Original Article

A Comparative Study of Intravenous Lornoxicam and Paracetamol for Post-operative Analgesia in Patients Undergoing Elective Laparotomy under General Anesthesia

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Abstract

Objectives: The objective of this study is to assess the analgesic effect of paracetamol and lornoxicam in post-operative pain using the Visual Analog Scale (VAS) score, time to first rescue analgesic, the total amount of rescue analgesic required in the first 24 h after surgery, and patient's satisfaction score after 8 h and adverse effects. **Materials and Methods:** Randomly, 69 patients were allotted to Group P (35) and Group L (34). Patients in Group P received a single dose of injection paracetamol 1 g 100 ml and Group L injection lornoxicam 8 mg in 100 ml normal saline. Both drugs were administered as intravenous infusion over half an hour before skin closure. The pain was assessed using VAS score, rescue analgesic tramadol 100 mg intravenously was administered if VAS score was more than three. Time required for first rescue analgesic and total amount required in the first 24 h after surgery were assessed. Patient's satisfaction was assessed at the end of 8 h, and adverse effects were monitored. **Results:** Among 69 patients, 45 were males and 24 females, with a mean age of 41.60 ± 12.71 and 37.41 ± 12.18 in paracetamol and lornoxicam groups, respectively. Mean VAS scores in patients who received paracetamol were more than lornoxicam, but it was significant at the 12th h ($P = 0.04$). Lornoxicam group required a significantly lesser amount of rescue analgesic ($P = 0.018$). At the end of 8 h, 37.1% of patients graded their satisfaction score as good in paracetamol group and 44.1% in lornoxicam group. The common adverse effect in both the groups was nausea. **Conclusion:** One gram intravenous paracetamol administrated during the intraoperative period is an effective analgesic for post-operative pain.

Keywords: Laparotomy, lornoxicam, paracetamol

Introduction

Pain is the most common complaint after abdominal surgery that restricts the physical activity of the patients, as well as decreases, work performance. The commonly used pharmacological agents for post-operative pain management are nonsteroidal anti-inflammatory drugs (NSAIDs) and opioid analgesics. However, opioids are associated with unwanted effects such as respiratory depression, sedation, nausea, vomiting, and dependence. Hence, NSAIDs which are devoid of these adverse effects are frequently used.[1,2]

Lornoxicam is a newer NSAID with potent analgesic and anti-inflammatory activity and belongs to the class of oxicams.[3] Paracetamol, a para-aminophenol derivative used to treat fever, headache is evaluated for its analgesic efficacy in mild-to-moderate pain.[1] There is a paucity of comparative studies between lornoxicam and paracetamol in India. Hence, this study is undertaken to compare the efficacy and safety of intravenous lornoxicam with paracetamol in patients undergoing elective laparotomy under general anesthesia.

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Materials and Methods

The study was conducted by the departments of pharmacology and anesthesiology on patients admitted for elective laparotomy under general anesthesia over a period of 1½ years in R. L. Jalappa Hospital and Research Center attached to Sri Devaraj Urs Medical College, Kolar. The study was approved by the Institutional Ethics Committee (No. DMC/KLR/UDOME/IEC-CER/50/2014-15 dated October 18, 2014), and written informed consent was obtained from all the patients willing to participate in the study.

The objectives of the study were to assess the analgesic effect of paracetamol and lornoxicam in post-operative pain using the Visual Analog Scale (VAS) score, time to first rescue analgesic, the total amount of rescue analgesic required in the first 24 h after surgery, and patient's satisfaction score after 8 h and adverse effects.

Patients of either gender aged between 20 and 55 years, undergoing elective laparotomy for an inguinal/umbilical hernia, cholelithiasis, chronic appendicitis, and small bowel obstruction under general anesthesia were included. Patient undergoing emergency surgery, history of peptic ulcer, gastrointestinal bleeding, renal or hepatic dysfunction, hemorrhagic disorders, and hypersensitivity to the test drugs were excluded. Demographic details of patients were recorded at the time of recruitment. Patients were randomly divided into Group P and Group L using computer-generated random numbers. Patients in Group P received a single dose of paracetamol 1 g intravenous infusion and Group L received lornoxicam 8 mg intravenous infusion in 100 ml normal saline. Both the drugs were administered as intravenous infusion over 20 min ½ h before skin closure. Duration of the surgery was noted.

The pain was assessed using VAS, which is divided into 10 equal parts where "0" is no pain and "10" is the worst pain. VAS score is classified as painless (0), mild (1–3), moderate (4–7), and severe (8–10). It was explained to the patient before the surgery, and pain was assessed at 2, 4, 8, 12 and 24 h post-operatively. Rescue analgesic tramadol 100 mg intravenously was administered to the patients if VAS score was more than three during the post-operative period. The time required for first rescue analgesic and total amount required in the first 24 h after the surgery were assessed. Pulse rate and blood pressure were monitored immediately after the recovery from anesthesia and at 2, 4, 8, 12, and 24 h post-operatively. Sedation was scored using a five-point scale with zero being alert, 1 – sedated, 2 – drowsy, 3 – asleep, and 4 – comatose. Sedation was assessed at 2, 4, 8, 12, and 24 h post-operatively. Patient's satisfaction was assessed at the end of 8 h on a four-point scale graded as score 1 = poor, 2 = fair, 3 = good, and 4 = excellent. Adverse effects were monitored. Injection ondansetron 8 mg was administered intravenously if the patient complained of nausea and vomiting.

Statistical methods

Taking into consideration, a power of 80% and an alpha error of 5% to detect a difference of 0.4 in total VAS score in 24 h with an effect size of 0.8 and a dropout rate of 10%, the sample size was calculated to be 31 patients per group. The demographic data were analyzed using the descriptive statistics. The VAS score was analyzed by the repeated measures analysis of variance (R-ANOVA) within the group (Bonferroni *post hoc* test) and unpaired *t*-test between the groups at each interval. The total amount of rescue analgesic used was analyzed between the groups by unpaired *t*-test. Patient's satisfaction score and sedation score was analyzed between the groups by the Mann–Whitney U-test. Adverse effects were analyzed by the Chi-square test. $P < 0.05$ was considered to be statistically significant.

Results

Sixty-nine patients undergoing elective laparotomy under general anesthesia were randomized into two groups – 35 in Group P and 34 in Group L. The groups were similar with respect to the demographic variables such as gender, age, and mean duration of the surgery. Parameters such as hemoglobin, blood urea, and serum creatinine were in the normal range in both the groups and were comparable. Among 69 patients, 45 were male and 24 female with their literacy rate of 53.6% [Table 1].

Mean VAS score in Group P was more compared to Group L at 2, 4, 8, 12, and 24 h, but it was statistically significant only at the 12th h ($P = 0.04$), as shown in Table 2.

In paracetamol group, analysis of VAS score using R-ANOVA followed by Bonferroni's *post hoc* test was statistically not significant at different intervals, whereas in the lornoxicam group it was significant between the 2nd and 8th h only ($P = 0.03$), as shown in Figure 1.

Time to first rescue analgesic was less in Group P compared to Group L. Lornoxicam group required a significantly lesser amount of rescue analgesic compared to paracetamol group, as shown in Table 3.

Table 1: Demographic parameters

Variables	Group P ($n=35$)	Group L ($n=34$)
Male/female	24/11	21/13
Age (years) (mean±SD)	41.60±12.71	37.41±12.18
Duration of surgery (min), mean±SD	136.57±59.28	146.03±58.53

SD: Standard deviation

Table 2: Comparison of mean Visual Analog Scale scores between two groups

	VAS Score (h)				
	2	4	8	12	24
Group P	3.26±1.59	3.34±1.03	3.60±1.45	3.66±1.06	3.40±1.41
Group L	2.68±1.12	3.09±0.83	3.56±1.19	3.21±0.69	2.85±0.89
P	0.08	0.26	0.89	0.04*	0.06

*P=0.04 VAS score between groups P and L at 12th h. VAS: Visual Analog Scale

Table 3: Rescue analgesic in paracetamol and lornoxicam group

	Mean±SD		*P*
	Group P (*n* = 35)	Group L (*n* = 34)	
Time to first rescue analgesic (min)	351.62±296.92	395.76±273.91	0.543
The total amount of rescue analgesic used (mg)	194.12±73.61	151.52±56.57	0.018*

SD: Standard deviation. *P<0.05 was considered statistically significant

Majority of the patients in the lornoxicam group received single rescue analgesic as compared to paracetamol group, and it was found to be significant (P = 0.03), as shown in Table 4.

At the end of 8 h, 44.1% of patients graded their satisfaction score as good and 8.8% as excellent in lornoxicam group, whereas 37.1% as good and 2.8% as excellent in the paracetamol group. It was not significant between two groups (P = 0.133), as shown in Figure 2. All patients had sedation score of zero in both the groups.

A total number of patients showing adverse effects were 10 in Group P and 5 in Group L. Number of adverse effects noted were 13 (37.1%) and 5 (14.7%) in Group P and Group L, respectively, as shown in Figure 3. The most common adverse effect in both the groups was nausea; otherwise, the drugs were well tolerated. Adverse effect compared between two groups was not significant, P = 0.16.

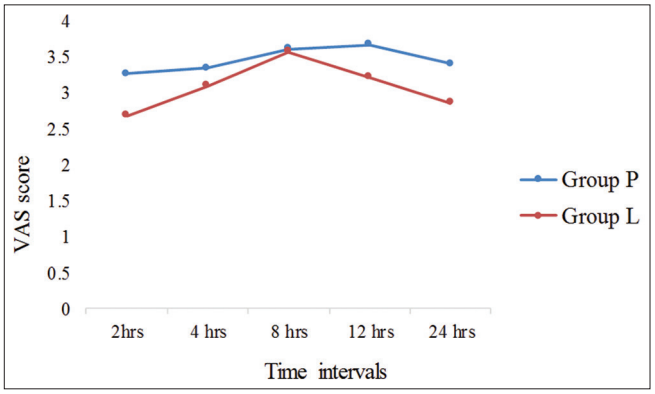

Figure 1: Intensity of postoperative pain in both the groups

Figure 2: Patient satisfaction score

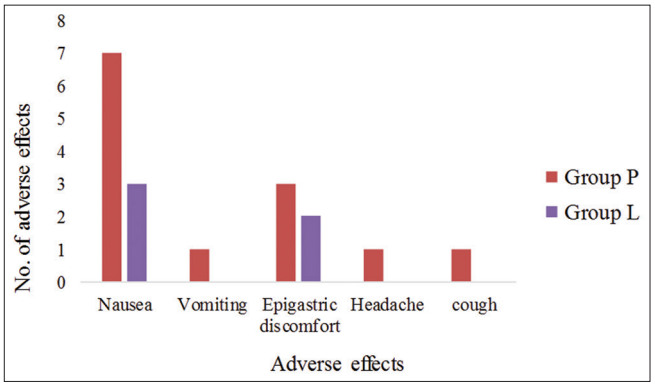

Figure 3: Adverse effects in both the groups

Discussion

Post-operative pain is a subjective sensation which varies from person to person depending on psychosomatic personality, age, nature, and type of surgery.[4] It is treated with opioids and NSAIDs. Opioids are associated with sedation and respiratory depression which needs intensive post-operative monitoring. NSAIDs are devoid of these effects but have the risk of gastrointestinal disturbance and bleeding.[5]

Intravenous paracetamol is used for the management of post-operative pain as monotherapy or as an adjuvant to opioids. Intraoperative administration of 1 g intravenous paracetamol results in an effective plasma level in the early post-operative period compared to an equal dose given orally preoperatively.[6] Lornoxicam, an NSAID has better efficacy with reduced gastrointestinal adverse effect as compared to other oxicams. Intravenous lornoxicam 8 mg was found to be equianalgesic to 20 mg of morphine, 50 mg of pethidine, and 50 mg of tramadol.[7]

In this study, patients were in the age group between 25 and 54 years, which is in concordance with another study by Goel *et al*. where it was between 30 and 45 years.[4] In this age group, patients usually present with conditions such as hernia, appendicitis, cholelithiasis requiring laparotomy. Number of male patients undergoing laparotomy were more compared to females which were similar to another study.[8]

The duration of the surgery was 2–3 h in both the groups in our study which was also observed in another study by Murthy *et al*.[9] This is usually the time required for performing elective abdominal surgeries under general anesthesia. In our study, mean VAS scores recorded at different intervals of time [Table 2] ranged from 3.2 to 3.7 for paracetamol which implies sustained analgesic effect of paracetamol over 24 h. In

Table 4: Number of patients requiring rescue analgesia

Number of times patients requiring rescue analgesia	Group P ($n=35$)	Group L ($n=34$)	*P*
0	1	1	0.98
1	9	17	0.03*
2	19	15	0.41
3	5	1	0.09
4	1	0	0.32

*$P<0.05$ was considered statistically significant

the lornoxicam group, it ranged between 2.7 and 3.5 over 24 h probably due to early onset and sustained effect.

In the present study, there was no significant difference between the pain scores in patients receiving paracetamol or lornoxicam. In a study conducted by Coskun *et al*., patients received 8 mg lornoxicam and 1 g paracetamol intravenously 30 min before intubation but they also did not observe significant difference between the two drugs in terms of VAS scores at 2, 4, 8, and 12 h post-operatively following elective abdominal surgeries.[10] Similar observation was noticed in another study using the same study drugs in the same dose for shock-wave lithotripsy.[11]

In our study, the mean time to first rescue medication with injection tramadol 100 mg intravenous was 6 h with paracetamol and 6½ h in lornoxicam groups [Table 3]. Similar findings were observed by Murthy *et al*., 5 h in lornoxicam group and Sinatra *et al*. 3 h in paracetamol group.[10,12] This shows the duration of action of lornoxicam as 3–5 h and paracetamol 4–6 has documented in the literature.[13] Even though their action is of shorter duration, their effect has been observed to last for 24 h in the presence of rescue analgesic. This can be explained on the basis that majority of patients required only one to two doses of tramadol whose duration of action is 4–6 h.

Pal *et al*. study observed that paracetamol group required a significantly higher amount of rescue analgesic compared to diclofenac in patients undergoing lower abdominal gynecological surgeries.[14] Number of patients graded their satisfaction score as good and excellent were more in paracetamol group compared to the lornoxicam group [Figure 2], which is similar to study a conducted by Coskun *et al*. in which 83% and 100% of patients graded completely satisfied with paracetamol and lornoxicam, respectively.[11] In Gupta *et al*. study, patients in the parecoxib group were more satisfied with the control of post-operative pain compared to paracetamol group.[15]

The most common adverse effect was nausea in both the groups. In another study, the commonest adverse effects observed with lornoxicam were nausea and vomiting accounting to 16.6% in patients undergoing an abdominal hysterectomy.[16] In another study, 23.3% patients had nausea and vomiting with paracetamol.[4] In this study, both the drugs were well tolerated and adverse effects were mild. In conclusion, intraoperative administration of 1 g intravenous paracetamol is non-inferior to lornoxicam for producing post-operative analgesia following laparotomy under general anesthesia.

Conclusion

Intraoperative administration of 1 g intravenous paracetamol is non-inferior to lornoxicam for producing post-operative analgesia following laparotomy under general anesthesia.

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Conflicts of interest

There are no conflicts of interest.

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