

Original Research

To compare the effects of intraperitoneal instillation of ropivacaine at various intraoperative stages for post operative analgesia in patients undergoing laparoscopic cholecystectomy

Kuldeep Raina¹, Deepak Kumar Bajaj², Harjinder Kohli³, Kiran Patil⁴

¹Senior Resident, department of Anaesthesia and critical care, Safdurjung hospital, New Delhi, India,

²Consultant, Anaesthesia Department, Fortis JK Hospital, Udaipur, Rajasthan, India,

³Senior consultant, Anaesthesia Department, SPS Apollo Hospitals, Ludhiana, Punjab, India,

⁴Senior Consultant, Anaesthesia Department, SPS Apollo Hospitals, Ludhiana, Punjab, India

ABSTRACT:

Background: The present study aims to standardize the timing of intraperitoneal instillation of ropivacaine in laparoscopic cholecystectomy. **Materials & Methods:** The present study was conducted on 90 patients who were to undergo elective laparoscopic cholecystectomy. Patients were divided into 3 groups of 30 each. Group A: patients received 20 ml of 0.5% ropivacaine instillation intraperitoneally just after the insertion of laparoscopic ports at the beginning of surgery. Group B: patients received 20 ml of 0.5% ropivacaine instillation intraperitoneally just before the removal of laparoscopic ports at the end of the surgery. Group C: patients received 10ml of 0.5% ropivacaine instillation intraperitoneally just after the insertion of laparoscopic ports at the beginning of surgery and 10ml of 0.5% ropivacaine instillation intraperitoneally just before the removal of laparoscopes at the end of the surgery. **Results:** Maximum patients were seen in age group >60 years (9) in group A, 51-60 years (11) in group B and 41-50 years (10) in group C. Pruritis, respiratory depression and allergic reaction was not present in any group. Urinary retention was present in 1 patient in group A and B while 2 in group C. Fever was present 1 patient each in group A and C, morphine was given to 9 in group A, 15 in group B and 39 in group C. Inter- group comparison was non- significant ($P > 0.05$). A non- significant difference in mean pulse rate in all groups ($P > 0.05$). **Conclusion:** Authors found that ropivacaine instillation in all doses found to be equally effective in all groups.

Key words: Laparoscopic cholecystectomy, Ropivacaine instillation, Pruritis

Received: 13 March, 2019

Revised: 10 June 2019

Accepted: 12 June 2019

Corresponding author: Dr. Deepak Kumar Bajaj, Consultant, Anaesthesia Department, Fortis JK Hospital, Udaipur, Rajasthan, India

This article may be cited as: Raina K, Bajaj D, Kohli H, Patil K. To compare the effects of intraperitoneal instillation of ropivacaine at various intraoperative stages for post operative analgesia in patients undergoing laparoscopic cholecystectomy. J Adv Med Dent Scie Res 2019;7(8): 46-50.

INTRODUCTION

More than 70% of laparoscopic surgeries are carried out as day care surgeries. It is considered to be less painful as compared to the open cholecystectomy but still associated with significant levels of post operative pain scores. Pain is most severe in the early post operative period which needs to be anticipated and addressed adequately.¹

A shortened hospital stay, decrease in morbidity and costs are related to improvement in post operative pain

management.² The pain associated with laparoscopic cholecystectomy is multifactorial including the pain arising from the incision sites, the pneumoperitoneum and the procedure itself at local resection site of gall bladder. Factors that may influence the degree of pain after laparoscopic procedures include the volume of residual gas, the type of gas used for pneumoperitoneum, the pressure created by the pneumoperitoneum and the temperature of

insufflated gas. The length of the operation and volume of insufflated gas may also be related to postoperative pain.³ Various routine methods to control post-operative pain include conventional systemic analgesics including paracetamol, non steroidal anti-inflammatory drugs(NSAIDs), iv-PCA (Intra venous-patient controlled analgesia), intra peritoneal injection of local anaesthetic drugs, peripheral nerve blocks, thoracic epidural analgesia, low pressure pneumo-peritonium and warm air/carbon dioxide are used.⁴The present study aims to standardize the timing of intraperitoneal instillation of ropivacaine in laparoscopic cholecystectomy.

MATERIALS & METHODS

The present study was conducted on 90 patients who were to undergo elective laparoscopic cholecystectomy. Patients with elective cases of symptomatic cholelithiasis confirmed ultrasonographically, age 18-60 yrs, ASA class 1 and 2 and BMI 18.5- 39.9 kg/m² were included in the study. Patients were divided into 3 groups of 30 each. Group A: patients received 20 ml of 0.5% ropivacaine instillation intraperitoneally just after the insertion of laparoscopic ports at the beginning of surgery. Group B: patients received 20 ml of 0.5% ropivacaine instillation intraperitoneally just before the removal of laparoscopic

ports at the end of the surgery. Group C : patients received 10ml of 0.5% ropivacaine instillation intraperitoneally just after the insertion of laparoscopic ports at the beginning of surgery and 10ml of 0.5% ropivacaine instillation intraperitoneally just before the removal of laparoscopes at the end of the surgery.

Pre anaesthetics check up and required investigations were carried out for the patients planned for elective laparoscopic cholecystectomy. The usage of Visual Analogue Scale for pain was explained to the patient in detail while taking the consent during the pre-anesthetic check-up.

After instillation procedure, in each of the groups, in order to obtain thorough diffusion, 2 minutes of Trendelenburg position (10°-20°) was maintained. During surgery, patients were placed in 15° - 20° Reverse Trendelenburg’s position with right side up.

Postoperatively patients were observed for vitals, sedation score and pain score in the surgical recovery ward for 24 hrs. Severity of pain was measured using a visual analogue scale, starting from the end of surgery, every 15min for the first hour, then at 2hr, 3hr, 6hr, 12hr and 24hr. Data was collected and expressed as mean ± standard deviation (SD). P values ≤0.05 were considered statistically significant.

RESULTS

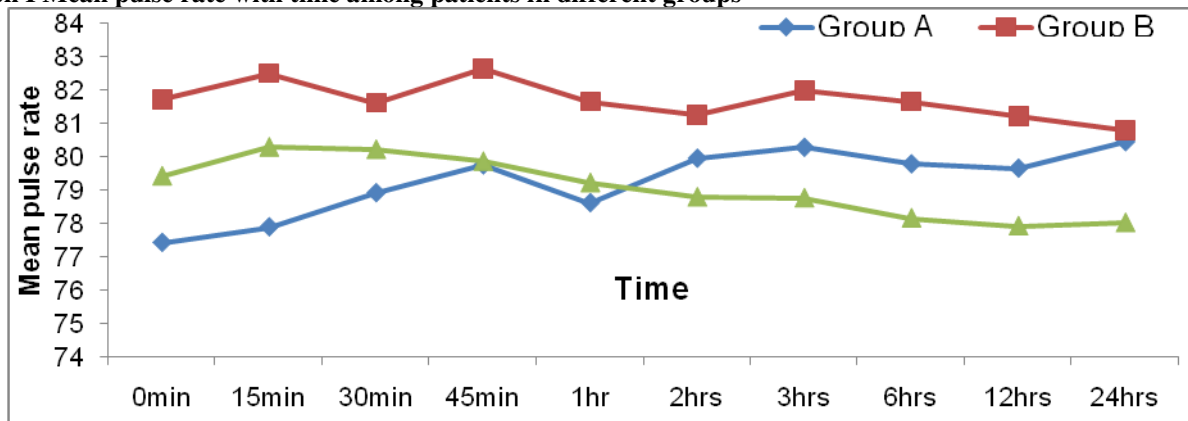
Table I Age wise distribution of the subjects

Age (years)	Group A		Group B		Group C		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
20-30	2	6.67	1	3.33	4	13.33	7	7.78
31-40	5	16.67	7	23.33	7	23.33	19	21.11
41-50	7	23.33	8	26.67	10	33.33	25	27.78
51-60	7	23.33	11	36.67	5	16.67	23	25.56
> 60	9	30.00	3	10.00	4	13.33	16	17.78
Total	30	100.00	30	100.00	30	100.00	90	100.00

p value = 0.318

Table I shows that maximum patients were seen in age group >60 years (9) in group A, 51-60 years (11) in group B and 41-50 years (10) in group C.

Graph I Mean pulse rate with time among patients in different groups



Graph I shows non- significant difference in mean pulse rate in all groups (P> 0.05).

Table II Comparison of parameters in all groups

	Group A		Group B		Group C		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pruritis								
Yes	-	-	-	-	-	-	-	-
No	30	100.00	30	100.00	30	100.00	90	100.00
Total	30	100.00	30	100.00	30	100.00	90	100.00
Respiratory depression								
Yes	-	-	-	-	-	-	-	-
No	30	100.00	30	100.00	30	100.00	90	100.00
Total	30	100.00	30	100.00	30	100.00	90	100.00
Urinary retention								
Yes	1	3.33	1	3.33	0	0.00	2	2.22
No	29	96.67	29	96.67	30	100.00	88	97.78
Total	30	100.00	30	100.00	30	100.00	90	100.00
p value = 0.600								
Allergic reaction								
Yes	-	-	-	-	-	-	-	-
No	30	100.00	30	100.00	30	100.00	90	100.00
Total	30	100.00	30	100.00	30	100.00	90	100.00
Fever								
Yes	1	3.33	0	0.00	0	0.00	1	1.11
No	29	96.67	30	100.00	30	100.00	89	98.89
Total	30	100.00	30	100.00	30	100.00	90	100.00
p value = 0.364								
Morphine given								
Yes	9	30.00%	15	50.00%	15	50.00%	39	43.33%
No	21	70.00%	15	50.00%	15	50.00%	51	56.67%
Total	30	100.00	30	100.00	30	100.00	90	100.00
p value – Group A vs Group B = 0.114 Group A vs Group C = 0.114 Group B vs Group C = 1.000								

Table II shows that pruritis, respiratory depression and allergic reaction was not present in any group. Urinary retention was present in 1 patient in group A and B while 2 in group C. Fever was present 1 patient each in group A and C, morphine was given to 9 in group A, 15 in group B and 39 in group C. Inter- group comparison was non- significant (P> 0.05).

Table III Mean VAS with time among patients in different groups

Time	Group A	Group B	Group C
	Mean	Mean	Mean
0 min	.63	.40	.33
15 min	1.00	.73	.57
30 min	1.23	.90	.93
45 min	1.47	1.57	1.20
1 hr	1.30	2.63	1.63
2 hrs	1.23	2.60	2.07
3 hrs	1.07	1.57	1.97
6 hrs	.77	.57	.37
12 hrs	.10	.17	.00
24 hrs	.00	.000	0-0

Table III shows that mean VAS score in all groups was non- significant (P> 0.05).

Table IV Mean systolic & Diastolic blood pressure in all groups

Time	Systolic			Diastolic		
	Group A	Group B	Group C	Group A	Group B	Group C
0min	125.63	131.17	129.83	70.70	75.60	75.97
15min	126.00	130.23	128.27	71.13	75.90	75.50
30min	125.97	131.20	129.60	71.50	75.90	75.73
45min	127.33	129.73	130.90	71.87	74.97	75.73
1hr	128.47	130.20	129.67	72.67	74.97	75.20
2hrs	128.13	129.80	129.77	72.93	74.83	74.73
3hrs	129.27	130.43	129.30	72.40	74.47	74.43
6hrs	129.70	130.27	129.87	72.40	74.90	74.67
12hrs	129.63	129.90	129.87	71.90	74.73	74.80
24hrs	130.13	130.43	129.63	72.37	75.17	74.40

Table IV shows that mean systolic and diastolic blood pressure in all groups was non- significant (P> 0.05).

Table V Mean time to first dose of morphine among patients in different groups

	Group A	Group B	Group C	P value
Dose of morphine	186.67	115.00	145.00	.142

Table V shows non- significant (P> 0.05) difference in dose of morphine I all groups.

DISCUSSION

Hans Christian Jacobaeus performed the first clinical laparoscopic surgery in Stockholm. Since then the major concern of the surgeon and the anaesthesiologist after this minimally invasive approach is to rehabilitate the patient as early as possible so that the patient can have unconstrained autonomy in his routine work and regain full functional capacity.

The term “band-aid surgery” has been used for laparoscopic cholecystectomy for quiet some time in the past. As such our aim should be to retain such common phrases to allay the anxiety of surgery in the patient by further developing the technique to an extent that it serves its name. A shortened hospital stay, decrease in morbidity and costs are related to improvement in post operative pain management.⁵

Further the techniques used intraoperatively to decrease post operative pain need to be standardized so that the best approach can be used uniformly. Joris et al. differentiated pain after laparoscopic cholecystectomy into three components: 1) visceral 2) abdominal wall 3) referred to the shoulder.⁶ Visceral pain in the biliary tract is carried by the sympathetic fibers originating from T7 to T10 and parasympathetic fibers from both the vagal nerves. He demonstrated visceral pain to be the major component of pain which was more than the parietal pain which itself was more than the shoulder pain. The anterior abdominal wall sensory innervation involves six lower thoracic nerves (T6-T12) and first lumbar nerve (L1). Referred pain to shoulder is carried by phrenic nerve. They found that pain is worst in

the first 24 hours after the surgery. Women were reported to have more pain than men.⁷ The present study aims to standardize the timing of intraperitoneal instillation of ropivacaine in laparoscopic cholecystectomy.

In this study, maximum patients were seen in age group >60 years (9) in group A, 51-60 years (11) in group B and 41-50 years (10) in group C. Khurana et al⁸ found that Visual analogue scale scores immediately postoperatively were 44.00 ± 19.16 and at 6th hour 35.40 ± 9.52. Similarly, verbal rating scale score (2.60 ± 0.88 vs 1.96 ± 0.74 vs 1.62 ± 0.56) was significantly reduced immediately postoperatively in Group 3. At the 6th hour verbal rating scale scores were 2.32 ± 0.79 vs 1.94 ± 0.42 vs 1.80 ± 0.49, which showed significantly less pain in patients receiving ropivacaine with fentanyl. Total analgesic consumption was also significantly lower in Group 3 patients in comparison to Group 1 and Group 2. In Group 1, the total analgesic (diclofenac) consumption was 149 ± 42 mg; in Group 2, 97 ± 47 mg; and in Group 3, 84 ± 25 mg.

We found that pruritis, respiratory depression and allergic reaction was not present in any group. Urinary retention was present in 1 patient in group A and B while 2 in group C. Fever was present 1 patient each in group A and C, morphine was given to 9 in group A, 15 in group B and 39 in group C.

Postoperative pain is unpredictable, but must be anticipated, which explains the need for analgesia before the patient wakes up from anesthesia. Visceral nociception has been neglected as a cause of post operative pain.⁹ Studies have shown visceral pain to be the major

component of post operative pain in addition to parietal (abdominal wall) pain. Third component which is the shoulder tip pain is pretty common after laparoscopic surgeries, also needs to be addressed. Carbon dioxide insufflation has widely been attributed to the shoulder tip pain. It may be due to the peritoneal irritation by carbonic acid or creation of space between the liver and diaphragm.^{10,11}

We found that mena pulse rate and mean VAS score in all groups was non- significant. Sharan et al¹² found that pulse rate, systolic blood pressure, and diastolic blood pressure were comparatively lower in Group B than in Group A. The visual analog scale (VAS) score was significantly lower in Group B. Rescue analgesia was given when VAS was >6. Verbal rating scale score was significantly lower in Group B, showing longer duration of analgesia in this group. Rescue analgesic requirement was also less in Group B.

CONCLUSION

Authors found that ropivacaine instillation in all doses found to be equally effective in all groups.

REFERENCES

1. Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy. The new 'gold standard' Arch Surg 1992;127:917-21.
2. McColl L. Laparoscopic cholecystectomy. Am R Coll Surg Engl 1992;74:231.
3. Rees BI, Williams HR. Laparoscopic cholecystectomy: The first 155 patients. Ann R Coll Surg Engl 1992;74:233-6
4. Devalkar PS, Salgaonkar SV. Intraperitoneal instillation of 0.25% bupivacaine for laparoscopic cholecystectomy: Effect on postoperative pain. IJCMAS 2016;12:91-5.
5. Meena RK, Meena K, Loha S, Prakash S. A comparative study of intraperitoneal ropivacaine and bupivacaine for postoperative analgesia in laparoscopic cholecystectomy: A randomized controlled trial. Anaesth Pain Intensive Care 2016;20:295-300.
6. Rapolu S, Kumar KA, Aasim SA. A comparative study on intraperitoneal bupivacaine alone or with dexmedetomidine for post-operative analgesia following laparoscopic cholecystectomy. IAIM 2016;3:33-40.
7. Shivhare P, Dugg P, Singh H, Mittal S, Kumar A, Munghate A. A prospective randomized trial to study the effect of intraperitoneal instillation of ropivacaine in postoperative pain reduction in laparoscopic cholecystectomy. J Minim Invasive Surg Sci 2014;3: 18009.
8. Khurana S, Garg K, Grewal A, Kaul TK, Bose A. A comparative study on postoperative pain relief in laparoscopic cholecystectomy: Intraperitoneal bupivacaine versus combination of bupivacaine and buprenorphine. Anesth Essays Res 2016;10:23-8.
9. Kim TH, Kang H, Park JS, Chang IT, Park SG. Intraperitoneal ropivacaine instillation for postoperative pain relief after laparoscopic cholecystectomy. J Korean Surg Soc 2010;79:130-6.
10. Kucuk C, Kadiogullari N, Canoler O, Savli S. A placebo-controlled comparison of bupivacaine and ropivacaine instillation for preventing postoperative pain after laparoscopic cholecystectomy. Surg Today 2007;37:396-400.
11. Trikoupis A, Papavramidis T, Kyurdzhieva E, Kesisoglou I, Vasilakos D. Intraperitoneal administration of ropivacaine during laparoscopic cholecystectomy. Eur J Anaesth 2010;27:222.
12. Sharan R, Singh M, Kataria AP, Jyoti K, Jarewal V, Kadian R. Intraperitoneal instillation of bupivacaine and ropivacaine for postoperative analgesia in laparoscopic cholecystectomy. Anesth Essays Res 2018;12:377-80.