COMPARISON OF THE EFFECTS OF INTERCOSTAL NERVE BLOCK WITH ROPIVACAINE AND INTRAVENOUS PARACETAMOL INFUSION TO INTRAVENOUS PARACETAMOL INFUSION ALONE FOR PAIN CONTROL AFTER OPEN CHOLECYSTECTOMY

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ABSTRACT

BACKGROUND

Postoperative pain after open cholecystectomy is associated with respiratory dysfunction, increased stress response and prolonged hospital stay. We compare intravenous paracetamol (7.5 mg/kg) plus intercostal nerve block with local anaesthetic ropivacaine 0.5% to intravenous paracetamol (15 mg/kg) on pain control after open cholecystectomy.

MATERIALS AND METHODS

140 patients, who underwent for open cholecystectomy, were randomly divided into two groups of 70. The patients were randomly allocated to any of the following two groups depending upon the drug used for analgesia (Group P or Group I) Intravenous paracetamol 15 mg/kg was given to patients of group P and paracetamol 7.5 mg/kg with Intercostal nerve block in right side 6-10 intercostal nerves with 2 ml local anaesthetic ropivacaine 0.5% in each space was given to patients of group I just after intubation before incision. When the patients were transferred to postoperative recovery room, intensity of pain was recorded by response from the patients using 100 mm linear visual analogue scale ranging from 0 to 100. The pain scoring was done in the immediate postoperative period (when the patient was able to communicate in the post anaesthesia care unit), at 30 minutes, 1 hr. then hourly up to 24 hrs. till patient complained of pain with VAS score 40 or more.

RESULTS

The severity of pain in VAS score was lower in immediate postoperative period, at 30 minutes, 1 hour and 2 hours postoperatively in group I than the group P and those were statistically significant ($p<0.001$). Duration of analgesia also significantly lower in group I. Mean duration of analgesia in group P is 161.9 ± 42.6 min and in group I is 241.3 ± 44.2 min ($p<0.001$).

CONCLUSION

Adding Intercostal nerve block to intravenous infusion of Paracetamol infusion (7.5 mg/kg) is better than sole intravenous infusion of Paracetamol (15 mg/kg) in controlling pain severity even after reducing dose of paracetamol after open cholecystectomy.

KEYWORDS

Pain, Intercostal Nerve Block, Ropivacaine, Paracetamol, Open Cholecystectomy.

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BACKGROUND

The International Association for the study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage".[1] Pain associated with open cholecystectomy may lead to splinting, loss of sighing and decrease of vital capacity, increased stress response and these may contribute to postoperative pulmonary morbidity.[2,3] Various types analgesic regimens have applied to decrease postoperative pain to decrease perioperative morbidity and mortality, hospital stay and ensure overall satisfaction of patient.[4] Nerve blocks with local anaesthesia are very effective in decreasing pain anxiety and sleeplessness.[5] The medical literature is increasing day by day in the field of pain management by various modalities of pain relief.[6] Cholecystectomy is the common surgical procedure in the abdomen. Today, despite many recent

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innovations in the treatment of gallstones, cholecystectomy remains the treatment of choice for symptomatic cases and is associated with significant morbidity.[7,8] The intercostal nerve block is claimed to provide an excellent intra-operative and postoperative analgesia in cholecystectomy yet does not significantly disrupt autonomic functions. Requirements of other systemic analgesics are also reduced.[9,10] Intravenous paracetamol nowadays commonly used analgesic. Intercostal block provides satisfactory analgesia and ropivacaine is one of the very common local anaesthetic agents with low cardiovascular toxicity, long half-life, and excellent effectiveness.[11]

MATERIALS AND METHODS

After obtaining Institutional ethics committee approval and informed written consent, 140 patients, ASA physical status I and II, both sex of age 20-50 yrs., undergoing open cholecystectomy under general anaesthesia were included in this prospective, randomized, double-blind study. Exclusion Criteria were patients refusal, history of drug abuse, psychiatric disease, seizures, uncontrolled hypertension, cerebrovascular, pulmonary, cardiovascular disease, renal or hepatic impairment, h/o drug allergy, pregnant females and those who received any kind of analgesic or sedative in the 24 hour prior to surgery.

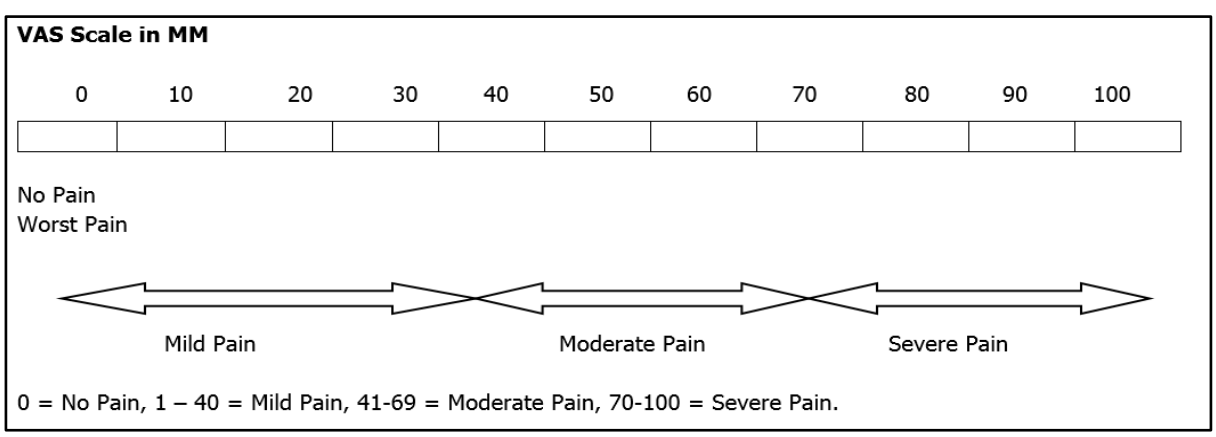
Patients were explained about the procedure in details in the pre-operative visit prior to obtaining written informed consent. No analgesics other than the study drugs were administered to the patients. The patients fasted for 8 h preoperatively. In the operating room, monitors, including non-invasive arterial pressure, electrocardiography, and pulse oximetry was applied. An 18 gauge IV cannula was secured in the peripheral vein on the non-dominant hand.

Depending upon the drug used for analgesia patients was randomly allocated to two groups (Group P or Group I) using the computer-generated table with random numbers. The randomization assignment was kept in sealed opaque envelopes and opened at the time of the 'study drug' preparation. The patients underwent elective cholecystectomy by Kocher's (Subcostal) incision. Intravenous paracetamol 15 mg/kg was given to patients of group P just after intubation before incision. Intravenous paracetamol 7.5 mg/kg was given to patients of group I just after intubation before incision along with intercostal nerve block in 6^{th}, 7^{th} 8^{th} 9^{th} and 10^{th} intercostal nerves on right side in the post-axillary line with 2 ml of 0.5% ropivacaine in each space.

Premedication given with iv midazolam 2 mg. General anaesthesia was given with iv fentanyl 2 µg/kg ,iv propofol (2 mg/kg) and iv atracurium (0.5 mg/kg) to facilitate tracheal intubation. Iv ondansetron 4 mg given in both groups. Maintenance of anaesthesia was achieved with nitrous oxide 66% and oxygen 33%. The patients received top-ups of iv atracurium (0.1 mg/kg) at regular intervals. Haemodynamics were recorded in every 10 min interval. At the end of surgery, all patients were reversed from muscle relaxation with iv neostigmine (0.05 mg/kg) and iv glycopyrrolate (0.01 mg /kg).

The patients were extubated and shifted to postoperative recovery room where intensity of pain was recorded by response from the patients using 100 mm linear visual analogue (VAS) ranging from 0 to 100.[3]

The pain scoring was done at the end of operation, at 30 minutes, then hourly up to 6 hrs. and for any complication up to 24 hours postoperatively. Intravenous tramadol 100 mg was given when the VAS was ≥ 40 and duration of analgesia taken as the time when operation started to the time when rescue analgesic was given. Postoperative adverse effects such as nausea, vomiting were recorded for 24 hrs. and treated.



RESULTS

Variable	Group	Mean	Standard Deviation	p value
Age	P I	37.9 39.6	7.1 7.3	>0.05
Weight	P I	64.8 68.2	10.9 11.9	>0.05

Table 1. Group wise Distribution of Patients According to Age and Weight (n=140)

Table no 1 shows that there was no significant difference in age and body weight in study group and control group.

The groups were comparable in ASA and sex distribution (p>0.05).

Variable	Group P (%)	Group I (%)
Sex		
Male	24 (34.3)	30 (42.8)
Female	46 (65.7)	40 (57.2)
ASA		
I	61	60
II	9	10

Table 2. Group Wise Distribution of Patients According to Sex, ASA (n=140)

Variable	Group	Mean	Standard Deviation	p value
HR0	P	77.6	9.1	0.5
	I	78.7	9.8	
HR10	P	77.0	7.5	0.80
	I	77.4	7.2	
HR20	P	77.2	7.3	0.68
	I	77.6	7.0	
HR30	P	78.4	7.6	0.79
	I	78.1	6.7	
HR40	P	79.1	7.2	0.43
	I	78.2	5.9	
HR50	P	82.0	10.1	0.22
	I	80.2	6.9	
HR60	P	82.4	11.8	0.11
	I	81.2	7.6	
HR70	P	87.2	9.9	0.09
	I	84.0	8.0	
HR80	P	90.7	10.7	0.28
	I	88.5	6.9	
HR90	P	98.0	13.0	0.23
	I	92.6	9.5	

Table 3. Comparisons of Intra Operative Heart Rates (Beats Per Min) in Study and Control Groups (n=140)

Variable	Group	Mean	Standard Deviation	p value
MAP0	P	81.3	11.2	0.75
	I	83.0	9.9	
MAP10	P	83.3	12.9	0.75
	I	83.9	8.9	
MAP20	P	82.2	10.3	0.97
	I	82.3	8.2	
MAP30	P	81.5	9.3	0.50
	I	82.5	7.7	
MAP40	P	81.2	9.8	0.61
	I	82.0	8.7	
MAP50	P	83.5	11.8	0.56
	I	84.6	9.6	
MAP60	P	83.5	11.5	0.49
	I	84.6	10.5	
MAP70	P	91.7	12.5	0.69
	I	92.7	11.7	
MAP80	P	95.7	13.3	0.7
	I	96.9	12.5	
MAP90	P	99.9	15.5	0.43
	I	104.7	14.5	

Table 4. Comparisons of Intra Operative Mean Arterial Pressures (MAP) in mm of hg in Study and Control Groups (n=140)

Variable	Group	Mean	Standard Deviation	p value
VAS0	P	6.4	10.6	<0.001
	I	2.2	4.4	
VAS30	P	20.9	10.2	<0.001
	I	13.1	4.6	
VAS60	P	30.6	8.0	<0.001
	I	23.3	4.7	
VAS120	P	38.7	5.7	<0.001
	I	32.7	5.6	
VAS180	P	43.3	4.4	0.02
	I	39.2	5.4	

Table 5. Group wise Distribution of Patients According to VAS Score (mm) (n=140)

DOA	P	161.9	42.6	<0.001
	I	241.3	44.2	

Table 6. Group wise Distribution of Patients According to Duration of Analgesia (mins.) in Study and Control Groups (n=140)

Variable	Group	Mean	Standard Deviation	p value
POHR0	P	75.7	7.4	0.34
	I	74.7	5.0	
POHR30	P	80.3	9.4	0.08
	I	78.0	5.4	
POHR60	P	82.8	10.8	0.08
	I	80.2	6.2	
POHR120	P	83.6	9.7	0.46
	I	84.8	7.5	
POHR180	P	92.4	11.6	0.09
	I	87.7	8.0	
POMAP0	P	80.0	10.4	0.34
	I	83.0	6.9	
POMAP30	P	85.1	10.9	0.69
	I	85.7	8.0	
POMAP60	P	90.5	11.8	0.55
	I	89.4	8.1	
POMAP120	P	95.0	13.6	0.66
	I	94.1	9.1	
POMAP180	P	95.4	14.8	0.16
	I	100.1	9.5	

Table 7. Group wise Distribution of Patients According to Postoperative Heart Rates and Postoperative mean Arterial Pressure

Table 3, 4 and 7 show that vitals between two groups were comparable (p >0.05). Table 5 shows that the difference in VAS score between groups was statistically highly significant at 0 (immediate postoperative period), 30 mins, 60 mins, 120 mins of postoperative period (p <0.001). Difference in vas score between two groups at 180 mins. post operatively also statistically significant (p <0.05). Table no 6 shows that Duration of analgesia (min) higher in group I than group P (241.3 ± 44.2 vs 161.9 ± 42.6). This difference was statistically highly significant (p <0.001).

Variable	Group P	Group I	p value
PONV			
Present	7	8	1.0
Absent	63	62	

Table 8. Group wise Distribution of Patients According to Occurrence of Postoperative Nausea Vomiting

DISCUSSION

The groups are comparable in aspects of age, weight, sex, ASA, intra and post-operative blood pressure and heart rate. The vas score shows statistically highly significant difference between two groups at 0 (immediate post-operative period), 30 mins. 60 mins. 120 mins. of post-operative period ($p<0.001$). Vas score significantly less in group I at 180 mins. postoperatively. Duration of analgesia significantly more in group I ($P<0.001$).

The response to pain is highly variable among persons as well as in the same person at different times.[7] Perception of pain depends not only on degree of tissue injury but also on modification of message by other simultaneously occurring sensory input. Pain perception is influenced by many factors including personality traits, cultural background, previous pain experience, fear, uncertainty, misinterpretation of events and helplessness.[12]

A study done in 2013 by Gousheh SM et al shows that although paracetamol (1 gram) has caused a better pain relief quality but it is not a suitable analgesic for moderate pain control in acute phase after surgery alone.[13]

Another study done in 2015 by Karbasy SH et al shows that Adding Intercostal nerve block to intravenous infusion of morphine is better than sole intravenous infusion of morphine in controlling pain severity after open cholecystectomy.[3]

Intercostal nerve blockade with a mixture of bupivacaine and phenol for control of post cholecystectomy pain was done by Maidatsi et al and was compared with PCA. The patients who underwent intercostal blockade group showed lower VAS pain score.[14]

There is a paucity of study regarding comparing most common analgesic iv paracetamol with intercostals nerve block in these patients. We often only use iv paracetamol in these patients.

Our study shows that in spite of giving a reduced dose of paracetamol in group I addition of intercostals block improves quality and duration of analgesia than giving only paracetamol in group P.I, literacy of the patients was the main confounding factor in this study. Most patients had tremendous difficulty in understanding the linear visual analogue scale (VAS) rating.

CONCLUSION

We conclude that adding Intercostal nerve block to intravenous infusion of 7.5 mg/kg dose of Paracetamol infusion is better than sole intravenous infusion 15 mg/kg of Paracetamol in controlling pain severity after open cholecystectomy. We also recommend its use for postoperative analgesia as it is safe and effective for providing analgesia.

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