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# Comparative Study of Post Operative Pain Relief with Intravenous Paracetamol and Intramuscular Diclofenac

**Amanjot Kaur*, Rana Ranjit Singh, Darpan Bansal**

## Abstract

Adequate management of post operative pain has been a goal of all surgeons since the advent of surgery. Over the decades the endeavour has been to find an ideal analgesic with minimal or no side effects. This ideal analgesic is still elusive. The most terrible period postoperatively is the first 24 hours when severity of pain and vital signs are fluctuating. If patients are kept pain free during this period, they can cope with the circumstances well, leading to early recovery. In this study we compared the analgesic effects of paracetamol intravenous injection(1000mg) and diclofenac intramuscular injection (75mg) in the management of post operative pain, to observe the efficacy, duration, quality of analgesic effect on visual analogue scale.

**Keywords:** Intramuscular injection; Postoperative analgesia; Intravenous injection

## Introduction

The word pain is derived from the latin 'poena' meaning punishment, a penalty, or torniquet. It is defined as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage potential tissue damage [1]. The most frequent indication of any kind of surgery is to relieve the patient of some type of pain. A large majority of the patients who seek medical attention and subsequently undergo surgical operation do so because of the compelling influence of pain. Therefore, it seems paradoxical that a surgeon, in accomplishing his or her mission of relieving pre-operative pain, induces pain in the early postoperative period which, usually, is much more severe than the original complaint. Pain, is an important cause of post operative complications. Excessive pain result in poor mobility, increased arterial pressure and myocardial work which may result in increased morbidity or mortality following surgery [2]. Effective postoperative pain control is an essential component of the care of the surgical patient. Various types drugs are used for postoperative analgesia, of which narcotics and NSAIDS are the most important ones. Narcotics are known to cause drowsiness, constipation, urinary retention, haemodynamic and respiratory disturbances as compared to minimal side effects by NSAIDS. NSAIDs are very safe and effective in postoperative period. After surgery, NSAIDs-alone or in combination with acetaminophen are more likely to reduce acute postoperative pain than standard opiod regimens [3]. Diclofenac is one of the most commonly used NSAID. Oral administration is the route of choice in daily practice but it becomes impractical before and after surgery because of high first pass metabolism. Therefore, injectable analgesia is employed.

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Diclofenac is available in intramuscular oily preparation and aqua preparation which can be given intravenous in diluted form. With the recent availability of intravenous solution of paracetamol there is increased interest of it's use in postoperative period [4]. Intravenous Paracetamol has quick onset of action, reasonable durability, good analgesic efficacy and practically no side effects in the dose that we have used. We conducted this trial to compare the analgesic effects of diclofenac and paracetamol in patients undergoing abdominal surgeries using VAS score. We chose VAS scale over other's because of it's ease and brevity of administration, minimal intrusiveness and conceptual simplicity. It is a continuous scale and the question is generic and the patients probably include in their answer pain-related information other than pain intensity.

Aim of our study was to compare postoperative pain relief with intravenous paracetamol injection and intramuscular diclofenac injection.

## Material and Method

100 patients undergoing surgery in the department of General Surgery at Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar were selected randomly and were divided into two groups of 50 patients each.

Group A: received intravenous paracetamol injection (1000 mg) every 8 hourly for 48 hours.

Group B: received intramuscular injection of Diclofenac sodium (75 mg) every 8 hourly for 48 hours.

## Inclusion criteria

Patients of age group 18-70 yrs with major surgical operations including cholecystectomy(open and laparoscopic), hernial repair, nephrectomy, exploratory laparotomy, appendicectomy.

## Exclusion criteria

1. Pregnant women
2. Mentally confused or mentally handicapped patients
3. History of allergy to drug
4. Severe kidney disease
5. Patients with neuropathies or nerve injuries
6. Patients with pain due to cause, other than presenting disease
7. Age <18 years and >70 years
8. Patients receiving epidural analgesia
9. Intubated patients

## Assesment

The selected patients were examined, thoroughly investigated and explained about the interpretation of visual linear analogue scale to determine the level of pain during the postoperative period. This was carried out with a 10 cm line marked on paper. The end marked with zero would mean no pain and other end marked 10 would mean maximum pain. Pain score was interpreted as follows:

**Table 1:** Visual analogue score postoperatively

| Time interval | Vas score | | | | 't' value | 'p' value |
|---|---|---|---|---|---|---|
| | Group 1 | | Group 2 | | | |
| | Mean | SD | Mean | SD | | |
| 4 hours | 3.260 | 0.640 | 3.200 | 0.700 | 0.460 | 0.310(NS) |
| 8 hours | 6.160 | 1.110 | 6.260 | 1.020 | -0.480 | 0.320(NS) |
| 12 hours | 3.460 | 0.790 | 3.240 | 0.690 | 1.630 | 0.060(NS) |
| 24 hours | 3.180 | 0.750 | 3.440 | 0.960 | -1.480 | 0.070(NS) |
| 48 hours | 3.340 | 0.895 | 3.54 | 0.885 | -1.123 | 0.264(NS) |
| Overall | 3.880 | 0.484 | 3.936 | 0.437 | -0.606 | 0.546(NS) |

S- Significant; NS- Non- Significant; SD- Standard Deviation

**Table 2:** Additional dose of analgesia required postoperatively

| Time interval | Additional Dose Requirement | | | | $X^2$ value | 'p' value |
|---|---|---|---|---|---|---|
| | Group 1 | | Group 2 | | | |
| | No. | Percentage | No. | Percentage | | |
| 4 hours | 14 | 28.00 | 20 | 40.00 | 1.604 | 0.146 |
| 8 hours | 50 | 100.00 | 50 | 100.00 | - | - |
| 12 hours | 24 | 48.00 | 15 | 30.00 | 3.405 | 0.065 |
| 24 hours | 12 | 24.00 | 18 | 36.00 | 1.714 | 0.190 |
| 48 hours | 21 | 42.00 | 24 | 48.00 | 0.364 | 0.546 |

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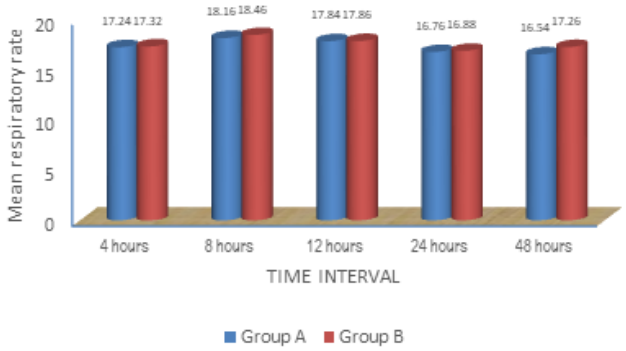



**Figure 1:** Mean respiratory rate before and after 4, 8, 12, 24, 48 hours

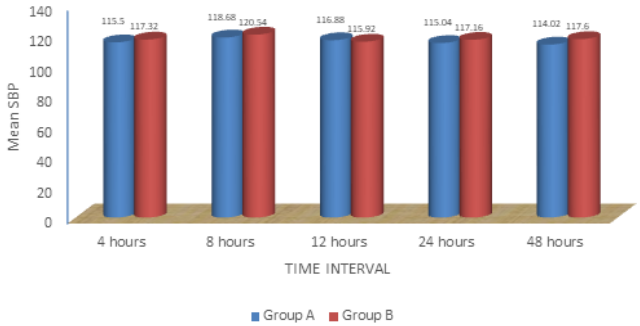
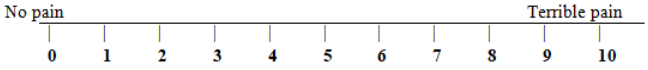



**Figure 2:** Mean systolic blood pressure after 4, 8, 12, 24, 48 hours

| | | |
|---|---|---|
| 1-3 cm | - | Mild pain |
| 4-6 cm | - | Moderate pain |
| 7-10 cm | - | Severe pain |




Quantitative measurement of pain was done on visual linear analogue scale at:

- Immediately after extubation
- 4 hours after operation
- 8 hours after operation
- 12 hours after operation
- 24 hours after operation
- 48 hours after operation

In addition to recordings of Pain score; pulse rate, systolic and diastolic blood pressure and respiratory rate were considered. Besides this, the timing of the rescue analgesia (VAS score>5) in the form of additional dose or additional other analgesic required was also noted.

## Observations

The age and gender difference was also not significant in the 2 groups. The mean age in group A was 46.540±13.452 and Group B was 45.500±14.620 years with p = 0.712. Type of surgery and type of anaesthesia were comparable in the two groups with no significant difference. Pain was assessed on VAS and was found that pain scores in both the groups were at their peak at or around 8 hours. 100% of patients required additional dose of analgesia at 8 hours postoperatively.The p value calculated came out to be 0.546 which was non significant.

In our study, there was no significant difference in the additional analgesic dose requirement of the two groups at any time of the evaluation postoperatively.

Average respiratory rate is comparable in the two groups with no significant At 4, 8, 12, 24 hours the average respiratory rate is same in both the groups.

At 48 hours the average respiratory rate is non significantly more in the diclofenac group.

Overall again there is no significant difference in the mean respiratory rate of the two groups at any time of the evaluation postoperatively.

There is no significant difference in the mean pulse rate of the two groups at any time of the evaluation postoperatively.

Mean systolic blood pressure was non significantly more in the group B patients receiving injection Diclofenac at 4, 8, 24 and 48 hours post-surgery.

At 12 hours the average systolic blood pressure is non significantly more in the group A patients receiving injection Paracetamol).

At 12, 24, 48 hours the average diastolic blood pressure is same in both the groups. Overall there is no significant difference in the mean diastolic blood pressure of the two groups at any time of the evaluation postoperatively.

So both injection paracetamol and injection diclofenac have same analgesic efficacy without any significant side-effects.

## Discussion

As the understanding of pain pathophysiology and treatment increases, new routes of drug delivery are being discovered with the objective of attempting to block pain at peripheral sites, with maximum active drug and minimal systemic effects. In the present study, we compared the analgesic efficacy of intravenous paracetamol and intramuscular diclofenac were compared. A total of 100 patients in all were divided into 2 groups of 50 patients each. The various parameters recorded postoperatively were; Pulse Rate, Blood Pressure, Respiratory Rate and Intensity of pain on VAS(visual analogue scale) in postoperative period at 4, 8, 12, 24, 48 hours. Score of 4 or more on VAS was considered

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**Table 3:** Mean pulse rate before and after 4, 8, 12, 24, 48 hours

| Time interval | Pulse rate | | | | 't' value | 'p' value |
|---|---|---|---|---|---|---|
| | Group 1 | | Group 2 | | | |
| | Mean | SD | Mean | SD | | |
| **4 hours** | 69.440 | 6.320 | 69.140 | 6.460 | 0.390 | 0.470 |
| **8 hours** | 79.840 | 7.470 | 79.920 | 7.680 | -0.730 | 0.430 |
| **12 hours** | 69.400 | 4.780 | 69.640 | 5.140 | 0.280 | 0.300 |
| **24 hours** | 71.580 | 7.610 | 71.580 | 7.710 | 0.260 | 0.440 |
| **48 hours** | 70.780 | 12.220 | 71.120 | 8.000 | -0.230 | 0.360 |

**Table 4:** Mean diastolic blood pressure after 4, 8, 12, 24, 48 hours

| Time interval | DBP | | | | 't' value | 'p' value |
|---|---|---|---|---|---|---|
| | Group 1 | | Group 2 | | | |
| | Mean | SD | Mean | SD | | |
| 4 hours | 73.800 | 5.880 | 75.240 | 5.920 | -1.310 | 0.090 |
| 8 hours | 73.080 | 10.130 | 75.480 | 6.640 | -1.600 | 0.080 |
| 12 hours | 73.520 | 7.060 | 73.840 | 4.900 | -0.290 | 0.370 |
| 24 hours | 72.720 | 5.520 | 72.840 | 4.840 | -0.150 | 0.450 |
| 48 hours | 73.340 | 7.450 | 73.480 | 5.220 | -0.140 | 0.460 |

to represent the need of additional dose of analgesia. Post-op mean respiratory rate and mean pulse rate at different points of time among the two treatment groups were almost equal. No statistical significant difference was seen for at any point of time between the two groups. The comparison of mean systolic blood pressure and mean diastolic blood pressure between the two treatment groups in our study showed no significant variations at different time intervals. The mean VAS score in paracetamol group was 3.880±0.484 and 3.936±0.437 in Diclofenac group respectively. Overall, there is no significant difference in the mean VAS score of the two groups at any time of the evaluation postoperatively. These results of the present study are comparable to the studies performed earlier by many workers in terms of analgesic efficacy. In a study done by Usha D Shah et al. [5] to asses intra and post-operative analgesic effects of i.v. paracetamol and i.v. diclofenac sodium used pre-emptively also to compare their hemodynamic effects. For general surgeries, p value was significant at 5 and 6 hours; in all other time intervals, p value was not significant. This showed that paracetamol and diclofenac provide equal analgesia. Similarly, in a study done by Monga et al. [6] where patients in group 1 received Diclofenac with Paracetamol P(100ml infusion) and group 2 Diclofenac with Paracetamol PL (2ml). VAS taken for post- operative pain assessment was same in both the age groups over equal time interval without any significant difference. Harshvardhan K et al. [7] compared Paracetamol and Diclofenac for post-operative pain relief. It was observed that pain was observed more in Diclofenac group at all the times, with statistical significance with p value < 0.05. The study concluded both drugs were effective for pain relief and that Paracetamol provided a similar degree of pain relief to that of Diclofenac. In a randomised clinical trial by Hombal P et al. [8] the mean of VAS score recorded at 4$^{th}$, 6$^{th}$, 12$^{th}$, 18$^{th}$, 24$^{th}$ hour showed no significant difference between the two groups(p value> 0.05) which received intravenous Paracetamol and intramuscular Diclofenac. On the contrary, Anirban Pal et al. [9] aimed to compare the efficacy of injectable diclofenac intramuscularly (IM), injection paracetamol intravenously (IV), or a combination of both to provide post-operative analgesia in patients undergoing lower abdominal gynaecological surgeries. They concluded injection diclofenac IM is more effective than injection paracetamol IV in terms of rescue analgesic requirement, but the combination of diclofenac IM and paracetamol IV provides no added advantage over diclofenac IM alone.

## Results and Conclusion

Thus, in our study both paracetamol and diclofenac drugs are safe to provide analgesia in postoperative period without any major significant side effects. The duration and quality of analgesia in both the groups were similar in postoperative period. Limitations of this study are the following:

- Additional dose of anaesthesia was administered based on a particular VAS score, which may vary with subjective experience of the patient and interpretation of the observer.
- VAS scores are measured at fixed time points so length of analgesic effect of study drugs could not be investigated.
- Primary outcome of our study was rescue analgesic

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requirement which may not truly reflect the efficacy of study drugs as analgesics.

- The sample size of this study was small, hence it might be difficult to generalize the results.

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