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POSTOPERATIVE ANALGESIC EFFICACY OF INTRAPERITONEAL ROPIVACAINE VERSUS INTRAPERITONEAL ROPIVACAINE WITH DEXMEDETOMIDINE IN LAPAROSCOPIC CHOLECYSTECTOMIES.

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ABSTRACT Intraperitoneal ropivacaine has postoperative analgesic effects in laparoscopic abdominal surgeries. Dexmedetomidine has been used as intraperitoneal instillation for postoperative analgesia. In this study our aim was to compare the postoperative analgesic efficacy of ropivacaine alone and ropivacaine with dexmeditomidine when used as an intraperitoneal instillation in laparoscopic cholecystectomies(LC).

METHODS: One hundred patients aged 20 to 60 years of ASA physical status I and II undergoing laparoscopic cholecystectomies were divided into 2 groups of 50 each. Group A patients received intraperitoneal instillation of 2 mg/kg ropivacaine along with 1 microgram /kg of dexmedetomidine in 50 ml normal saline and in Group B, patients received intraperitoneal instillation of 2 mg/kg ropivacaine in 50 ml normal saline(NS) before creation of a pneumoperitoneum. Postoperative pain abdomen, time to first rescue analgesia and total analgesic consumption was compared between the two groups.

RESULTS: VAS (visual analogue scale for pain abdomen) was significantly lower in group A as compared to Group B(2.52 ± 0.73 in group A vs 3.53 ± 1.75 at 12 hours in group B, p<0.0001) . Time to first request of analgesia was found to be significantly lower in Group B (212.19min ± 14.42) when compared to group A (472.12 ± 23.65, P = 0.001). No of doses of rescue analgesia in 24 hours(1.42 ± 0.62 in group A vs 3.37 ± 0.56 in group B, p<0.0001) and total analgesic consumption(1285.0 gm ± 61.14 in group A vs 2340.0gm ± 86.12 in group B, p<0.0001) was significantly lower in group A when compared to group B.

CONCLUSION: Intraperitoneal dexmeditomidine with ropivacaine is more efficacious than Intraperitoneal ropivacaine alone for postoperative pain management in laparoscopic abdominal surgeries.

KEYWORDS : Analgesia, Ropivacaine, Laparoscopic Cholecystectomy(lc), Dexmedetomidine, Intraperitoneal.

INTRODUCTION

Surgical management of symptomatic cholelithiasis is laparoscopic and open cholecystectomy. Nowadays the standard procedure is laparoscopic cholecystectomy (LC) as it causes less patient discomfort when compared to open cholecystectomy and is associated with faster patient recovery with less postoperative complications. Pain accompanying laparoscopic cholecystectomies is significant although less as compared to open cholecystectomy[1,2] Postoperative pain remains a major concern in patients undergoing abdominal surgeries including laparoscopic cholecystectomy . Pain with abdominal surgeries is associated with visceral and incision site(abdominal wall) pain, however patients with cholelithiasis and post cholecystectomy also have referred pain to shoulder tip [3] .

These days, the practice of intraperitoneal (IP) administration of local anesthetics has become more common as they provide the benefit of analgesia without systemic side effects that may result from use of enterally and parenterally administered drugs[4] .

The results of various studies have been conflicting with majority demonstrating benefit of pain reduction after intraperitoneal instillation of local anesthetics in the postoperative period, whereas there are some suggesting that it does not attenuate pain following LC[3, 5,6] .

Dexmedetomidine is a highly selective alpha2 receptor agonist with sympatholytic, sedative, analgesic, amnestic and opioid sparing properties[7]. It has been used as an intravenous analgesic and amnestic agent in laproscopic cholecystectomies both in a bolus dose of 1mcg/kg followed by an infusion of 0.2 to 0.4 mcg/kg. Recently some authors have evaluated the role of intraperitoneal administration of dex medetomidine (1mcg/kg) in combination with 0.25%bupivacaine. They concluded that dexmedetomidine as an adjuvant provided better postoperative analgesia when used as a bolus in a dose of 1mcg/kg with 0.25 % bupivacaine [8,9]. However other authors evaluated the effect of intraperitoneal bupivacaine on pain following LC and concluded that intraperitoneal bupivacaine does not attenuate pain following LC[5,6]. The aim of this study was to compare the postoperative analgesic effect of intraperitoneal administration of ropivacaine with intraperitoneal administration ropivacaine with dexmedetomidine in LC.

MATERIALS AND METHOD :

This prospective randomized, double-blind study was conducted after approval from hospital ethical committee in 100 patients of age group 20 to 60 years of American Society of Anesthesiologist physical Status I and II, scheduled for LC under general anesthesia.

EXCLUSION CRITERIA:

1. Patients who refused to participate in study.
2. Patients in whom surgery converted to open cholecystectomy
3. Patients with a history of hypersensitivity to ropivacaine, acute cholecystitis, acute pancreatitis, pregnancy and history of peritonitis.

Detailed preanaesthetic evaluation was performed 1 day before surgery. Written informed consent was taken and visual analogue scale (VAS) of 0–10 was explained to all the patients where 0=no pain and 10=worst possible pain. Patients were randomly divided using concealed opaque envelopes to one of the two groups of fifty each group B and group A. The patients, surgeons and anesthesiologists were blinded to patient allocation. In Group B, patients received intraperitoneal instillation of 2 mg/kg ropivacaine in 50 ml normal saline(NS) and Group A patients received intraperitoneal instillation of 2 mg/kg ropivacaine along with 1microgram /kg of dexmedetomidine in 50 ml NS before creation of a pneumoperitoneum .After shifting, the patient to operation theatre, baseline heart rate, blood pressure, respiratory rate, temperature, and SpO2 were recorded. Minimum monitoring standards were ensured and an intravenous (IV) access was secured on the non-dominant hand. After preoxygenation with 100% oxygen via an anatomical face mask for 3 min, all patients were induced with 0.2 mg glycopyrrolate, lignocaine 1.5 mg/kg, fentanyl 2 µg/kg and propofol 2–2.5 mg/kg. Atracurium 0.6 mg/kg was given to facilitate oral endotracheal intubation with appropriate size endotracheal tube. After checking and securing the endotracheal tube, anesthesia was maintained with intermittent positive pressure ventilation using closed circuit and isoflurane targeted to a MAC of 1.15. Muscle relaxation was maintained with intermittent boluses of atracurium. Drug solution was administered using veress needle before creation of pneumoperitoneum in both the groups by the surgeon who did not participate in the study. Intraoperatively, all patients received an IV infusion of lactated ringers solution and at a rate of 5–7 ml/kg/h patients. Hypotensive episodes if any were maintained with 3 to 6 mg boluses of ephedrine. Recording of patient vitals (Heart rate and non-invasive blood pressure) was done at 5 minute intervals till removal of gall bladder and thereafter at 15 minute intervals till the extubation of trachea. During laparoscopy, intra-abdominal pressure was limited to10–12 mmHg. Diclofenac

75mg /kg was given intraoperatively to both groups as an infusion over 15 minutes. The CO2 was carefully evacuated at the end of surgery. Both the groups of patients received 0.1 mg/kg of ondensteron at the end of the surgery for control of post-operative nausea and vomiting. Residual neuromuscular blockade if any was reversed and the trachea extubated .The patient post extubation was shifted to the post anaesthesia care unit where the Anesthesiologist was unaware of treatment to which each patient was randomized.

All patients were assessed postoperatively in terms of following parameters:

A. Abdomen pain (immediately after recovery: 0 h, at 1, 3, 6, 12, 18, 24 h)
B. Heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate were recorded at 0, 1, 3, 6, 12,18 and 24 h
C. Time to first Analgesic requirement and number of doses of rescue analgesics. The patients with VAS score ≥4 were administered an infusion of 1gm of paracetamol (IV) as rescue analgesia. Patients were administered injection ondansetron 4 mg on complaint of nausea/vomiting. Nausea and vomiting were assessed depending on the episodes, number and need for antiemetic medication and occurrence of any other adverse effects were also recorded.

RESULTS

Data was collected and the statistical analysis was done in SPSS 20.0. A p value of <0.05 was considered as significant . Mean and standard deviations were also calculated in SPSS 20.0.

The two groups were comparable with reference to age, sex, body weight duration of surgery and ASA grading (table 1)

Table 1: Demographic profile

Variables	Mean ± Standard Deviation		p-value
	Group A	Group B	
Age (years)	44.50 ± 9.92	45.40 ± 11.13	0.742
Weight (kg's)	68.67 ± 9.41	66.50 ± 7.75	0.310
Female:male	27/23	31/19	0.441
Duration of surgery (min)	54.80 ± 3.01	56.20 ± 3.65	0.392
ASA I/ASA II	31/19	34/16	0.542

The two groups showed statisticaly significant result(p<.05) when the visual analogue scores(VAS) for pain abdomen were compared at 0, 1, 3, 6 and 12 hours with group A (dexmedetomidine plus ropivacaine) showing lower VAS scores than group B (ropivacaine only) , Table 2 , Figure 1. The difference in intraoperative heart rate,SpO2, EtCO2, mean systolic blood pressure, mean diastolic pressure, mean arterial pressure of both the groups at all the times was statistically nonsignificant ($P > 0.05$). The two groups showed statistically significant difference(p<0.05) when they were compared with respect to the time of first rescue analgesia, no of doses of rescue analgesia and total analgesia consumption(table 3) with group A showing increased latency in first rescue analgesia, less no of doses of rescue analgesia and less total analgesia consumption.

Table 2: Visual analogue scale score for pain abdomen.

VAS pain abdomen (h)	Mean ± Standard Deviation		p-value	Remarks
	Group A	Group B		
0	2.57 ± 0.87	3.42 ± 1.64	<0.0001	S
1	2.37 ± 0.93	3.13 ± 1.13	<0.0001	S
3	2.13 ± 0.63	3.83 ± 1.79	<0.0001	S
6	2.80 ± 0.71	3.60 ± 1.62	<0.0001	S
12	2.52 ± 0.73	3.53 ± 1.75	<0.0001	S
18	1.87 ± 1.19	1.73 ± 1.06	0.773	NS
24	0.67 ± 0.41	0.88 ± 0.67	0.561	NS

Figure 1: comparison of abdominal pain.

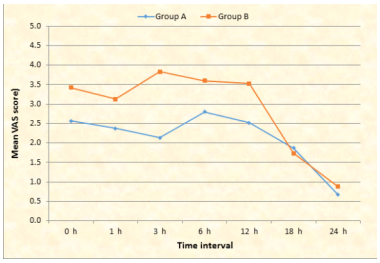

Table 3: Requirement of analgesia

	Mean ± Standard Deviation		p-value	Remarks
	Group A	Group B		
Time of first rescue analgesic (min.)	472.12 ± 23.65	212.19 ± 14.42	<0.0001	S
Number of doses of rescue analgesia	1.42 ± 0.62	3.37 ± 0.56	<0.0001	S
Total analgesic consumption in 24 hours (gram)	1285.0 ± 61.14	2340.0 ± 86.12	<0.0001	S

DISCUSSION:

Pain after laparoscopic cholecystectomy(LC) is multifactorial and of great concern. Postoperative pain management with intraperitoneal instillation of local anesthetics in these patients is gaining recognition. Various local anesthetics such as lignocaine, bupivacaine, ropiva ca ine, and levobupivacaine have been used in various stu die s[9,10].Dexmeditomidine, an alpha 2 agonist has been used along with local anesthetics in laparoscopic abdominal surgeries[11] Intraperi toneal administration of dexmedetomidine causes local analgesia by enhancement of the hyperpolarization-activated cation channels, which prevents the nerve from returning to resting membrane potential[12].Use of local anaesthetics and dexmedetomidine as intraperitoneal instillation avoids the systemic side effects that are associated with these drugs. This was exemplified in our study as no patient in either of the groups had any significant systemic effect of either ropivacaine or dexmeditomidine. In our study we used ropivacaine in a dose of 2mg/kg for intraperitoneal instillation in one group(B) and ropivacaine(2mg/kg) plus dexmeditomidine(1 microg ram/kg) in another group(A). Ropivacaine is a long-acting amide type local anesthetic used as regional anesthetic. It is a pure S(−) enant iomer, developed for the purpose of reducing potential cardiac toxicity and improving relative sensory and motor block profiles. When ropivacaine is given intraperitoneally it starts acting within 10–20 min, and duration of action lasts for 4–6 h[13]. In our study, mean postoperative VAS scores for pain abdomen were significantly lower in Group A than Group B in the first 12 h thereby indicating that the patients receiving intraperitoneal ropivacaine plus dexmeditomidine had lesser pain in the first 12 h during the postoperative period. The VAS scores were non-significant after the 12 hour period. The time to first rescue analgesia was more in Group A than Group B. Total number of doses of rescue analgesia and total analgesic consumption was more in group B than in Group A. Our findings thus suggest that intraperitoneal Dexmeditomidine with ropivacaine significantly improve the postoperative analgesic efficacy when compared to using intraperitoneal ropivacaine only, thus signifying improved postoperative analgesic effect of intraperitoneal dexmeditomidine.

CONCLUSION:

Using intraperitoneal dexmeditomidine with ropivacaine has more postoperative analgesic effect in laparoscopic cholecystectomies when compared to use of intraperitoneal ropivacaine alone.

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Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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