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***Post Endodontic Treatment Anaesthesia and Pain  
control from Pharmacological point of view .***

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ  
إِنَّمَا يَخْشَى اللَّهَ مِنْ  
عِبَادِهِ الْعُلَمَاءُ  
( فاطر : ٢٨ )

## **Certification**

**I certify that this research has been prepared under my supervision  
at the college of Dentistry , University of Babylon .**

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## الاهداء :

مرّت قاطرة البحث بكثير من العوائق ، ومع ذلك حاولنا أن نتخطّاها بثبات بفضل من الله و منه .  
الى أبويّ و أخوتي و أصدقائي ، فلقد كانوا بمثابة العضد والسند في سبيل استكمال البحث .  
و لا ينبغي أن أنسى أساتذتي ممن كان لهم الدور الأكبر في مُساندتي و مدّي بالمعلومات القيّمة ..  
أهدي لكم بحث تخرّجي ..  
داعين المولى - عزّ وجلّ - أن يُطيل في أعماركم ، ويرزقكم بالخيرات .

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## *Introduction :*

A root canal is a major procedure, so pain after a root canal is normal. A root canal involves deep cleaning inside the canals of the tooth, which can in turn irritate surrounding nerves and gums. The pain shouldn't last forever. In fact, a root canal is meant to help in avoid pain related to a decaying or fractured tooth. It's normal to experience mild to moderate pain for a few days after a root canal. Any pain beyond this point may warrant additional cleaning of the canals or other procedures from the dentist. In the past, root canals were extremely painful. This is one reason why people sometimes avoided such procedures. Dentists now have pain-relieving measures that can be used to reduce the amount of pain you experience during the procedure. As the local anesthetic wears off after the root canal, patient might experience mild pain and sensitivity. This is related to the cleaning process. Since the pain experienced after a root canal is usually mild, patient likely only need over-the-counter pain medications for relief. These include acetaminophen (Tylenol) and ibuprofen (Advil, Motrin IB). Patient will want to check with the doctor before taking these medications to make sure they don't interact with any supplements or prescriptions that he/ she already takes.

## *Can the patient still get pain in a tooth that's had a root canal?*

Yes, it's possible to have pain in a tooth that's had a prior root canal.

Some causes of this pain may be due to.

- The root canal not healing properly.
- The root canal not being completely disinfected because of complicated root anatomy.
- New decay can infect the root canal filling material, causing a new infection.
- A tooth injury that allows new decay to enter the tooth [1].

## **Etiologies :**

### **Clinician related :**

Missed canal.  
Over instrumentation.  
Over obturation  
Incomplete debridment

### **Host related :**

Gender .  
Age .  
Tooth type.  
Immunological state .  
Psychological factors .

### **Microbial causes :**

Types of microbes .  
Level of virulence .  
Development of  
secondary infection.

## **Pharmacotherapy in Endodontic mainly involves :-**

- Local Anesthesia .
- Non – Narcotic analgesic : NSAIDS.
- Opioid analgesics.
- Corticosteroids .
- Antibiotics .

In post endodontic pain , dentist usually use Non – Narcotic analgesic.

## **REVIEW OF LITERATURE**

Postoperative pain is one of the primary problems in endodontic treatment. Although the success of endodontic treatment is highly related to the elimination or reduction of post-endodontic pain, many clinical studies have reported varying degrees of pain, ranging from 25 to 40%. [1,2,3]



## **FACTORS INFLUENCING POST ENDODONTIC PAIN:**

Certain factors may influence the progression of postoperative pain, such as :

1. History of preoperative pain .
2. Need for re-treatment[4,5].
3. Microorganisms are usually regarded as the most common cause of postoperative pain.
4. Mechanical or chemical injury to pulpal or periradicular tissues. [6]
5. Iatrogenic circumstances can lead to post-endodontic pain. The operator can induce post-endodontic pain by extruding debris, instruments, paper points, filling materials or disinfectant outside of the canal and into the periapical tissues [7]

Unfortunately these situations are sometimes unavoidable and result in post-endodontic pain.

## **SINGLE VISIT VS MULTIPLE VISIT ROOT CANAL TREATMENT:**

The number of office visits required to complete root canal therapy has been continually argued. The incidence of postoperative pain between one-visit endodontics and multiple-visit endodontics has been explored.

**Fox et al. 1970** evaluated postoperative pain in 247 teeth following complete, one-visit endodontic treatment. Within 24 hours following treatment, 90% of the patients showed little or no spontaneous pain and 82% had little or no percussion sensitivity [8].

**Mulhern et al. 1982** concluded that no difference existed in postoperative pain and the number of visits required to complete the root canal procedure [9].

**Morse et al. 1987** studied 200 cases and found 98.5% of the patients showed no or slight pain after one appointment root canal therapy [10].

**Fava et al. 1989** from Netherlands found no difference in the incidence of pain between one and two visit cases [11].

**Thorpe. 1991** reported no flare ups in one appointment cases with no apical lesions [12].

**Bayram Ince. 2009** compared the incidence of postoperative pain after single-and multi-visit endodontic treatment of teeth with vital and non-vital pulp and found No significant difference in postoperative pain between vital and non-vital teeth [13].

**Su et al. 2011** compared healing rate and post-operative pain of single visit versus multiple visit treatments in infected root canals [14].

**Samita singh. 2012** compared the intensity of post obturation pain after single or multiple visit root canal treatment on single rooted teeth in a randomized controlled trail and concluded that the incidence and intensity of post obturation pain experience were not significantly different [15].

**Sumita Bhagwat. 2013** compared the post-operative pain following single visit endodontics in vital and non-vital teeth, with and without periapical radiolucency and found no statistical difference between incidence of pain in vital and non-vital teeth without periapical radiolucency. Non-vital teeth with periapical radiolucency exhibited relatively less pain as compared with non-vital teeth without periapical radiolucency[16].

### **USE OF NSAIDS FOR POST ENDODONTIC PAIN:**

Ideally, root canal therapy would eliminate all pain that exists in the involved tooth. Unfortunately, the physiodynamics of the inflammatory process do not allow for pain to immediately disappear once the source of the pain is removed. An acute inflammatory process causes increased hydrodynamic pressure in the periodontal ligament space, resulting in a pain response. This inflammatory process may arise from procedures completed during the root canal procedure. These include haemorrhage resulting from pulpal extirpation, cleaning and shaping of the root canal systems, irrigation, intracanal medications and/or root canal obturating materials [17]. Injury to the periradicular tissue initiates the inflammatory cascade. Inflammatory mediators; histamine, serotonin, bradykinin, prostaglandin, and leukotriene are

released, causing increased vascular permeability and eventually pain [18,19].

**Winter et al. 1978** compared the effectiveness of 400 mg and 800 mg of ibuprofen to 650 mg of aspirin, 65 mg of propoxyphene HCl, and a placebo in 510 patients experiencing pain subsequent to oral surgery procedures. Ibuprofen, at both doses, was shown to be more effective for both degree and duration of relief from pain[20].

**Flath. 1987** concluded that prophylactic administration of flurbiprofen significantly reduced post-endodontic pain in patients who were symptomatic before treatment, compared to patients who received a placebo [21].

**Torabinejad et al.1994** evaluated the effectiveness of nine different medications on postoperative pain following complete instrumentation and following root canal obturation. In the study, three factors (preoperative pain, apprehension, and types of medication) were found to be significant in determining post instrumentation pain. In patients with moderate to severe preoperative pain, ibuprofen, ketoprofen, erythromycin base, penicillin, and methylprednisolone plus penicillin were more effective in controlling postoperative pain than a placebo within the first 48 hours following complete instrumentation[22].

**Dionne et al.2003** evaluated relative efficacy of selective cox-2 inhibitor compared with over the counter ibuprofen. Both drugs significantly reduced pain compared with placebo [23].

**Hakan Arslan et al.2006** evaluated effectiveness of tenoxicam and ibuprofen for pain management following endodontic therapy. Results showed that in the 6 hr period both 20 mg tenoxicam or 200 mg ibuprofen provided significantly better pain relief than placebo [24]. The ultimate goal of analgesic use is pain relief. Nonsteroidal anti-inflammatory drugs inhibit prostaglandin synthesis by decreasing the activity of the enzyme cyclooxygenase, which results in decreased formation of prostaglandin precursors. Researchers have discovered that the cyclo-oxygenase enzyme exists as two separate entities, Cox-1 and Cox-2. Cox-1 synthesizes protective prostaglandins, which preserve the integrity of the stomach lining and maintain normal renal function. Cox-2 is induced by pro-inflammatory cytokines and growth factors, which implies that Cox-2 plays a role in both inflammation and control of cell growth [25].

Ibuprofen is one of the most effective and commonly used NSAIDS for control of postoperative pain associated with root canal treatment and it has good efficacy and safety profile.

### **LOW-LEVEL-LASER-THERAPY (LLLTH) LASERS: [26]**

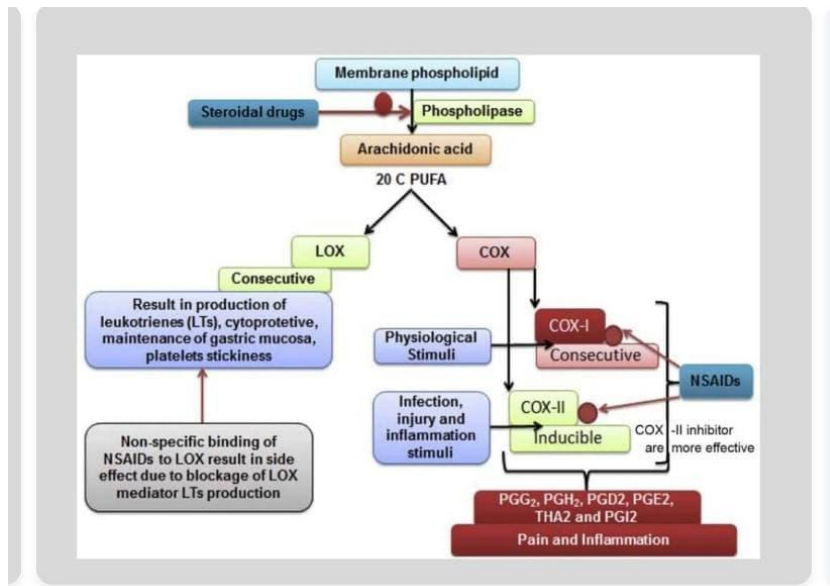
Recently rapid developments in laser technology and better understanding of bio-interactions of different laser systems have broaden new horizons for clinical use of laser in contemporary endodontics. Currently the following analgesic effects of Lasers are recognized:

1. Low-power lasers inhibit the release of mediators from injured tissues. In other words, they decrease concentration of chemical agents such as histamine, acetylcholine, serotonin, H<sup>+</sup> and K<sup>+</sup>, all of which are pain mediators.
2. Low-power lasers inhibit concentration of acetylcholine, a pain mediator, through increased acetylcholine esterase activity.
3. They cause vasodilatation and increase blood flow to tissues, accelerating excretion of secreted factors. On the other hand, better circulation leads to a decrease in tissue swelling.
4. They decrease tissue edema by increasing lymph drainage. They also remove the pressure on nerve endings, resulting in stimulation decrease.
5. These lasers decrease sensitivity of pain receptors as well as transmission of impulses.
6. They decrease cell membrane permeability for Na<sup>+</sup> and K<sup>+</sup> and cause neuronal hyperpolarization, resulting in increased pain threshold.
7. Injured tissue metabolism is increased by electromagnetic energy of laser. This is induced by ATP production and cell membrane repolarization.

### **Non – Narcotic analgesic :**

#### **NSAIDs :**

Major class of drugs for managing endodontic pain . NSAIDs offer anti- inflammatory , analgesic and antipyretic effect . In 1971 ,Vane & coworkers observed that aspirin & other NSAIDs blocked prostaglandin production .



A clinical trials to assess the efficacy of NSAIDs drugs to control the post root canal treatment pain by Dr.Wail Elzaki , University of Khartoum in April 15, 2015 .

### **Ibuprofen :**

One of the most commonly used pain medications is ibuprofen. Many endodontic recommend ibuprofen 600- 800 mg significantly more than any other pain medication. Due to the mechanism of action, ibuprofen is able to treat both pain and inflammation at the site of injury. Ibuprofen is a non-steroidal anti-inflammatory drug (NSAID). This class of drugs, which includes aspirin, works by blocking the conversion of arachidonic acid to prostaglandins via the cyclooxygenase (COX) -1 and -2 pathways. By preventing the production of prostaglandins, inflammation can be reduced and pain managed. It has been shown in numerous studies that ibuprofen 400-800 mg is more effective than almost all other pain medications, including acetaminophen (APAP), narcotics, and combinations of narcotics and APAP . The U.S. Food and Drug Administration (FDA) has set the maximum single dose of ibuprofen at 800 mg and the maximum daily dose at 3200 mg. The potential side effects of ibuprofen range from mild to severe and include nausea, gastrointestinal bleeding, diarrhea, constipation, headache, dizziness, rash, renal impairment, stroke and heart attack. These adverse reactions, however, are rare; the more serious cardiovascular risks are

seen only in patients taking long-term high doses. Ibuprofen has also been shown to interfere with the antiplatelet activity of aspirin. Because the prostaglandin pathway is blocked by ibuprofen, much of the arachidonic acid is converted through the still-viable lipoxygenase pathway into leukotrienes. Some leukotrienes are responsible for bronchoconstriction, which can lead to an asthma attack in asthmatic patients. For this reason, those with asthma should not take ibuprofen [20].



### **Acetaminophen:**

It is another commonly used over-the-counter pain medication. While the method of action is not fully understood, it is thought that it generally affects pain perception centrally rather than peripherally as ibuprofen and other NSAIDs do. Recent work has found that the metabolite AM404 is responsible for all or part of the analgesic effects of acetaminophen. There has also been speculation that acetaminophen has some capacity as a COX-2 inhibitor, but this may be limited at the site of inflammation. The FDA recommends the maximum single dose be limited to 1000 mg and the daily dose to 4000 mg. At these levels, adverse effects are rare but can include nausea and other stomach issues. At higher doses, APAP can cause acute hepatotoxicity. Recently, there has been more evidence supporting a combination of both ibuprofen and acetaminophen in the treatment of post-operative pain. A study demonstrated that, following root canal therapy, a combination of ibuprofen 600 mg and APAP 1000 mg was more effective than ibuprofen 600 mg alone at treating post-operative pain. A combination of ibuprofen 400 mg and APAP 1000mg relieved pain better than a combination of

ibuprofen 200 mg and APAP 500 mg, ibuprofen 400 mg alone, or APAP 1000 mg alone. The addition of acetaminophen to ibuprofen has an additive effect that can preclude the need for narcotic analgesics and thus avoiding the undesired side effects [22].



### *Mefenamic acid :*

Oral mefenamic acid 500 mg was effective at treating moderate to severe acute postoperative pain, based on limited data. Efficacy of other doses, and safety and tolerability could not be assessed.

Adverse effects :

- Increased risk of bleeding due to clotting disorder  
an increased risk of bleeding.
- High blood pressure.
- A heart attack.
- Chronic heart failure.
- Abnormal bleeding in the brain resulting in damage to brain tissue, called a hemorrhagic stroke.
- A blood clot.
- An ulcer from too much stomach acid .



### *Diclofenac :*

A 50 mg tablet of the medication to be taken one hour before initiation of endodontic treatment. All patients receive the assigned premedication one hour before single-visit root canal treatment. The incidence of analgesic intake is also recorded.

Adverse effects :

- Stomach ache.
- Vomiting ( feeling sick or being ).
- Diarrhea.
- Black poo or blood in your vomit ( a sign of bleeding in a stomach).
- Headaches .
- Drowsiness.
- Tinnitus( ringing in your ears) [27] .





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