain of pulpal origin when there is insufficient time to do a complete pulpectomy. The goal of the pulpotomy is to remove the coronal pulp tissue in the chamber without penetrating pulpal tissue in the root canal systems. The pulpotomy, including sealing of sedative and antibacterial dressings in the pulp chamber, has been advocated in emergency situations for many years.<sup>[22,23]</sup> Among the dressings suggested that have been phenol, cresatin, and eugenol.

## PULPECTOMY

Since it is impossible for the clinician to precisely determine the apical extent of pulpal pathosis, a pulpectomy offers the advantage of complete removal of the pulp. However, it is possible that the pulpectomy itself can be the cause of increased post-operative pain. This may happen when a pulpectomy is done without the benefit of an accurate canal length measurement. The subsequent risk of leaving shredded, inflamed tissue in the canal, or damaged periradicular tissue is adequate reason for the clinician to take the time to establish a measurement control. Pulpectomy is the course of treatment often used in patients who present with symptoms of irreversible pulpitis, or pulp necrosis with or without swelling.<sup>[24]</sup>

## TREPHINATION

Trephination is the surgical perforation of the alveolar cortical plate over the root end of a tooth to release accumulated tissue exudate that is causing pain. The procedure has been recommended for patients with severe recalcitrant periradicular pain of endodontic origin. Those who are advocates of trephination do not agree in their choice of flap (or if a flap is necessary) as well as the instrument to be used to perforate through the cancellous bone toward the periradicular lesion.<sup>[25]</sup>

## INCISION AND DRAINAGE

Pulpal necrosis may result in a periradicular abscess with swelling. The swelling may be seen at an emergency visit, as part of an interappointment flare-up, or even as a post-obturation complication. Swellings may be described as localized or diffuse and as fluctuant or hard. They may also extend laterally or vertically well beyond the involved tooth and can involve fascial spaces. The goal of emergency treatment for patients with swelling is to achieve drainage.<sup>[26]</sup> The object of drainage is to evacuate pus from the tissue spaces. In endodontic cases, drainage is best achieved through a combination of canal instrumentation. Antibiotics can be used to supplement the clinical procedures primarily in patients where there are poor drainage and large swellings. In patients with well-localized swellings where the canal can be instrumented and good drainage established with an incision and drainage, antibiotics are of only supplemental value. Occlusal reduction when performed in appropriate cases is a highly predictable simple strategy for the prevention of post-operative pain and relief of pain due to endodontic emergencies. There is a biologic rationale for the relief of pain provided by the previous techniques. Mechanical allodynia (i.e., sensitivity to percussion or biting forces) is due to tissue

levels of factors that stimulate peripheral terminals of nociceptors. Occlusal adjustment reduces mechanical stimulation of sensitized nociceptors.<sup>[27]</sup> Pulpotomy, pulpectomy, occlusal reduction, and incision and drainage, when indicated, provide the clinician with highly predictable pain reduction strategies in endodontic emergencies.

## ANXIETY AND PAIN

Investigators have suggested a close relationship between pain and anxiety: The greater the anxiety, the more likely we are to interpret the sensation as pain. In a clinical study of children, it was found that anxiety is the strongest predictor of poor intraoperative pain control. Similarly, during heightened anxiety, the pain threshold is lowered for patients. Highly fearful patients are more sensitive to pain in general and those who are dentally anxious are more sensitive to dental pain specifically. High levels of stress, anxiety, or pessimism in pre-operative patients predict poor outcomes in measures that range from speed of wound healing to duration of hospital stay. Although pharmacological strategies to reduce anxiety are available, other non-pharmacologic approaches have been extensively evaluated.<sup>[28]</sup> Behavioral techniques can be used to prevent excessively high levels of tension or anxiety from developing in response to potential dental stressors.

## MODELING

Modeling is a variant of information provision. Many studies have shown that observing a peer (either live or on a video) can be successful in reducing anxiety about dental treatment, especially for inexperienced children.<sup>[29]</sup> Allowing an anxious patient to observe, from a doorway, can be effective in building confidence and reducing anxiety.

## MANAGEMENT OF POST-ENDODONTIC PAIN

Managing post-endodontic pain is of prime importance because the incidence of patients returning to endodontist with discomfort is on the rise. This pain can be relieved by being more careful during the endodontic treatment procedure. Each step of root canal treatment must be done with utmost perfection some examples such as accurate working length determination, disoccluding the opposing teeth,<sup>[30]</sup> proper cleaning and shaping with adequate sequencing of instruments, optimum use, and judicious selection of irrigants and use of magnifying devices such as dental loupes and endodontic microscopes<sup>[31,32]</sup> would be more helpful in identifying the most commonly missed accessory canals which when left untreated result in post-endodontic pain. Near

perfection in these iatrogenic factors would drastically reduce the incidence of post-endodontic pain.

## CONCLUSION

Endodontic pain management is a common clinical problem, so the effectiveness of pain management begins with determining an accurate diagnosis; treatment plan includes control of pain before and after treatment and determines the effects of drugs that will be recommended for patient.

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