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Comparative efficacy of pre emptive Paracetamol, Ibuprofen, and Diclofenac for post operative pain relief in surgical extractions

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Abstract

Background: Post operative pain management is crucial and remains a source of concern post surgical extractions. Insufficient analgesia and the subsequent pain affect the patient physically and psychologically. Drugs (NSAIDS) are one of the most commonly used treatment modalities for pain relief for surgical extraction.

Materials and methods: Sixty patients are divided into 3 groups with 20 patients each . The groups were administered pre emptive analgesia based on their randomisation- paracetamol, diclofenac and ibuprofen. Post operative pain at 2, 4 and 6 post surgical extraction were measured on the VAS scale.

Results:A p-value of <0.05 was considered to be statistically significant.There was a significant decrease in mean pain VAS scores for diclofenac group compared to paracetamol and ibuprofen groups at 4 hours postoperatively (one-way Analysis of Variance: p=0.0001, p=0.001) and 6 hours postoperatively (p=0.04, p=0.005) and this result was statistically significant.

Conclusion: Pre emptive Diclofenac was more effective than paracetamol or ibuprofen for reducing postoperative pain associated with surgical extraction.Patients' post operative anxiety levels and distress are also adequately controlled with it. Using diclofenac could be of great help to patients who are in moderate to severe pain during surgical dental procedures.

Keywords: pre emptive, analgesia, surgical extraction, paracetamol, ibuprofen, diclofenac

Introduction

The extraction of the mandibular third molars is the most frequent treatment that oral and maxillofacial surgeons perform . Surgical dental extractions are commonly associated with trauma to both the soft and hard tissues. Post operative pain management is crucial and remains a source of concern. With increase in the difficulty of the surgical extraction, the discomfort and pain worsen [1]. Insufficient analgesia and the subsequent pain affect the body systemically. All types of surgery induce wounds and inflammation, which alters how the body perceives stimuli of all kinds. Nonsteroidal Anti inflammatory Drugs (NSAIDS) are one of the most commonly used treatment modalities for pain relief for surgical extraction. It has been proven that NSAIDs are helpful in lowering postoperative discomfort [2]. NSAIDs function directly at the site of damage. By preventing the release of prostaglandins and

thromboxanes, NSAIDs prevent the propagation of the inflammatory process. These metabolites only operate locally and have no systemic role [3]. NSAIDs reduce these metabolites' concentration and peripheral nociceptors' sensitivity [4].

Considering its anti-inflammatory, analgesic, and antipyretic properties, diclofenac is one of the most researched and frequently used NSAIDs [5]. It is often used to manage pain following third molar extractions and is quite efficient in relieving discomfort [6]. Diclofenac inhibits prostaglandin synthesis which in turn inhibits Cyclooxygenase enzymes 1 and 2.

Ibuprofen is a derivative of 2-propionic acid that acts as a potent anti-inflammatory and peripherally acting analgesic by reversibly inhibiting both COX-1 and COX-2 enzymes in a balanced manner. It has been thoroughly investigated for the treatment of postoperative tooth pain, and several studies have attested to its efficacy(7)

Paracetamol (acetaminophen) is a nonopioid analgesic possessing antipyretic activity and is effective in relieving pain with a low incidence of adverse effects (8). It is one of the most commonly used analgesics and is widely available without prescription around the world. Paracetamol is often grouped with the nonsteroidal anti-inflammatory drug (NSAID) family, however, it is considered only to have relatively weak anti-inflammatory activity.

This study aims to compare the effectiveness of different pre emptive oral analgesics (NSAIDS) for relieving pain and distress in adults following surgical extraction of teeth and under local anaesthesia.

Materials and methods

The participants for the study were recruited from the outpatients of the Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital, Chennai, Tamil Nadu, India in patients presenting with a requirement for surgical removal of the impacted mandibular third molar tooth(position A, class 1). The Institutional Human Ethics committee had given approval for conducting the study (IHEC/SDC/OMFS-2302/24/115) and written informed consent was obtained from the participants. This randomised controlled study was conducted on 60 patients who were randomly allocated to 3 groups. There were 20 patients in the paracetamol (500 mg) group, 20 in the ibuprofen (400 mg) group and 20 in the diclofenac (50 mg) group. A single operator performed all the surgical procedures. The patients were allocated into three groups based on sealed opaque envelopes prepared by the investigator and both the operator and the participants were unaware of the study grouping (double blinding). Pre emptive dose of analgesia was administered one hour prior to the procedure based on the allocated group. Mandibular anesthesia was induced with 2% lignocaine hydrochloride with 1:80,000 epinephrine as inferior alveolar nerve block. Full thickness mucoperiosteal flap was elevated and the tooth was elevated and removed. Closure was done using 3-0 silk. All the operated patients were admitted in the day care unit and patients were discharged after assessment of postoperative pain. The pain was assessed using a Visual Analogue Scale (VAS score from 0 to 10 at two, four and six hours post-surgical removal of the impacted tooth, wherein a score of 0 = no pain, values between 0-3 = mild pain, values 4-7 = moderate pain, values between 8-10 = severe pain, and a score of 10 = most severe pain). Pain intensity at various time intervals was compared among the three groups. In both groups, postoperatively patients were prescribed antibiotics and analgesics for five days and 0.12% chlorhexidine gluconate mouthwash for a week.

Results

The statistical data was analysed using SPSS for Windows version 23.0 (IBM Corp., Armonk, NY, USA). The comparative statistical test adopted to compare pain scores between the two groups was the one way analysis of variance. A p-value of <0.05 was considered to be statistically significant.There was a significant decrease in mean pain VAS scores for diclofenac group compared to paracetamol and ibuprofen groups at 4 hours postoperatively (one-way Analysis of Variance: $p=0.0001$, $p=0.001$) and 6 hours postoperatively ($p=0.04$, $p=0.005$) and this result was statistically significant.

Discussion

An essential component of providing surgical patients with care is postoperative pain control. Opioids and non-steroidal anti-inflammatory medicines (NSAIDs) are the two primary classes of medications used to relieve pain following surgery. For dental outpatients, NSAIDs are frequently recommended to reduce pain during tooth extractions. This study compared the efficaciousness of diclofenac, ibuprofen and paracetamol as analgesics after surgical extraction of impacted third molars. All treatment groups in the research had a decrease in pain, with Diclofenac showing significantly greater efficacy than Ibuprofen and Paracetamol in lowering pain intensity and severity.

The findings of this study revealed that all the three analgesics (paracetamol at dosage of 500 mg, ibuprofen at dosage of 400 mg and diclofenac at dosage of 50 mg) reduced the post surgical extraction pain. The result also showed that the diclofenac was statistically stronger than paracetamol and ibuprofen in terms of reduction of pain intensity and frequency. Taking a single dose of 50 mg diclofenac pre operatively is sufficient to achieve reliable pain control following surgical extraction. In this study, there were only 3 (15%) patients in diclofenac group who requested additional analgesics postoperatively. In contrast, there were 11 (35%) patients in the paracetamol group and 9 (55%) patients in the ibuprofen group who required supplementary rescue analgesia.

Diclofenac was found to be more effective than paracetamol or ibuprofen for reducing postoperative pain associated with tooth extraction in a randomized control trial done by Gazal G et al., which postulated that the effectiveness of diclofenac potassium over ibuprofen & paracetamol could be as a result of the differences in the chemical properties rather than the mode of action.The possible mechanism of the superiority of diclofenac over ibuprofen and paracetamol may be due to its faster absorption rate and rapid onset of action. The second possible reason could be as a result of the slight differences in their mechanism of action as diclofenac is a preferential COX-2 inhibitor.(9)

According to the research by Eslampour et al, patients who took pre emptive diclofenac experienced less pain than those who took paracetamol and ibuprofen.The ability of diclofenac bound to plasma proteins (99%) may justify its potency over the ibuprofen & paracetamol. In addition, neutrophil chemotaxis and superoxide production at the inflammatory site are greatly reduced by diclofenac. (10)

Conclusion

Pre emptive Diclofenac was more effective than paracetamol or ibuprofen for reducing postoperative pain associated with surgical extraction.Patients' post operative anxiety levels and distress are also adequately controlled with it. Using diclofenac could be of great help to patients who are in moderate to severe pain during surgical dental procedures.

Additional information :

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Ethics: Due ethical clearance was obtained from the institutional ethics committee. Ethical clearance reference number :IHEC/SDC/OMFS-2302/24/115

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