

Out-look of Comparative Evaluation of Intraperitoneal Instillation of Bupivacaine and Bupivacaine with Dexmedetomidine in Laproscopic Surgeries

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Abstract

Introduction: Intraperitoneal injections of local anesthetic have been proposed to minimize post-operative pain after laparoscopic surgery.

Aim: The aim of this study was to comparing the antinociceptive effect of intraperitoneal instillation of bupivacaine and bupivacaine with dexmedetomidine after laparoscopic surgeries in post-operative pain management.

Materials and Methods: The study was conducted in the age group of 18–60 years on 120 adult patients of American Society of Anesthesiologists physical status 1 and 2, scheduled for elective laparoscopic surgeries under general anesthesia. Patients were randomly allocated into two groups of 60 each: Group A: ($n = 60$) Intraperitoneal bupivacaine (50 ml 0.25% + 5 ml normal saline) and Group B: ($n = 60$) Intraperitoneal bupivacaine (50 ml 0.25%) + dexmedetomidine 1 $\mu\text{g}/\text{kg}$ (diluted in 5 ml normal saline).

Results: The mean visual analog score in our study for the bupivacaine group was 2.95 ± 0.675 when compared to bupivacaine and dexmedetomidine group 2.30 ± 0.830 over a period of 24 h. However, it was statistically significant from 6 h postoperatively.

Conclusion: VAS was observed at 2, 4, 6, 8, 12, 16, 20, and 24 h and we found that Group B has less score (VAS <3) compared to Group A (VAS >3) which was statistically significant ($P < 0.05$).

Key words: Bupivacaine hydrochloride, Dexmedetomidine hydrochloride, Intraperitoneal injection, Pain, Post-operative

INTRODUCTION

Laparoscopic surgery is a modern surgical technique used for various surgeries such as cholecystectomy, appendectomy, and hernia repair. There are a number of advantages of this technique including reduced pain and bleeding, shorter recovery time and hospital stay, and over all reduced healthcare costs.^[1]

The pain intensity usually peaks during the 1st post-operative period and usually declines over the following

2–3 days.^[2] The pain after laparoscopic surgery results from the stretching of the intra-abdominal cavity,^[3] peritoneal inflammation, and phrenic nerve irritation caused by residual carbon dioxide (CO_2) in the peritoneal cavity. The pain can prolong hospital stay and lead to increased morbidity. Intraperitoneal injections of local anesthetic have been proposed to minimize post-operative pain after laparoscopic surgery.^[4]

The α_2 -adrenergic agonist provides sedation, anxiolysis, analgesia, and sympatholysis. Dexmedetomidine has become one of the frequently used drugs in anesthesia due to its hemodynamic, sedative, anxiolytic, analgesic, neuroprotective, and anesthetic sparing effect. Bupivacaine is an anesthetic that blocks nerve impulses in your body. Bupivacaine is used as a local (in only one area) anesthetic.

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MATERIALS AND METHODS

After getting approval from the Institutional Ethical Committee, written informed consent was obtained from all the patients before surgery. One hundred and twenty patients of American Society of Anesthesiologists (ASA) physical status I-II of both sexes, aged between 18 and 60 years undergoing laparoscopic surgeries, were included in this prospective, and randomized study conducted.

Patients with the previous abdominal surgery, drug allergy, cardiac patients, significant pulmonary diseases, and leaving intra-abdominal drain at the end of the surgery were excluded from the study.

Exclusion Criteria

The following criteria were excluded from the study:

- Patient refusal
- Patients belonging to ASA grade 3 and grade 4
- Patients physically dependent on narcotics
- Patients with history of drug allergy
- Patients with gross spinal abnormality, localized skin sepsis, hemorrhagic diathesis, or neurological involvement/diseases.

Pre-anesthetic check-up was carried out preoperatively with a detailed history, general physical examination, and systemic examination. Airway assessment examination was done.

The following laboratory examinations were done in all the subjects in study – hemoglobin, urine analysis, blood sugar, blood urea, serum creatinine, coagulation profile, blood grouping and Rh typing, electrocardiography (ECG)-for patients over 40 years of age, and chest X-ray.

On arrival to the operation theater, a peripheral intravenous line was established with an 18G cannula on the non-dominant hand. The patients were monitored with standard five-lead ECG, heart rate, non-invasive blood pressure, and pulse oximeter. Patients were induced with 2 µg/kg fentanyl and propofol until the verbal response was lost. The muscle relaxation was achieved with atracurium 0.5 mg/kg and the trachea was intubated with an appropriate size endotracheal tube after 3 min. The anesthesia was maintained with admixture of oxygen + nitrous oxide and sevoflurane to achieve the MAC of 1.3 and maintained with top up of injection atracurium (0.1 mg/kg) as a muscle relaxant.

The intraperitoneal instillation of the test drug (bupivacaine 0.25%, 50 ml and bupivacaine 0.25, and 50 ml with dexmedetomidine 1 µg/kg) was done by the same operating surgeon after the gallbladder was taken out and the peritoneal wash had been done. At

the end of the surgery, residual neuromuscular blockade was reversed with injection neostigmine 0.05 mg/kg with injection glycopyrolate 0.01 mg/kg and tracheal extubation was performed as per standard anesthesia protocol.

Data were collected after the patient was shifted to post anesthesia care unit (PACU). Heart rate, systolic and diastolic blood pressure, MAP, and SpO₂ were recorded at 0, 1, 2, 4, 6, and 8 h of intervals after surgery. The time 0 started when the patient was shifted to PACU. If heart rate was <50 beats/min, injection atropine was given. Injection mephentermine was given in 3 mg bolus if the mean arterial pressure was <20% of the baseline.

RESULT AND DISCUSSION

In the present study, we elicited significant difference in the study groups with respect to the rescue analgesic consumption and total dose analgesics consumption.^[5] The present study results correlate with study done by Ahmed *et al.*,^[6] which has shown that intraperitoneal instillation of dexmedetomidine in combination with bupivacaine 0.25% significantly decreases the post-operative analgesic requirements and decreased incidence of shoulder pain in patients undergoing laparoscopic cholecystectomy surgeries. Intraperitoneal instillation of bupivacaine in combination with dexmedetomidine is superior to bupivacaine alone.

In the present study, results vital parameters such as heart rate and blood pressure are important indicators of patients comfort as the values correlated well with high visual analog score (VAS) scores. In the present study, only 8 (13.33%) patients in Group A suffered from shoulder pain as compared to 3 (5%) patients in Group B. Incidence of shoulder pain was also lower in dexmedetomidine group in study done by Ahmed *et al.*^[6]

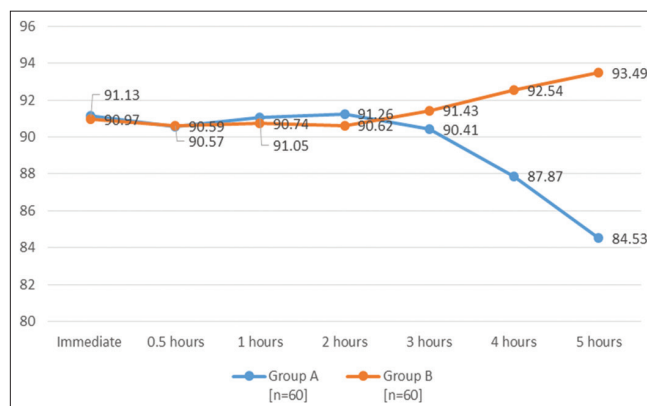


Figure 1: Mean arterial pressure (mmHg) in study group

Table 1: Demographic distribution in the study

| Patients Characteristic | Group A (n=60) | Group B (n=60) | P-value |
|---------------------------|----------------|----------------|-----------|
| Age in years | 42.35±11.040 | 42.12±10.577 | 0.96 (NS) |
| Body weight in kg | 58.28±4.819 | 57.95±5.444 | 0.72 (NS) |
| Height in cm | 156.97±6.142 | 154.17±5.773 | 0.07 (NS) |
| ASA* I/II | | | |
| Duration of surgery (min) | 47.13±5.861 | 47.63±5.995 | 0.64 (NS) |

Data presented as mean±standard deviation or Number: *P<0.05 was considered significant

Table 2: Comparison of mean duration of analgesic in two group

| Variable | Group A (n=60) | Group B (n=60) | P-value |
|----------------------------|----------------|----------------|----------|
| Mean duration of analgesic | 184.43±23.545 | 198.30±36.065 | 0.01 (S) |

Table 3: VAS post-operative period up to 24 h

| VAS score | Group A (n=50) | Group-B (n=50) | P-value |
|-----------|----------------|----------------|-----------|
| Immediate | 123.00±6.936 | 120.02±4.773 | 0.007 (S) |
| 0.5 h | 122.37±7.052 | 119.52±4.649 | 0.01 (S) |
| 1 h | 119.98±6.307 | 118.37±6.112 | 0.15 (NS) |
| 2 h | 120.28±5.508 | 118.67±4.444 | 0.08 (NS) |
| 3 h | 117.08±7.495 | 117.57±7.263 | 0.71 (NS) |
| 4 h | 117.57±5.838 | 118.70±5.878 | 0.29 (NS) |
| 5 h | 114.40±6.129 | 119.27±4.940 | 0.001 (S) |

VAS: Visual analog score

Table 4: Analgesic requirement

| Analgesic profile | Group A (n=50) | Group-B (n=50) | P-value |
|---|----------------|----------------|----------|
| Number of patients given rescue analgesia | 32 (53.33%) | 27 (45.00%) | - |
| Mean time for first dose (hours) | 347.88±4.301 | 455.19±9.262 | 0.01 (S) |
| Mean total dose | 3.75±0.440 | 2.26±0.447 | 0.01 (S) |

Table 5: Adverse effects

| Side effect | Group A (n=60) (%) | Group B (n=60) (%) |
|-------------------|--------------------|--------------------|
| Nausea/Vomiting | 4 (6.67) | 5 (8.33) |
| Shoulder pain | 8 (13.33) | 3 (5.00) |
| Sedation | 0 (0.00) | 0 (0.00) |
| Diarrhea | 0 (0.00) | 0 (0.00) |
| Pruritis | 0 (0.00) | 0 (0.00) |
| Urinary retention | 0 (0.00) | 0 (0.00) |
| Constipation | 0 (0.00) | 0 (0.00) |
| Shivering | 0 (0.00) | 0 (0.00) |

The adverse effects noted by us were nausea and vomiting, only 4 (6.67%) patient experienced PONV in Group A as compared to 5 (8.33%) patients in Group B.⁷⁻¹⁰ This present study confirms earlier evidence that, in patients with gallbladder diseases undergoing laparoscopic cholecystectomy, intraperitoneal local anesthetic instillation

is more effective when applied at the end of an operation than at the start.

Limitation of the present study is the post-operative pain, which is a subjective experience and can be difficult to quantify objectively and compare when comparing various treatment options [Tables 1-4 and Figure 1].^{7-10]}

CONCLUSION

The following conclusions were drawn after discussion from the study.

1. Demographic data (e.g, age, sex, diagnosis, distribution, and BMI) were comparable in both the groups
2. Mean time taken for the duration of analgesia and total rescue analgesia in Group A was 3.75 ± 0.440 and Group B was 2.26 ± 0.447 min, which was concluded that rescue analgesic requirement was high in Group A than in Group B
3. Mean duration of analgesia (Minutes) in Group A was 184.43 ± 23.545 and in Group B was 198.3 ± 36.065 , which showed that Group A had higher mean duration of analgesia than in Group B after instillation of the drugs respectively
4. Significant changes were seen in hemodynamics (SPO2 and MAP) when both the groups were compared and Group A showed effective analgesic response with minimum hemodynamic alternations
5. No significant complications were observed VIZ, Hypotension, and Bradycardia. Only eight patients suffered from shoulder pain in Group A and three patients in Group B

VAS was observed at 2, 4, 6, 8, 12, 16, 20, and 24 h and we found that Group B has less score (VAS <3) compared to Group A (VAS >3) which was statistically significant ($P < 0.05$).

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