A comparison of hemodynamic profile of intraperitoneal instillation of ropivacaine versus bupivacaine in laparoscopic surgeries

Sanmuga Piriya K1, Ramya N1,*, Balasubramanian S1, Vigneswaran J1, Suresh Kumar K1, Suresh Anand B S2

1 Dept. of Anesthesiology, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India
2 Rajalakshmi Engineering College, Chennai, Tamil Nadu, India

Abstract

Background: Inadequate pain relief in the postoperative phase is a well-known problem world-wide. Aside from the suffering caused by insufficient pain relief, this is an issue with potential adverse physiological and psychological consequences for patients in addition to financial drawbacks for caregivers. Poorly managed pain may interfere with postoperative complications, cause patient suffering and prolong recovery. Patients may anticipate future medical interventions with greater anxiety if pain has not been managed effectively in the past.

Objective: To assess postoperative hemodynamics of intraperitoneal instillation of Ropivacaine and bupivacaine in Laparoscopic surgeries.

Materials and Methods: The present study was conducted at Sri Manakula Vinayagar Medical College and Hospital, Pondicherry in the Department of Anaesthesia. The double blinded randomized experimental study was conducted from October 2017 to May 2019. The sample size of 50 study subjects was selected using the mean pain score at 3.6 with 80% power and 95% confidence interval. In each of the group 25 study subjects were allotted based on randomization. All patients were instilled with 30 ml of solution in a standardized manner by the operating surgeon under vision before removal of trocar at the end of the surgical procedure. Group R received 30 ml (0.2%) ropivacaine and group B received 30 ml (0.25%) bupivacaine. The drugs were prepared and given to the investigator who was blind to the identity of drugs.

Results: The heart rate was found to be comparable between two groups at 10 min, 30 Min, 60 Min, 120 Min, 4 Hrs, 8 Hrs, 12 Hrs and at 24 hrs and the p value was found to be non-significant. The Systolic Blood pressure was found to be statistically significant between the two groups at 10 Min, 30 Min, 60 Min, 120 Min, 4 hrs, 8 Hrs and 12 hrs. Whereas at 24 hrs the difference of Systolic Blood Pressure was found to be non-significant.

Conclusion: Heart rate was similar in both the study groups at various time intervals. Systolic blood pressure and diastolic blood pressure was significantly high among patients in Bupivacaine group measures in most of the time intervals, while mean blood pressure differences were inconsistent over the follow up period.

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1. Introduction

"The pain of surgery was torturous" said by Celsus in the pre anesthetic era. Pain is a Greek word derived from the name POINE, the Greek Goddess of revenge.

*Corresponding author.
E-mail address: dr.ramyaa@gmail.com (Ramya N).
of pain has defined pain as an “unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pain is always underestimated and under treated. Pain relief is an important goal of Anesthesia. Any degree of pain is significant to a patient. It is argued that any amount of reduction in the pain is beneficial, when the treatment is not associated with any adverse effect. It makes a difference in duration of hospital stay and time of ambulation.

The highest achievable standard of health is enshrined in the 1948 Universal Declaration of Human Rights as a fundamental right of every human being (WHO, 2002). Post-operative Pain relief is part of that basic human right to health.²

Inadequate pain relief in the postoperative phase is a well-known problem world-wide. Aside from the suffering caused by insufficient pain relief, this is an issue with potential adverse physiological and psychological consequences for patients in addition to financial draw backs for caregivers.³,⁴ Poorly managed pain may interfere with postoperative complications, cause patient suffering and prolong recovery.³,⁴ Patients may anticipate future medical interventions with greater anxiety if pain has not been managed effectively in the past.⁵ There are a number of risk factors for chronic pain after surgery and one of the most striking predictor is indeed the severity of acute postoperative pain.⁶,⁷

2. Objective

To assess postoperative hemodynamics of intra peritoneal instillation of Ropivacaine and bupivacaine in Laparoscopic surgeries.

3. Materials and Methods

A double blinded randomized experimental study was conducted at Sri Manakula Vinayagar Medical College and Hospital, Pondicherry in the Department of Anaesthesia from October 2017 to May 2019.

A total of 100 Study subjects aged between 20 to 65 years of age of either sex, ASA risk I and II, undergoing laparoscopic surgeries under general anaesthesia comprised the study population.

Sample size was calculated to be 50 (25 in each group) using Open Epi software version 3.03, taking into consideration mean pain score of 3.6 with SD 2.5 in one group and mean 2.0 with SD 2.5 based on previous study with 80% power and 95% confidence interval.

All patients posted for surgery during the study period fulfilling the eligibility criteria were included. Patients were divided into two groups of 25 each, irrespective of age and gender for the proposed surgery by Randomization chart.

3.1. Inclusion criteria

1. Age 18-60 years.
2. ASA I and II.
3. Both Genders.
4. Patient’s undergoing laparoscopic surgeries (with incision to closure time > 30 Mins).

3.2. Exclusion criteria

1. Paediatric age group < 18yrs
2. ASA III and IV
3. Patients with known allergy to drugs to be used
4. Renal dysfunction
5. Patients unable to comprehend VAS Score

All patients were instilled with 30 ml of solution in a standardized manner by the operating surgeon under vision before removal of trocar at the end of the surgical procedure. Group R received 30 ml (0.2%) ropivacaine and group B received 30 ml (0.25%) bupivacaine. The drugs were prepared and given to the investigator who was blind to the identity of drugs.

Means and proportions were calculated for continuous and categorical data respectively. Difference in proportions were tested using chi square test. Tests of normality were carried out for continuous variables and Mann Whitney U test was carried out to test statistical difference in means between the study groups. A p value <0.05 was considered statistically significant. Data entry was done using MS Excel 2013 and data analysis was carried out using SPSS version 23.0

4. Results

A total of 50 study subjects were selected and 25 subjects were selected in each group by random allocating.

Both the study groups were comparable in terms of Age, Gender, BMI and ASA with no significant difference was observed between the groups.

The heart rate was found to be comparable between two groups at 10 min, 30 Min, 60 Min, 120 Min, 4 Hrs, 8 Hrs, 12 Hrs and at 24 hrs and the p value was found to be non-significant with p value more than 0.05 at all the time intervals.

The Systolic Blood pressure was found to be statistically significant between the two groups at 10 min, 30 Min, 60 Min, 120 Min, 4 hrs, 8 Hrs and 12 hrs. Whereas at 24 hrs the difference of Systolic Blood Pressure was found to be non-significant.

The Diastolic Blood pressure was found to be statistically significant between the two groups at 10 min, 30 Min, 60 Min, 120 Min, 4 hrs and 12 hrs, whereas at 8 hrs and 24 hrs the difference of Diastolic Blood Pressure was found to be non-significant.
### Table 1: Socio Profile of study subjects.

| Study Group | Ropivacaine n (%) | Bupivacaine n (%) | P Value |
|-------------|-------------------|-------------------|---------|
| Age Group   |                   |                   |         |
| 18-30       | 13(52.0)          | 9(36.0)           | 0.476   |
| 31-45       | 7(28.0)           | 8(32.0)           |         |
| 46-65       | 5(20.0)           | 8(32.0)           |         |
| Gender      |                   |                   |         |
| Male        | 4(16.0)           | 6(24.0)           | 0.480   |
| Female      | 21(84.0)          | 19(76.0)          |         |
| ASA         |                   |                   |         |
| 1           | 19(76.0)          | 21(84.0)          | 0.480   |
| 2           | 6(24.0)           | 4(16.0)           |         |
| BMI         |                   |                   |         |
| Normal      | 22(88.0)          | 17(68.0)          | 0.088   |
| Overweight and Obese | 3(12.0) | 8(32.0) |         |

### Table 2: Distribution of study groups based on Heart Rate at various intervals

| Heart Rate | Ropivacaine (n=25) | Bupivacaine (n=25) | p value* |
|------------|---------------------|---------------------|----------|
|            | Median IQR          | Median IQR          |          |
| 10 Min     | 78 72-82            | 78 75-80            | 0.775    |
| 30 Min     | 76 72-81.5          | 76 72-80            | 0.822    |
| 60 Min     | 74 69.5-82.5        | 74 72-79.5          | 0.719    |
| 120 Min    | 76 70.5-82.5        | 78 73-83            | 0.312    |
| 4 Hrs.     | 76 74-87            | 78 76-82            | 0.364    |
| 8 Hrs.     | 79 72-85.5          | 80 76-86            | 0.412    |
| 12 Hrs.    | 80 71.5-84.5        | 79 76-82            | 0.756    |
| 24 Hrs.    | 79 75-83            | 78 76-81            | 0.718    |

*Mann Whitney u test was applied for comparison of means

### Table 3: Distribution of study groups based on SBP at various intervals

| SBP        | Ropivacaine (n=25) | Bupivacaine (n=25) | p value* |
|------------|---------------------|---------------------|----------|
|            | Median IQR          | Median IQR          |          |
| 10 Min     | 120 110-126         | 128 120-130         | 0.014    |
| 30 Min     | 118 114-124         | 124 117.5-129       | 0.048    |
| 60 Min     | 118 110-124         | 126 120-130         | 0.003    |
| 120 Min    | 120 114-127         | 128 124-130         | 0.002    |
| 4 Hrs.     | 124 118-128         | 130 124-135         | 0.002    |
| 8 Hrs.     | 124 120-130         | 128 124-138         | 0.062    |
| 12 Hrs.    | 124 119-128         | 130 124-134         | 0.005    |
| 24 Hrs.    | 126 122-134         | 128 124-130         | 0.859    |

*Mann Whitney U test was applied for comparison of means

### Table 4: Distribution of study groups based on DBP at various intervals

| SBP        | Ropivacaine (n=25) | Bupivacaine (n=25) | p value* |
|------------|---------------------|---------------------|----------|
|            | Median IQR          | Median IQR          |          |
| 10 Min     | 70 70-77            | 76 70-79            | 0.032    |
| 30 Min     | 72 68-77            | 76 72-80            | 0.093    |
| 60 Min     | 74 69-78            | 76 73-80            | 0.034    |
| 120 Min    | 74 69-78            | 78 74-80            | 0.010    |
| 4 Hrs.     | 74 70-80            | 80 77-82            | 0.005    |
| 8 Hrs.     | 78 71-80            | 80 76-80            | 0.175    |
| 12 Hrs.    | 78 72-80            | 80 78-82            | 0.023    |
| 24 Hrs.    | 80 78-82            | 80 78-80            | 0.612    |

*Mann Whitney U test was applied for comparison of means
5. Discussion

The present study was carried out as an attempt to compare the postoperative analgesic effects of intraperitoneal instillation of Ropivacaine and Bupivacaine in laparoscopic surgeries. The study was carried out as a double blind randomised control experiment among 50 Adult patients (20–65 years) of either sex, ASA risk I and II, undergoing laparoscopic surgeries under general anaesthesia. The study groups were comparable in terms of baseline characteristics like age, gender, MMS, ASA, BMI classification and duration of surgery. Heart rate was similar in both the study groups at various time intervals. However, systolic blood pressure and diastolic blood pressure was significantly high among patients in Bupivacaine group measures in most of the time intervals. Hence, VAS score was significantly lower in Group-R than in Group-B. The VAS score was significantly lower in Group-R from postoperative 5th hr. to 12th hr. Rescue analgesia was given when VAS was > 40. The VRS score was significantly lower in Group-R from postoperative 7th hr., showing longer duration of analgesia in this group. The rescue analgesia requirement was also less in Group-R. A comparable result was noted in the present study also, where lower VAS scores were noted from 8 hours and after, in patients who received Ropivacaine.

Babu R et al.9 study reported revealed that the age and sex distribution of both the groups was similar. The heart rate, systolic & diastolic blood pressure, mean blood pressure and mean trend of SpO2 in both groups remained similar over the periods.

Porika S et al.10 study findings reported that there was no significant difference in age and weight between the two groups. Intraoperatively statistically significant differences were observed SBP - At 15 and 30 min post nebulization and at extubation. No significant differences were observed with respect to DBP and HR. Postoperatively DBP and HR differences were found to be statistically significant at 4th post-operative hour. There were no statistically significant differences in SBP and MAP between both the groups.

6. Conclusion

The study groups were comparable in terms of baseline characteristics like age, gender, MMS, ASA, BMI classification and duration of surgery. Heart rate was similar in both the study groups at various time intervals. Systolic blood pressure and diastolic blood pressure was significantly high among patients in Bupivacaine group measures in most of the time intervals, while mean blood pressure differences were inconsistent over the follow up period.

7. Source of Funding

None.

8. Conflict of Interest

The authors declare that there is no conflict of interest

References

1. Goldstein A, Grimault P, Henique A, Keller M, Fortin A, Darai E. Preventing postoperative pain by local anesthetic instillation after laparoscopic gynecologic surgery: a placebo-controlled comparison of bupivacaine and ropivacaine. Anesth Analg. 1994;91(2):403–7.

2. Brennan F, Cousins MJ. Pain relief as a human right. Pain Clin Updates. 1994;12(5):1–4.

3. Bardiaux FM, Taviaux NF, Albert A, Boogaerts JG, Studler M. An intervention study to enhance postoperative pain management. Anesth Analg. 1996;96(1):179–85.

4. Bedard D, Purden MA, Sauve-Larose N, Certosini C, Schein C. The pain experience of post surgical patients following the implementation of an evidence-based approach. Pain Manag Nurs. 1996,7(3):80–92.

5. Twycross A. Educating nurses about pain management: the way forward. J Clin Nurs. 1997;11(6):705–14.

6. Keelert H, Jensen TS, Woolf CJ. Persistent postsurgical pain: risk factors and prevention. Lancet. 1997;367(9522):1618–25.

7. Perkins FM, Keelert H. Chronic pain as an outcome of surgery. A review of predictive factors. Anesthesiol. 1998;93(4):1123–33.

8. Meena R, 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. 2017;20(3):295–30.

9. Babu R, Jain P, Sherif L. Intraperitoneal instillation: ropivacaine vs bupivacaine for post operative pain relief in laparoscopic cholecystectomy. Int J Health Sci Res. 2017;3(12):42–7.

10. Porika TS. Intraperitoneal nebulization of ropivacaine 0.75% vs intraperitoneal nebulization of bupivacaine 0.5% for post-operative analgesia in laparoscopic surgeries: Prospective double blinded randomised controlled trial. Int Arch Integrated Med. 2018;5(9):105–17.

Author biography

Sanmuga Piriya K, Assistant Professor
Ramya N, Assistant Professor
Balasubramanian S, Professor
Vigneswaran J, Assistant Professor
Suresh Kumar K, Professor
Suresh Anand B S, Associate Professor

Cite this article: Piriya K S, Ramya N, Balasubramanian S, Vigneswaran J, Kumar K S, Anand B S S. A comparison of hemodynamic profile of intraperitoneal instillation of ropivacaine versus bupivacaine in laparoscopic surgeries. Indian J Clin Anaesth 2021;8(1):92-95.