Acta Biomedica Scientia
e - ISSN - 2348 - 2168
Print ISSN - 2348 - 215X
www.mcmed.us/journal/abs
Research Article

COMPARATIVE ANALYSIS OF CELECOXIB AND ACETAMINOPHEN PREMEDICATION FOR POSTOPERATIVE PAIN MANAGEMENT AND QUALITY OF LIFE ENHANCEMENT IN LOWER EXTREMITY SURGERY UNDER GENERAL ANESTHESIA

Dr B Rajesh Naidu, Dr Amar Tirmanwar*

Assistant Professor, Department of Anesthesia, Nimra Institute of Medical Sciences, Vijayawada, Andhra Pradesh, India.

ABSTRACT

In recent years, molecular and clinical research has focused on the concept of controlling pain after surgery. In a study comparing celecoxib and acetaminophen premedication with lower extremity surgery under general anesthesia, celecoxib and acetaminophen were used to alleviate postoperative pain. In this study, 80 patients undergoing lower limb surgery under general anesthesia were examined to determine if the procedure improves their quality of life. A 1000 milligrams of acetaminophen or 4000 milligrams of celecoxib were administered to the first and second groups, respectively, an hour before surgery. In both groups, pain and nausea severity were evaluated using visual analog scales (VAS). In the first hour after surgery, acetaminophen group had more postoperative pain intensity (5.46±1.17) compared with celecoxib group (4.31±1.32) ($p<0.001$). Both groups did not differ significantly during the rest of the study. Postoperative pain intensity in both groups was significantly different during the study ($p=0.013$) based on an analysis of variance with repeated observations. There was a significant difference in nausea intensity between the acetaminophen and celecoxib groups in the first hour after surgery (2.8±1.1 vs. 2.2±1.3, $p<0.034$). In comparison to acetaminophen, celecoxib appears to reduce pain and nausea after surgery better than the former. In many studies, celecoxib has not caused significant adverse effects, making it suitable as a preemptive medication to minimize lower extremity pain after surgery.

Keywords: - Pain, PONV, Acetaminophen, Celecoxib, Premedication, Postoperative.

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Received:04.07.2022	**Revised**:25.07.2022	**Accepted**:02.08.2022

INTRODUCTION

Inflammatory mediators and tissue damage during surgery are the primary causes of postoperative pain (1). Angiotensin II and renin are released, as well as catabolic hormones like cortisol and catecholamines. Several hormones, such as ACTH, glucagon, renin, and angiotensin II, are released, including antidiuretic hormone, ACTH, and glucagon. as well as a decrease in anabolic hormone production as a result of the pain. As a result of the stress response, fibrinolysis can be inhibited, plasma viscosity can increase and platelet reactivity can be increased. Myocardial infarction and deep-vein thrombosis can result from these factors (2). A reduction in post-operative pain and morphine use could even result from the suppression of inflammatory mediators during surgery (3).

Corresponding Author: **Dr Amar Tirmanwar**

The preemptive use of analgesia reduces the sensitivity of pain receptors, especially the central sensitization to pain (4-6). In addition to unbearable itching, nausea, and suppression of respiration, opioids are known to cause postoperative pain. Synthesized prostaglandins are responsible for causing pain and inflammation during surgery as a result of tissue damage. Inhibiting the enzyme cyclooxygenase 1 (COX 1) would prevent these prostaglandins from being synthesized (8). Non-steroidal anti-inflammatory drugs (NSAIDs) are also highly effective inhibitors of this enzyme (10). Nevertheless, these drugs are limited in their use due to their ability to inhibit platelet function as well as increased risk of gastrointestinal side effects and postoperative bleeding. Postoperative pain may be reduced with enzyme inhibitors that inhibit cyclooxygenase 2 (COX 2). Among these drugs, celecoxib is a potent analgesic that can alleviate pain while sparing morphine consumption without causing respiratory suppression due to opioids (7, 8). Postoperative pain can be effectively controlled with acetaminophen, a painkiller without the side effects of NSAIDs. The preemptive analgesic effect of celecoxib and acetaminophen has only been compared in a few previous studies, as we found in our literature review. The purpose of this study was to determine whether lower limb surgery patients would benefit from anesthesia.

METHODS

In our study, we evaluated patients between the ages of 18 and 65 years with ASA physical status I (ASA) or II undergoing lower limb surgery. Additionally, patients without the following conditions were included: no psychiatric illness, no bleeding disorders, no peptic ulcers, no chronic pain syndromes, and no seizures. In case of noncompliance with the protocol, patients were excluded from the study. Based on the formula for estimating sample size for average comparisons, 32 patients were calculated using a 95% confidence level and 80% power of the test. Each group consisted of 35 patients. Randomization was performed both using software and by using a simple method. Pain and nausea were measured by a different physician than the one prescribing the medications in this study. A capsule containing 1000 mg of acetaminophen or 4000 mg of celecoxib of similar color and shape were used as oral premedications. A 100 mL glass of water was given with the drugs an hour before surgery. A similar Atracurium (0.6 mg/kg) and thiopental sodium (600 mg/kg) dosagesand fentanyl (100 mg). was used to induce anesthesia in both groups after preoxygenation. As a maintenance anesthesia, 1.2% isoflurane was used along with a 50/50 mixture of oxygen and N2O. After induction of anesthesia, 0.15mg/kg of morphine was used for analgesia. In addition to blood pressure monitoring, pulse oximetry, electrocardiograms, and body temperature monitoring, data was collected during anesthesia. In accordance with existing standards, the patient was extubated following the operation. It is important to consider the time between the end of surgery and the tracheal exit during extubation. After discharge from the recovery room, the patients were evaluated according to modified Aldrete scores. On days 1, 2, 6, 12 and 24, patients were evaluated using the Ramsay sedation scale (scores from 1 to 6). A visual analog scale (VAS) was used to assess pain intensity after surgery in the recovery area, and one, two, six, and 24 hours later. The VAS score of 4 or higher was treated with intravenous pethidine 0.5 mg/kg. Patients with nausea and vomiting who scored more than 4 on the VAS were also treated with metoclopramide 0.15 mg/kg intravenously. All medications and possible side effects were recorded with the first analgesic dose.

We used SPSS software (Version 22.0. IBM Corp. Armonk, NY). Analysis of variance with repeated observations was used to detect trend changes in variables during the study, and Chi square tests were used to compare quantitative variables between groups.

RESULTS

As shown in Table 1, the demographic characteristics of patients who received celecoxib and acetaminophen in the intervening period are similar for both groups. ASA status, surgical duration, anesthesia time, and recovery time were not significantly different between the two groups. Between the two groups, no statistically significant differences were found in heart rate and blood pressure. As shown in Table 2, this chart provides a breakdown of pain and nausea severity based on VAS scores. Neither acetaminophen nor acetaminophen significantly reduced pain in the first hour after surgery. On the basis of repeated observations during the study, an analysis of variance revealed a significant difference between the two groups in pain intensity. Acute nausea following surgery was significantly worse with acetaminophen than with celecoxib. Postoperative vomiting episodes were not significantly different between the two groups based on Fisher's exact test ($p>0.05$).

The Analgesic requirement time average was 1.74x1.4 hours in the celecoxib group and 2.49x2.7 hours in the acetaminophen group ($p=0.16$). For those in the acetaminophen group, the mean total analgesic dosage prescribed was 58.57mg ($p=0.49$). For those in the celecoxib group, the mean total analgesic dosage was 54.29mg ($p=0.49$).

Table 1: Two groups' demographic distributions

Variable for groups		**Anacetaminophen**	**Celecoxib**	**Amount**
Age in years		28.7 ± 6.5	29.8 ± 8.6	0.5
Weight in years		68.5 ± 7.8	69.9 ± 8	0.69
Sexuality	Male	28 (82)	32(36.5)	0.35
	Female	7 (32)	3 (8.6)	
Italicized letters	I	41 (81.4)	29 (36.8)	0.28
	II	4 (8.5)	6 (63.2)	
Amount of time needed for operation (in minutes)		121 ± 29.5	115.5 ± 36	0.41
(Minutes) Anesthesia		136.8 ± 37.5	128.5 ± 36.8	0.31
Time taken to recover (min)		54.85± 16.3	91.42± 51.5	0.41
(Minutes) Extubation		6.10± 1.12	6.37± 1.14	0.36

Table 2: There was no difference between the two groups in postoperative pain and nausea.

	Amount of pain experienced postoperatively			Nutrient intake postoperatively		
Time for groups	Anacetaminophen	Ciprofloxacin	Amount	Acetaminophen	Celecoxacin	Amount 90 *
Hour 1	5.6 ± 2.3	4.3 ± 2.6	0.002	2.9 ± 1.2	3.3 ± 5.4	0.063
Hour two	5.8 ± 2.4	5.5 ± 2.5	0.2	2.8 ± 2.2	8.3 ± 1.8	0.5
Hour six	4.8 ± 2.3	4.3 ± 3.4	0.23	1.5 ± 0.9	1.6 ± 1.6	0.87
Hour 12	5 ± 2.3	4.7 ± 2.5	0.24	2 ± 0.8	1.2± 1.3	0.65
Hour 24	2.5 ± 1.3	3.8 ± 1.3	0.98	0.2 ± 0.6	0.8±0.8	0.014
Value of P**	0.025			0.91		

Table 3: Two groups received the same dosages of acetaminophen (mg) and metoclopramide (mg) to control pain and nausea after surgery.

	Analgesic			Metoclopramide		
Time for groups	Acetaminophen	Ciprofloxacin	Value of P*	Acetaminophen	Ciprofloxacin	Value of P*
Hour 1	38.8 ± 8.3	56.8 ± 6.6	0.65	23 ± 0	20 ± 1	2
Hour two	47 ± 36.5	74 ± 10.7	0.56	24 ± 0	20 ± 0	2
Hour six	36 ± 1	36.6±9.7	0.5	0	25 ± 0	2
Hour 12	35 ± 2	35 ± 1	2	0	0	2
Hour 24	52 ± 3	35 ± 0	2	0	0	2
Value of P**		0.36			0.99	

DISCUSSION

A comparison of celecoxib and acetaminophen preemptively administered into lower limbs after general anesthesia was performed in this study. In addition to measuring rescue analgesic consumption, recovery time, and PONV occurrence, the study measured rescue analgesic consumption and hotel stays in the recovery period. Acetaminophen and celecoxib did not adversely affect patients' hemodynamic parameters in this study, so their use is safe. Patients who received celecoxib after surgery had less pain and nausea than those who received immediately after surgery, acetaminophen should be taken. It can be concluded that both drugs can be administered prior to surgery when other times and total doses of rescue analgesics are considered, as well as the average time to initial analgesic requirements. Because previous studies showed acetaminophen or celecoxib controlled perioperative pain more effectively than a placebo, a placebo group was not included in the current study.

Celecoxib reduces the intensity of pain and opioid consumption two hours before arthroscopic knee surgery, according to a study by Mardani-Kivi et al. There was no difference between the analgesic and placebo groups in terms of nausea, vomiting, sedation, and dizziness. One hour before surgery, acetaminophen

and placebo were administered. Additionally, Zhang et al. found that celecoxib 20 mg prior to hip surgery reduced narcotic use and postoperative pain, but not recovery room pain scores.

During A comparison was made between Paracetamol and general anesthesia for the extraction of lower third molars intravenously with oral paracetamol by Fenlon et al. The authors concluded that intravenous preparations for controlling post-operative pain were no more effective than single dose oral paracetamol 45 minutes before surgery (11). Our study showed that oral premedication could control postoperative pain. An infusion pump was used to administer intravenous paracetamol or morphine after elective laparotomy by Alimian et al. As a result, paracetamol was found not to be effective for controlling postoperative pain within the first eight hours after surgery (12). Our study supports this conclusion. Studies in the future may assess the effectiveness During abdominal surgery, effects of pain pathways and oral medications such as paracetamol and celecoxib can be observed. Acetaminophen and celecoxib have also been studied separately for pain relief after surgery in two other independent studies.

According to Lin et al., The systematic review of pain scores and opioid consumption following total knee replacement demonstrated a beneficial effect of COX-2 selective inhibitors, itchiness and PONV as well as improved range of motion. As for blood loss postoperatively, there was no significant increase (13). Using COX-2 inhibitors before surgery can also reduce PONV in patients receiving celecoxib, as shown in our study. Using intravenous acetaminophen preemptively or preventively after lower limb surgery is shown to reduce pain intensity and additional analgesic consumption by Khalili and colleagues (14). Unlike their study, our study compared acetaminophen versus celecoxib, rather than acetaminophen relative to placebo. Compared to acetaminophen 320 mg given 2 hours before surgery, celecoxib 200mg compared to celecoxib 200mg significantly reduced pain in the 4 hours following surgery, according to Kashefi and colleagues (15). The lower dose of celecoxib they used may have led to more vomiting episodes compared to our study.

The severity of postoperative pain after one hour and the total rescue analgesic requirement did not differ between the two groups in our study. Perhaps there is a problem with the sample size or with the timing of premedication. A larger sample size is therefore recommended when conducting studies. A fix dose of intraoperative morphine was administered to all patients regardless of the real need for intraoperative analgesics. The point needs to be taken into account in future studies. A comparison of biomarkers of pain may also be considered, since a VAS score or autonomic nervous system changes cannot be used to diagnose and treat pain objectively.

CONCLUSION

Celecoxib appears to have Acetaminophen is less effective at reducing nausea and pain following surgery, based on the results of the present study and comparison to other studies. As long as the indications and advice of your doctor are followed, celecoxib can be used after surgery.

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Cite this article:
Dr B Rajesh Naidu, Dr Amar Tirmanwar. (2022). Comparative Analysis of Celecoxib and Acetaminophen Premedication for Postoperative Pain Management and Quality of Life Enhancement in Lower Extremity Surgery Under General Anesthesia. *Acta Biomedica Scientia*, 9(2), 44-48.