

Effect of Ketorolac on Pain Scores and Length of Stay in Post Anaesthetic Care Unit after Major Abdominal Surgery

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Abstract

Background: To find out the effectiveness of ketorolac administered at the end of surgery in reducing pain scores and the length of stay in the Post Anaesthetic Care Unit (PACU) for the patients undergoing major abdominal surgery.

Methods: This interventional study, a double blind randomized control trial was conducted at POF Hospital, Wah Cantt, over a three year period starting 2004. One hundred adult patients, planned for major surgery fulfilling the inclusion criteria were randomized by simple random numbers table into two groups by codes. At the end of procedure, 30mg ketorolac (an NSAID) was given intravenously to every member of ketorolac group and 10 ml normal saline I/V (placebo) was given to every member in control group. All the patients were shifted to PACU. The doctor in charge PACU had to decide the length of stay based on two parameters; 1) Pain score on the basis of visual analogue score (VAS) and 2) Salim ABC score for recovery room stay.

Results: The initial mean post operative scores in the PACU were lower for ketorolac group, 3.6 on Visual analogue score(VAS) with a standard deviation (S.D.) of +/-0.9, and for control group the respective mean postoperative pain score was 5.4 with the S.D. of +/-1.3. This difference was of statistical significance with a p value of less than 0.05. The mean length of stay in PACU for ketorolac group was 97 minutes with an S.D. of +/-30 minutes, while the corresponding mean and S.D. for the control group were 134 minutes and +/-35 minutes respectively which also depicted a difference of statistical significance with a p value of less than 0.05.

Conclusion: Ketorolac administered I/V at the end of

surgery effectively controls the immediate post operative pain and reduces the length of stay in PACU.

Introduction

Recovery is the period of cessation of the administration of anaesthesia until the patient is awake with good protective reflexes. It is a re-equilibration of the body with atmospheric air and its speed depends upon many factors like period of surgery and anaesthetics administered. Adequate management of postoperative pain is important for the reasons that it affects the physiological, emotional and psychological outcome of the patient.

Postoperative analgesia can be obtained by different medications including nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, regional and local anaesthetic techniques¹. Adverse outcome of patient may also be associated with therapeutic modalities e.g. opioids leading to undesired effects like sedation, vomiting, respiratory or circulatory depression.

Effectiveness and safety of ketorolac, an NSAID, has been proved in various clinical settings of postoperative pain. Having seen the claims of effectiveness of ketorolac in controlling the pain, this study was carried out with the intent to validate the usefulness of ketorolac in pain control in postoperative period and also to measure its effect on length of stay in PACU².

Patients and Methods

For this experimental study, the ethical committee approval was obtained. One hundred patients were selected who had to undergo major abdominal surgery and fulfilled the inclusion criteria.

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Informed consent was obtained from all patients. Inclusion criteria comprised male or female patients between 30 and 60 years of age who consented at free will and fulfilled the criteria of American Society of Anaesthesiology (ASA) grade-I or ASA grade II patients.

Exclusion criteria comprised history of gastrointestinal bleeding, allergy to NSAIDs, presence of a bleeding disorder and renal insufficiency. Also excluded were patients with morbid obesity, pregnancy and jaundice. Patients with history of asthma or chronic obstructive pulmonary disease and patients with ASA grade III or IV were also excluded.

Investigations done in all patients were blood CP and urinalysis, bleeding and clotting time, liver function tests (LFTs) and serum urea and creatinine.

Selected patients were then randomized through simple random numbers table in two groups named *ketorolac group* and *control group*. Ketorolac group were to receive an intravenous (I/V) bolus dose of 30mg ketorolac (Toradol brand by Roche) diluted in 10ml normal saline. The control group received 10ml of normal saline as placebo at the time of first skin stitch at the end of procedure by the in charge anaesthetist in the operation room who was blinded to randomization. Every patient in both the groups underwent major abdominal surgery through a standard midline incision and layer wise closure of the abdomen using the

same suture material and technique. All patients had general anaesthesia with morphine (0.1mg/kg) I/V and propofol (2.5mg/kg) I/V. Tracheal intubation was performed using rocuronium bromide (0.45 mg/kg) Anaesthesia was maintained on oxygen, nitrous oxide and halothane until last skin stitch. All patients were extubated after reversal of paralysis and shifted to post anaesthetic care unit (PACU) or recovery room.

The in charge PACU who was also blinded to the randomization had to monitor the pain scores and to decide the length of the stay of the patient in the PACU.

The pain was assessed with the help of Visual analogue score (VAS) (Table 1), the interpretation of which was thoroughly explained to the patients before undergoing surgery.

The length of stay in PACU was decided on two criteria, the pain score and the Salim ABC score (Table 2). A pain score of less than 4 along with a Salim ABC score of 8 or more formed the criteria of discharge from PACU. If the pain score was more than 4 rescue analgesia was offered in the form of injection morphine (0.1 mg/kg). Physiological parameters were continuously monitored and included pulse, blood pressure, respiratory rate (RR) and oxygen saturation (SaO₂) for the patients in both the groups. Bleeding time, clotting time, blood urea and serum creatinine of every member in the study were serially monitored. Chi-square test was employed to draw statistical inference.

Table 1: Visual Analogue Scale

0	1	2	3	4	5	6	7	8	9	10
No pain	Mild pain		Moderate pain			Severe pain		Very severe pain		Worst pain

Table 2: Salim ABC Score for Recovery Room

Scores	3	2	1	0
Airways	Can cough or cry	Maintain airway without holding jaw	Jaw holding needed	Measures other than jaw holding needed
Behaviour	Can lift head	Can open eyes and show tongue	Some non-purposeful movements	No movements at all
Consciousness	Fully awake, can	Awake but needs	Responds to stimuli only	No response

talk and oriented support

Table 3: Pain Scores and PACU Stay

Groups	No. of patients	Pain score	PACU stay in minutes (min)
Ketorolac	50	2.7-4.5 (average 3.6)	67-127 minutes (average 97)
Control	50	4.1-6.7 (average 5.4)	99-169 minutes (average 134)

Results

The mean for the initial postoperative pain scores for the ketorolac group was 3.6 with an S.D. of +/-0.9 and for the control group the mean was 5.4 with an S.D. of +/- 1.3 in the PACU. It was a statistically significant difference with a p value of less than 0.05. The length of stay in the PACU for the ketorolac group had a mean of 97 minutes with an S.D. of +/- 35 minutes and this was also statistically significant difference with a p value of less than 0.05. Results are summarized in Table 3.

No significant difference in the physiological parameters (pulse, BP, RR and oxygen saturation) was observed between both groups. There was no significant alteration of renal parameters, LFTs or bleeding and clotting times. There was also no significant evidence of nausea and vomiting in both the groups. Three patients were withdrawn from the study: two for prolonged surgery because of malignant disease and another for postoperative adhesions.

Discussion

Resumption of protective reflexes, cognitive functions and control of postoperative pain is one of the major concerns in PACU after surgery. Other concerns include control of post operative nausea and vomiting, oxygenation, breathing and bleeding from site of operation. The intensity of postoperative pain varies with the individual patient and largely depends upon the site and nature of operation and constitution of the patient⁴. The acute surgical pain after upper abdominal surgery is more severe than after lower abdominal surgery. Postoperative pain differs from other types of pains in that it is usually transitory; with a progressive improvement over a relatively short time course⁵. Furthermore acute pain is more easily amenable to therapy than chronic pain.

One area of managing immediate post-

operative pain is to manage it before return to consciousness for the reason that the dose of an analgesic required to prevent pain is only a fraction of that required to control it once it has become severe. Moreover, the early administration of a strong analgesic is a useful method of decreasing postoperative pain and to modify the systemic response of the patient to acute pain⁶.

In one randomized clinical trial effectiveness and safety of ketorolac (an NSAID) was compared with that of morphine (an opioid) in controlling postoperative pain in cases of upper abdominal surgery and it was found that Ketorolac had a clear morphine sparing effect⁷. In yet another clinical trial it was concluded that 30mg of Ketorolac given I/V provides analgesia equivalent to 6-12 mg of morphine given by the same route with the similar onset of action but longer duration (6-8 hours)⁸.

In a similar clinical trial it was established that morphine given immediately before the end of surgery proved effective in controlling postoperative pain scores in PACU⁹. It also has another advantage of reduced subsequent analgesic requirement.

In our study, ketorolac group depicted the significant reduction in pain score i.e., an average of 3.6 on VAS (mild pain) against placebo group with pain score of 5.4 (moderate pain). Similarly, the duration of stay was also significantly reduced i.e., 97 minutes average stay in control group against 134 minutes average stay in the placebo group. The patients were better conversant in ketorolac group than the other group and were psychosomatically better with better sensorium than the control group.

Many problems associated with anaesthesia and surgery may occur in immediate postoperative period. It is essential to continue supervision of the patient by experienced personnel during recovery. It is usually desired that the patient resume protective reflexes and consciousness at the earliest as this period may last from several minutes to few hours. Opioids may also reduce the postoperative stay in PACU but ketorolac does the same with lesser degree of undesired effects of opioids.

Conclusion

Ketorolac (30mg) intravenous, administered at the end of surgery is an effective method of controlling immediate postoperative and pain reduces length of stay in post anaesthesia care unit.

References

1. Reissine T, Pasternac G. Opioid analgesics and antagonists: Goodman Gillman, Ruddon RW, Molinoff PB, The Pharmacological basis of Therapeutics: 3rd ed, McGraw Hill, New York; 1996: 521-55.
2. Whaetley RG. Analgesic efficacy of ketorolac. *Acta Anaesthesiol Belg* 1996; 47(3): 135-42.
3. Rushman GB, Davis NJH, Cashman JN. Immediate postoperative care, Lee's synopsis of Anaesthesia 12th edition: Reed Educational and Professional publishing Ltd: Oxford 1992; 62.
4. Dieudonne N, Gomola A, Bonichon P, Ozier Y. Prevention of postoperative pain after thyroid surgery: a double blind randomized study of bilateral superficial cervical plexus blocks. *Anaesth Analg* 2001; 92: 1538-42.
5. Dahj JB. Letters to Editor, Correspondence. *Br J Anaesth* 1990; 64: 178.
6. Gozal Y, Shapira SC, Gozal D, Magora F. Bupivacain wound infiltration reduces postoperative pain and opioid demand. *Acta Anaesthesiol Scand* 1994; 38: 813-15.
7. Evaluation of safety and efficacy of ketorolac versus morphine by patient controlled analgesia for postoperative pain, *Pharmacotherapy* 1997; 17(5): 891-99.
8. Morgan GE, Makhail MS. *Clinical Anaesthesiology*. 2nd ed. Appleton and Lange, USA: 1996; 204-05.
9. Motamed C, Merle JC, Yakhou L, Combes X, Dumerat M, Vodinh J, et al. Correspondence: *BJA* 2005; 306-07.