International Journal of Medical Anesthesiology

E-ISSN: 2664-3774
P-ISSN: 2664-3766
www.anesthesiologypaper.com
IJMA 2024; 7(4): 24-27
Received: 03-10-2024
Accepted: 16-10-2024

Dr. Arpita M Tellur
Post Graduate, Department of Anesthesiology, Shri Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India

Dr. Megha GH
Professor and Head, Department of Anesthesiology, Shri Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India

Corresponding Author:
Dr. Megha GH
Professor and Head, Department of Anesthesiology, Shri Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India

A comparative study of efficacy of intraperitoneal instillation of injection ropivacaine 0.375% versus placebo on postoperative analgesia for laparoscopic abdominal surgery

Dr. Arpita M Tellur and Dr. Megha GH

DOI: https://doi.org/10.33545/26643766.2024.v7.i4a.507

Abstract
In laparoscopic abdominal surgeries the cause of pain are of somatic and visceral origin. Somatic pain is due to skin incision and the visceral pain is due to peritoneal distension and visceral irritation caused by creation of capnoperitoneum and surgical handling. Ropivacaine acts by reversible blockade of generation and propagation of action potential in nerves and other excitable tissues at the level of sodium channels. Ropivacaine is long acting amide when given intraperitoneally its action starts in 15-20 minutes and reduces postoperative visceral and shoulder pain following laparoscopic surgeries. A comparative, Randomised study was conducted on 60 adult patients ASA 1 and ASA 2 undergoing elective laparoscopic abdominal surgeries under general anaesthesia for 18 months from Feb 2024 to August 2025 in Basaveshwara Medical college and hospital, Chitradurga, divided into 2 groups of 30 each, Group S - Intraperitoneal instillation with 40 ml of 0.9% normal saline and Group R - with 40 ml of 0.375% Ropivacaine. The mean NRS was <5 till only for 4 hrs in group's, till 8 hrs in group B, 16 hrs in group R. The duration of analgesia was 137+1.38 hrs in gr R, 7.93+1.44 hrs in gr B and 4.47 +0.86 hrs in gr S.

Keywords: Ropivacaine, post-operative analgesia, laparoscopic abdominal surgery

Introduction
Laparoscopic abdominal surgeries are one of the most commonly performed elective day care procedures. Providing adequate postoperative pain relief is important to enhance recovery [1]. Although pain following laparoscopic surgery is less intense than open surgery, it can occur due to stretching of the abdominal wall from insufflation of gas and the release of inflammatory mediators, local dissection, and irritation of the peritoneum produced by blood and CO_2 used for pneumoperitoneum. In laparoscopic abdominal surgeries, the causes of pain are of somatic and visceral origin. Somatic pain is due to skin incision, while visceral pain arises from peritoneal distension and visceral irritation caused by the creation of capnoperitoneum and surgical handling [2]. Many patients complain of pain radiating to the right shoulder, which is due to residual carbon dioxide post-pneumoperitoneum irritating the diaphragm.

Pain relief is an important aim of any surgery. Different methods have been proposed to relieve postoperative pain after laparoscopy. These include NSAIDs/opioids, intraperitoneal and port site infiltration of local anesthetics, intraperitoneal saline, and the use of N2O in place of CO_2. Intraperitoneal instillation of local anesthetics at the end of laparoscopic procedures reduces postoperative pain and lengthens the period of the first postoperative analgesia requirement [3]. Intraperitoneal local anesthesia is a simple, cheap, and safe method of providing postoperative analgesia after laparoscopic abdominal surgeries. The main advantage of using local anesthetics is that they do not have the adverse effects of opioids, which may delay recovery and discharge from the hospital. These effects include postoperative nausea, vomiting, sedation, impairment of gastrointestinal motility, and pruritus. Many local anesthetics in various concentrations are used in practice, including lignocaine, bupivacaine, and the latest being ropivacaine.

Ropivacaine has shown to be less toxic to the cardiac and central nervous systems compared to other drugs. Ropivacaine is an amino amide that belongs to the pipecoloxylidide group of local anesthetics. S-ropivacaine is more potent and less cardiotoxic than R-ropivacaine. The drug used in our study is a racemic mixture of ropivacaine. Ropivacaine acts by reversible blockade of the generation and propagation of action potentials in nerves and other excitable tissues at the level of sodium channels. It is a long-acting amide; when given intraperitoneally, its action starts in 15-20 minutes and reduces postoperative visceral and shoulder pain following laparoscopic surgeries [4].

Materials & Methods

Study will be conducted on 60 adult Patients scheduled for elective laparoscopic abdominal surgery at Basaveshwara Medical College and Hospital, Chitradurga for 18 months.

A comparative, Randomised study was conducted on 60 adult patients ASA 1 and ASA 2 undergoing elective laparoscopic abdominal surgeries under general anaesthesia for 18 months from Feb 2024 to August 2025 in Basaveshwara Medical college and hospital, Chitradurga, divided into 2 groups of 30 each, Group S - Intraperitoneal instillation with 40 ml of 0.9% normal saline and Group R - with 40 ml of 0.375% Ropivacaine.

Stastical analysis

Sample size was calculated using published data of a previous study based on the anticipated difference in the pain score between the bupivacaine and ropivacaine groups.

The pain scores with use of 0.375% ropivacaine was (mean±standard deviation) 13.47±1.33. Assuming Type I error of 5% and Type II error of 20% (power of 80%), a decrease in the pain score by 25% (at least one point) is considered clinically significant.

This resulted in a sample size of 27 patients for each group calculated by using the formula.

The data will be compiled using an excel sheet. Statistical analysis will be conducted using Statistical Package for Social Services (SPSS ver 20). The categorical variables will be presented as frequencies and percentages and chi square test will be used as test of Significance.

After the approval by the institutional Ethical committee, written informed consent will be obtained from all the patients before being included in the study. The study population will be subdivided randomly into 2 groups by the use of random number generator each consisting of 30 patients:

Group S (n=30) and Group R (n=30).

The study is carried out as a randomised, prospective, double blind and controlled trial.

Patients undergoing laparoscopic abdominal surgery and who gave written informed consent to participate in the trial are allocated into two groups (S and R) of 30 patients each using computer generated random numbers.

Group S (n= 30) - These patients receives intraperitoneal instillation with 40 ml of 0.9% normal saline

Group R (n=30) - These patients receives intraperitoneal instillation with 40 ml of 0.375% ropivacaine

The duration of the study will be 18 months that is from FEB 2024 to AUGUST 2025. The study will be conducted in the department of Anaesthesia, BMCH, Chitradurga.

Inclusion criteria

- Patients willing to participate in the study.
- ASA 1 & 2 posted for elective laprotomy abdominal surgeries
- Age between 18 to 60 yrs
- Patient weight between 50 to 80 kgs

Exclusion criteria

- Patient with severe systemic disease
- Pt with morbid obesity, heart block, hepatorenal disease.
- Surgeries converted to open,
- Patient on chronic use of analgesics
- Pregnancy
- Patient with hypersensitivity for loacl anaesthestics.

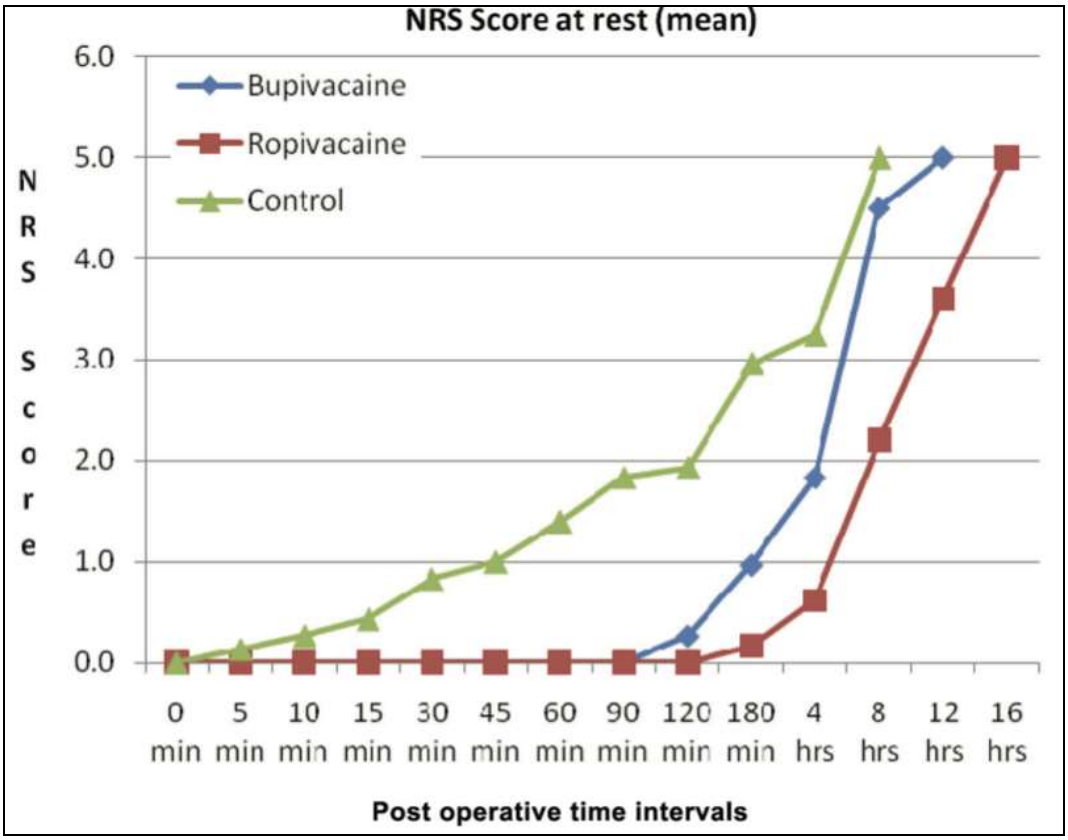
Anaesthetic technique

- In the pre-op ward, all patients are explained the proper use of the Numerical Rating Scale (NRS) for assessing pain, where 0 indicates no pain and 10 indicates the worst imaginable pain. Once the patient is shifted onto the operating table, an intravenous line will be secured using an 18G IV cannula, connected to ASA standard monitoring, which comprises heart rate, non-invasive measurements of systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), oxygen saturation (SpO_2), end-tidal carbon dioxide (Et CO_2), a temperature probe, and continuous ECG monitoring.
- Patients will be premedicated with IV glycopyrrolate (0.2 mg), IV fentanyl (2 mcg/kg), and induced with IV propofol (2 mg/kg), followed by suxamethonium (2 mg/kg). Intubation will be performed using a laryngoscope, and the endotracheal tube will be fixed after confirmation of bilateral air entry. Anesthesia will be maintained with O_2, N_2O, isoflurane, and vecuronium. Laparoscopic abdominal surgeries will be performed according to standard surgical and anesthesia protocols, utilizing a standard 10 mm trocar for the umbilical port and epigastric ports. Pneumoperitoneum will be achieved using non-humidified and non-heated CO_2, with the intra-abdominal pressure maintained between 14 and 17 mmHg.
- The required fluids will be calculated according to the instructions for intraoperative fluid infusion. All patients will receive 15 mg/kg of IV paracetamol 30 minutes prior to extubation. The drug (40 ml) will be injected intraperitoneally before the removal of the trocar at the end of the surgery, in Trendelenburg's position, to facilitate the dispersion of the drug solution in the subhepatic region.
- Parietal pain (superficial pain felt on touch) and visceral pain (deep, dull aching, not able to localize to a specific point) will be assessed with the NRS at rest and during movement/coughing. The incidence of shoulder pain will also be recorded. The intensity of pain will be recorded for all patients using the Numerical Rating Scale at 0.5, 1, 2, 4, 8, 12, and 24 hours after surgery. Rescue analgesia requirements will be recorded for 24 hours. If the NRS is greater than or equal to 5, patients will be prescribed rescue analgesia in the form of IV tramadol (1 mg/kg), which may be repeated if necessary to maintain an NRS of less than 5.

Results

Demographic data between the groups being statistically insignificant. Hemodynamic data between the grs being statistically insignificant.

The mean NRS was <5 till only for 4 hrs in groups, till 8 hrs in group B, 16 hrs in group R .the duration of analgesia was 137+1.38hrs in gr R, 7.93+1.44 hrs in gr B and 4.47 +0.86 hrs in gr S



Graph 1: NRS scores

Discussion

The duration of postoperative analgesia was counted from the first reading in PACU to the time of administration of rescue analgesia. Rescue analgesia was administered when the NRS score was >5 in the form of IV tramadol (1 mg/kg). The mean of duration of analgesia in Group S was 4.47+0.86 hours, in Group B 7.93+1.44 hours and in Group R 13.47+1.38 hours during the postoperative period. Thus, the mean duration of analgesia in Group R was almost double the duration of analgesia observed in Group B and three times the duration of analgesia observed in Group S. This difference was statistically as well as clinically significant.

This shows that the duration of analgesia was longer in the local anaesthesia groups where intraperitoneal local anaesthetic infiltration in the gallbladder fossa and suprahepatic surface was provided. Use of ropivacaine significantly prolonged and improved the analgesia as assessed by NRS score. No patient from our study complained of shoulder pain.

Intraperitoneal infiltration in gallbladder fossa and suprahepatic surface with bupivacaine and ropivacaine also helped in maintaining better haemodynamic profile in the postoperative period. Ropivacaine had a more profound and longer duration of analgesia as compared to bupivacaine.

We observed for various complications like nausea, vomiting, bradycardia, respiratory depression, hypotension and sweating in all patients. No patient from the entire study population had any incident of any of these complications. This shows that intraperitoneal instillation of ropivacaine and bupivacaine in the volume and dose used in our study is not associated with any adverse effects.

Conclusion

Trocar site infiltration and intraperitoneal instillation in the gallbladder fossa and subdiaphragmatic hepatic surface using ropivacaine (35 ml of 0.375%) and bupivacaine (35 ml of 0.25%) at the end of surgery as a part of multimodal analgesia provide safe and effective somato-visceral analgesia in patients undergoing LC. Ropivacaine provides a more profound and prolonged analgesia as compared to bupivacaine.

This technique of providing postoperative analgesia is simple, effective and will help in improving the postoperative recovery profile of the patient and help in making it a truly out-patient based surgery.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Das NT, Deshpande C. Effects of intraperitoneal local anaesthetics bupivacaine and ropivacaine versus placebo on postoperative pain after laparoscopic cholecystectomy: a randomised double-blind study. J

Clin Diagn Res. 2017 Jul;11(7).
2. 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. 2016;20:295-302.
3. Putta P, Pasupuleti H, Samantaray A, Natham H, Rao M. A comparative evaluation of pre-emptive versus post-surgery intraperitoneal local anaesthetic instillation for postoperative pain relief after laparoscopic cholecystectomy: A prospective, randomised, double-blind, and placebo-controlled study. Indian J Anaesth. 2019;63:205.
4. Dugg P, Shivhare P, Mittal S, Singh H. A prospective randomised control trial to study the role of intraperitoneal instillation of ropivacaine versus normal saline irrigation in postoperative analgesia.

How to Cite This Article
Tellur AM, Megha GH. A comparative study of efficacy of intraperitoneal instillation of injection ropivacaine 0.375% versus placebo on postoperative analgesia for laparoscopic abdominal surgery. International Journal of Medical Anesthesiology 2024; 7(4): 24-27.