Review Article
AMERICAN JOURNAL OF PHARMACY AND HEALTH RESEARCH
www.ajphr.com
2014, Volume 2, Issue 10
ISSN: 2321–3647(online)

Pharmacologic Strategies in Management of Endodontic Pain

Amit Malhotra [1]*, Jyoti Ahlawat[1], Akhil Rajput[1]
1. M.D.S. Conservative Dentistry and Endodontics Senior Resident, Maulana Azad Institute of Dental Sciences New Delhi, India

ABSTRACT

The mark of an astute clinician is his ability to resolve patients discomfort and strive for complete patient satisfaction. This however becomes tough while providing dental care since patients already may have an instilled fear of dental treatment when they visit a dental practioner. Such fear and apprehension arises due to anticipation of pain during dental procedures. While treating endodontic infections, an important aspect is to provide adequate pain relief. Operative procedures may provide eventual healing of infection but post operative pain might still persist. Therefore adjunctive use of pharmacologic strategies is often required. This review article aims to outline various pharmacologic treatment approaches in resolving pain associated with endodontic cases.

Keywords: Endodontic Pain, dental treatment.

*Corresponding Author Email dramit.chd@gmail.com
Received 14 October 2014, Accepted 17 October 2014

Please cite this article as: Malhotra A *et al.*, Pharmacologic Strategies in Management of Endodontic Pain. American Journal of Pharmacy & Health Research 2014.

INTRODUCTION

Perception of pain and discomfort is often the first thought in patient's mind while deciding about dental treatment. This becomes even more relevant in case of endodontic diseases where often the only patient complaint might be sensation of pain. The severity of pretreatment pain often sensitizes the patient to expect even more discomfort during the treatment procedure. Such a situation presents a tough scenario for the clinician since pain has a psychologic aspect as well apart from the physiologic component.[1] The management of endodontic diseases employs both clinical procedures as well as adjunctive use of drugs to relieve pain and anxiety. While the mainstay of treatment strategy for resolution of pulpal and periapical pathology are the intraoperative procedures only including pulpotomy or pulpectomy but they seldom provide immediate pain relief. Most of the patients still complain of mild to severe pain even after completion of endodontic therapy.[2,3] Pharmacologic intervention in endodontics includes the use of drugs, mostly analgesics and less commonly antibiotics during preoperative and post operative period. Pretreatment patient fear may also require prescribing anti anxiety agents while intraoperative pain control is achieved by administering local anesthesia.[4] This article attempts to review the role and effectiveness of pharmacologic therapeutic interventions in management of endodontic pain.

Backland 6th edition, Keisner and Hargreaves, Endodontic topics, 2002)

The first step in pain management is to establish an accurate diagnosis. Its imperative for a dental clinician to be able to distinguish between odontogenic and non odontogenic pain and moreover to differentiate between pulpal and periodontal pain.

History and Chief complaint

Chief complaint of patient with pulpal pathology is often acute orofacial pain. Complete information should be obtained from the patient regarding history of pain in following sequence.

- Onset of pain : Acute endodontic pathology often presents with pain which is spontaneous and rapid in onset
- Location of pain
- Nature and severity of pain
- Referred pain
- Aggravating and relieving factors
- Effect of posture on pain

Medical and Dental history

Patient should be asked about the presence of any current or previous systemic illness that may mimic odontogenic pain like sinusitis, migraine, musculoskeletal disorders, ear and nose infections. Clinician should enquire regarding any associated symptoms that may occur concurrently like nausea, nasal congestion, vision changes. Previous dental history is also relevant regarding possible etiology of pulpal inflammation and also gives an idea regarding patient compliance. Soft tissue and mucosa are examined for presence of swelling or inflamed tissues. Periodontal health is evaluated by probing and percussion testing. Teeth are inspected to check for caries, faulty restorations, attrition or cracks.

Diagnosis of endodontic pain (figure. 1)

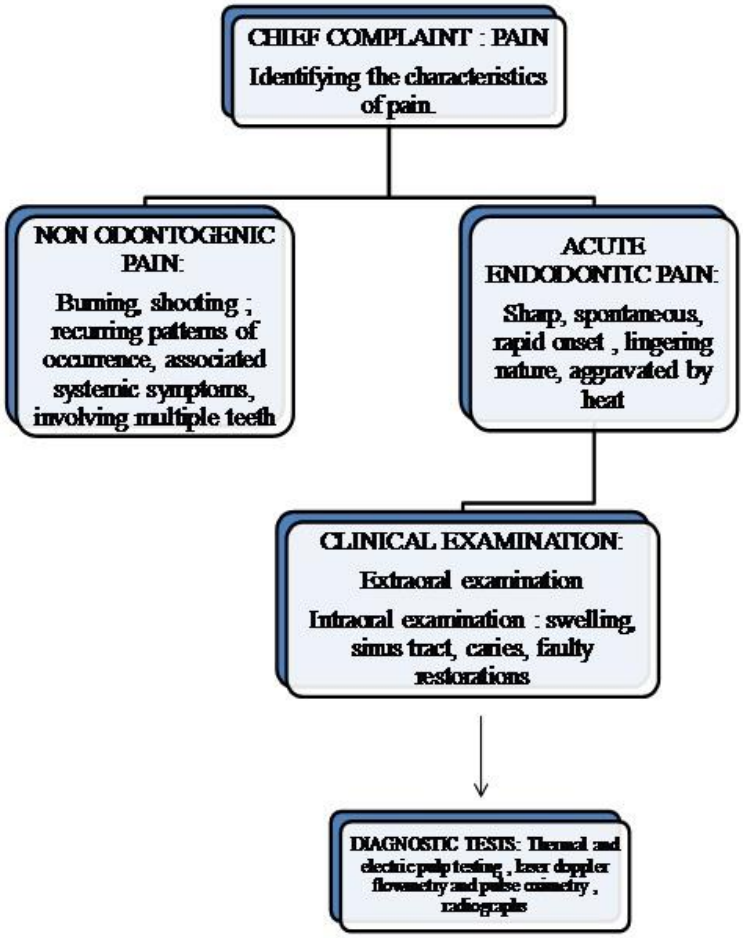

Figure 1: Steps in establishing diagnosis of Endodontic pain (Modified from Ingle and

Clinical examination and Diagnostic tests

Pulp Vitality tests

Thermal and electrical testing is commonly performed to check for presence or loss of pulp vitality and to find out if the pulpal inflammation is reversible or not. Cold tests have been considered to be more reliable most of the time. [5] If the pulpal inflammation is reversible then the pain usually subsides on removal of stimulus. However an irreversibly inflamed pulp will give a lingering response even after stimulus removal. Thermal tests are of little value in older patients since they have receded pulp cavity. Here electric pulp tests may be performed to assess the pulp status. Recent aids to check for pulp vitality include laser Doppler flowmetry and pulse oximeter.

Endodontic Pain Managament (Table 1)

Table 1: Treatment Modalities in Endodontic Pain Management

Preoperative Phase	Intraoperative Phase	Postoperative Phase
• Proper diagnosis of etiologic factor • Reducing patient apprehension : anxiety control and reassurance • Pharmacologic management ➢ Non narcotic analgesics (NSAIDS) ➢ Opiod drugs ➢ Anti Anxiety agents ➢ Use of corticosteroids to reduce inflammatory process	• Clinical procedures: ➢ Pulp capping ➢ Pulpotomy ➢ Root canal therapy ➢ Incision and drainage ➢ Occlusal reduction • Pharmacologic Adjuncts: ➢ Profound anesthesia: Moderate acting (Lidocaine) and long acting anesthetics (Bupivacaine,, Ropivacaine) ➢ Supplemental injection techniques: Intraligamentary, Intraosseous and intrapulpal injection ➢ Use of NSAIDS before administering local anesthesia: Ibuprofen, Acetaminophen	• Pharmacologic pain control • NSAIDS: Ibuprofen, Ketoprofen, Ketorolac, Acetaminophen, Diclofenac (Monotherapy / Combination of drugs for synergistic effect) • Opiod agents: Used in combination with NSAIDS • Role of Long acting anesthetic agents: May provide pain relief upto 24 hours after treatment

Preoperative and Intraoperative pain management

As discussed earlier, definitive treatment of pulpal pathology includes root canal therapy since it lowers the pulpal pressure and results in removal of the infected and necrotic tissues from the root canal system. Since the pain of pulpal diseases can be of most severe nature, it is of utmost importance to achieve profound local anesthesia. Apart from the nerve block, there is often a

need to administer supplemental injections especially in cases of acute irreversible pulpitis. 2% lidocaine with 1:100000 epinephrine is a commonly used local anesthetic agent. If a prolonged duration of pain control is desired, then long acting anesthetics like bupivacaine can be used. [6,7] Ropivacaine is another long acting anesthetic that has lower risk of central nervous system and cardiovascular effects.[8] Long acting anesthetic agents also appear to a provide considerable post treatment pain relief. Incidence of post treatment pain reduces for upto period of 48 hours.[9]

Management of Postoperative pain

Various drugs that have been used for treating post operative endodontic pain include non narcotic analgesics consisting of non steroidal anti-inflammatory analgesics, opioids and steroidal drugs.

(a) Non steroidal anti-inflammatory drugs (NSAIDS)

These drugs are commonly prescribed for management of both pre and post treatment endodontic pain. They act by blocking the activity of cyclooxygenase (COX 1 and 2) enzyme. In human dental pullps with irreversible pulpitis, a higher level of expression of COX 2 was demonstrated by Nakinishi et al [10] In cases on irreversible pulpitis NSAIDS can be administered preoperatively since they reduce the level of PGE2 which is responsible for sensitization of pulpal nociceptors. This lowers the resistance of nociceptors to local anesthetics.[11] Drugs like Ibuprofen and ketorolac as monotherapy have proved effective in various studies for relieveing post treatment endodontic pain.[12,13,14] As an alternative to a single drug, a combination of non selective NSAID with acetaminophen or an opioid could also be used for pain management. Acetaminophen has less adverse effects compared to other NSAIDS and it appears to provide an additive action in combination with various NSAIDS such as ibuprofen, ketoprofen, diclofenac in pain relief.[15]

(b) Steroids

Glucocorticoids were utilised in endodontics due to their anti-inflammatory properties. They have proved effective in resolving post operative pain and inflammation when used as intracanal medicament.[16] Various steroidal agents that have been studied include ledermix, dexamethasone, prednisolone and triamcinolone acetonide. Nobuhara reported a significant Periapical anti-inflammatory effect of local infiltration of dexamethasone in vital and partially necrosed teeth with over instrumentation.[17] Intraosseous injection of methylprednisolone have been shown to achieve significant pain reduction in teeth with irreversible pulpitis where no endodontic treatment was performed.[18]

c) Opioids have been advised for endodontic pain management in situations where additional pain control is required after administering NSAIDS. They reduce pain by acting on mu receptors that block pain transmission from trigeminal nucleus to higher brain centers.[19,20] Commonly prescribed opioid analgesic combinations include acetaminophen (300 mg) and codeine (30 mg) or acetaminophen (500 mg) and hydrocodone or oxycodone (5 mg). However the use of opioids is associated with side effects like vomiting, dizziness, constipation. Tolerance and dependence may occur with chronic use. A synthetic opioid drug with lower abuse potential and decreased incidence of adverse effects is tramadol. It has shown excellent efficacy in reduction of moderate to severe endodontic pain.[21]

Relevance of antibiotics in endodontic pain management

The root cause of endodontic pain is the inflammatory process that increases the interstitial tissue pressure inside the pulp cavity or the inflammation present in confined periapical tissue space. The only way to effectively relieve this pressure is through debridement of root canal or through incision and drainage of swelling. Antibiotics are not routinely advocated in pulpal and periapical pathology since effective endodontic therapy along with host immune responses is sufficient to resolve the infection. The role of antimicrobials is of significance only in cases where the host defense system fails to localise the infection resulting in diffuse cellulitis or presence of systemic symptoms.[22] Apart from the various adverse effects of these drugs, the most undesirable side effect associated with injudicious use of antibiotics is the emergence of resistant microbial strains.[23,24,25] Studies have demonstrated the development of drug resistance in bacterial strains of enterococci including E. faecalis which is most frequently present in teeth with failure of endodontic therapy.[26] Therefore the usage of antibiotic drugs should be guarded in endodontic infections since they offer no advantage in pain resolution and are instead associated with the danger of increasing bacterial drug resistance.

CONCLUSION

Pulpal and periapical diseases may result in symptoms of pain ranging from mild to severe nature. Extensive pain coupled with patient's fear and anxiety makes it all the more difficult for clinician to provide effective dental treatment. Therefore the most important aspect of managing endodontic patient is profound pain control during and after the treatment. Although the mainstay of treating endodontic infection is to carry out the canal debridement procedures, still pharmacologic management of pain is often required as an adjunct in most of the cases. The perioperative pain reduction is achieved by profound anesthesia. Postoperative pain management

relies mostly on the use of analgesics including NSAIDS like ibuprofen and acetaminophen. Apart from non narcotic drugs, steroids and opioids have also been recommended in literature as effective adjuncts as well as alternatives.

REFERENCES

1. Mehlisch DR. The efficacy of combination analgesic therapy in relieving dental pain. J Am Dent Assoc 2002;133(7):861-71.
2. Marshall JG, Walton RE. The effect of intramuscular injection of steroid on posttreatment endodontic pain. J Endod 1984; 10(12):584-8.
3. Liesinger A, Marshall FJ, Marshall JG. Effect of variable doses of dexamethasone on posttreatment endodontic pain. J Endod 1993; 19(1):35-9.
4. Keiser K, Hargreaves KM. Building effective strategies for the management of endodontic pain. Endod Top. 2002;3:93–105.
5. Petersson K, Soderstrom C, Kiani-Anaraki M, Levy G. Evaluation of the ability of thermal and electrical tests to register pulp vitality. Endod Dent Traumatol 1999;15: 127–131.
6. Dunsky JL, Moore PA. Long-acting local anesthetics: a comparison of bupivacaine and etidocaine in endodontics. J Endod 1984;10(9):457-60.
7. Moore PA, Dunsky JL. Bupivacaine anesthesia- a clinical trial for endodontic therapy. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1983;55(2):176-9.
8. Kennedy M, Reader A, Beck M,Weaver J. Anesthetic efficacy of ropivacaine in maxillary anterior infiltration. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;91(4):406-12.
9. Crout R, Koraido G, Moore PA. A clinical trial of long acting local anesthetics for periodontal surgery. Anesth Progr 1990; 37: 194–199.
10. Nakanishi T, Shimizu H, Hosokawa Y, Matsuo T. An immunohistological study on cyclooxygenase-2 in human dental pulp. J Endod 2001; 27(6):385-8.
11. Rood JP, Pateromichelakis S. Inflammation and peripheral nerve sensitisation. Br J Oral Surg 1981;19: 67–72.
12. Torabinejad M, Cymerman JJ, Frankson M, Lemon RR, Maggio JD, Schilder H. Effectiveness of various medications on postoperative pain following complete instrumentation. J Endod 1994; 20(7):345-54.
13. Penniston SG, Hargreaves KM. Evaluation of periapical injection of Ketorolac for management of endodontic pain. J Endod 1996; 22(2):55-9.
14. O'Hara DA, Fragen RJ, Kinzer M, Pemberton D. Ketorolac tromethamine as compared with morphine sulfate for treatment of postoperative pain. Clin Pharmacol Ther 1987; 41(5):556-61.

15. Miranda HF, Puig MM, Prieto JC, Pinardi G. Synergism between paracetamol and nonsteroidal anti-inflammatory drugs in experimental acute pain. Pain 2006;121(1-2):22-8.
16. Liesinger A, Marshall FJ, Marshall JG. Effect of variable doses of dexamethasone on posttreatment endodontic pain. J Endod 1993; 19(1):35-9.
17. Nobuhara WK, Carnes DL, Giles JA. Anti-inflammatory effects of dexamethasone on periapical tissues following endodontic over-instrumentation. J Endod 1993;19: 501-507.
18. Gallatin E, Reader A, Nist R,Beck M. Pain reduction in unteated pulpitis using an intraosseous injection of Depo-Medrol. J Endod 2000;26(11):633-8.
19. Dionne R, Lepinski AM, Gordon SM, et al. Analgesic effects of peripherally administered opioids in clinical models of acute and chronic inflammation. Clin Pharmacol Ther 2001;70:66.
20. Hargreaves K, Joris J. The peripheral analgesic effects of opioids. J Am Pain Soc 1993;2:51
21. Scott LJ, Perry CM. Tramadol: a review of its use in perioperative pain. Drugs 2000; 60(1):139-76.
22. Faoud AF. Are antibiotics effective for endodontic pain? Endodontic Topics. 2002;2(1):52-66.
23. Handal T, Olsen I. Antimicrobial resistance with focus on oral b-lactamases. Eur J Oral Sci 2000; 108: 163–174.
24. Harrison JW, Svec TA. The beginning of the end of the antibiotic era? Part I. The problem: abuse of the 'miracle drugs'. Quintessence Int 1998: 29: 151–162.
25. Harrison JW, Svec TA. The beginning of the end of the antibiotic era? Part II. Proposed solutions to antibiotic abuse. Quintessence Int 1998: 29: 223–229.
26. Kaye KS, Fraimow HS, Abrutyn E. Pathogens resistant to antimicrobial agents. Epidemiology, molecular mechanisms, and clinical management. Infect Dis Clin North Am 2000; 14:293-319.