STUDY OF POST OPERATIVE ANALGESIA WITH INTRAPERITONEAL ROPIVACAINE WITH DEXMEDETOMIDINE IN LAPAROSCOPIC CHOLECYSTECTOMY

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Received Date: 22/07/2024 Accepted: 15/09/2024

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ABSTRACT

Background: Intraperitoneal instillation of local anesthetic may decrease post operative pain after laparascopic surgeries.. Present study was aimed to study post operative analgesia with intraperitoneal ropivacaine with dexmedetomidine in laparoscopic cholecystectomy. **Material and Methods:** Present study was single-center, prospective, comparative study, conducted patients age between 18 and 60 years, ASA grade I or II, posted for elective laparoscopic cholecystectomy. The postoperative pain was assessed using 10 point VAS at 0.5 ,1, 2, 4, 6, 8 ,12, 24 hrs. after surgery and over all VAS score. **Results:** The present study was conducted among 50 patients to evaluate the efficacy of Ropivacaine and dexmedetomidine. Mean age was 38.26 ± 12.2 years. Study group consist of 10 (20%) males and 40 (80%) females. Mean weight was 55.8 ± 5.29 kgs. There was no significant difference in the mean heart rate, systolic blood pressure (SBP), diastolic blood pressure (SBP), mean arterial pressure (MAP) & SpO2 at any time interval. The mean duration of analgesia was 746.60±93.78 min, difference in the mean duration of analgesia was statistically highly significant ($p < 0.05$). Mean VAS scores were less than 2.5 till 24 hours post-operatively. Mean sedation score in postoperative period was found to be less than 2 at all-time interval. 6 patients (12 %) required 2 doses and 44 (88 %) patients required only one dose of rescue analgesic. Mean doses required were 1.12 ± 0.33. The mean total rescue analgesic consumption was 84.0 ±24.62 mgs. The PONV was observed in 1 (2.5%) patient. There was no incidence of shoulder pain, bradycardia, hypotension and pruritus in the two groups. **Conclusion:** Intra-peritoneal instillation of ropivacaine with dexmedetomidine provides superior and prolonged pain relief without any adverse effects, making its use simple, safe and effective for postoperative analgesia in laparoscopic cholecystectomy.

Keywords: Intra-peritoneal, ropivacaine, dexmedetomidine, postoperative analgesia, laparoscopic cholecystectomy.

INTRODUCTION

Cholecystectomy is performed in the field of general surgery in the treatment of symptomatic cholelithiasis, gall bladder cancer, biliary colic and other gall bladder conditions.[1] Cholecystectomy can be done by open surgical approach or laparoscopic approach. Open cholecystectomy is opted only in presence of absolute contraindication for laparoscopic approach.[1]

Laparoscopic Cholecystectomy also causes post-operative pain but minimal in nature

compared to open cholecystectomy. Pain after surgical procedures is due to peritoneal inflammation from tissue trauma caused by surgical incision and dissections, nerve injuries caused by transaction, stretching, or compression. [2] Pain occurs as a result of stretching of the intra-abdominal cavity, diaphragmatic irritation (action of residual in CO2 in peritoneal cavity), gas insufflation and raised intra peritoneal pressure. Uncontrolled post- operative pain causes venous thrombo-embolism, it may lead to chronic regional pain syndromes. [3]

Ropivacaine is considered as classical example of local anesthetic with anaesthetic and analgesic effect. Ropivacaine is less lipophilic, less cardio and neuro-toxic, low probability of penetrating large myelinated motor fibres and tolerable.[4] It causes reversible inhibition of sodium ion influx and blocks propagation of action channels. [4] Dexmedetomidine an alpha 2 agonist acts as an adjuvant and has a synergistic effect with ropivacaine. [5] Present study was aimed to study post operative analgesia with intraperitoneal ropivacaine with dexmedetomidine in laparoscopic cholecystectomy.

MATERIAL AND METHODS

Present study was single-center, prospective study, conducted after approval from institutional ethical committee, informed written consent was obtained from the patients.

Inclusion criteria

- Patients age between 18 and 60 years, ASA grade I or II, elective laparoscopic cholecystectomy, willing to participate in present study

Exclusion criteria

- Patients undergoing emergency surgery
- Patient refusing surgery
- Allergy to trial drugs
- History of alcohol and drug abuse
- Pregnancy, cardiovascular, hematological, neurological, respiratory disease

All patients were done preanaesthetic checkup with detailed airway, general and systemic examination along with routine hematological and radiological investigations. All patients were kept 8 hours fasting prior to surgery.

An 18 gauge IV cannula was inserted after arriving to OT. Noninvasive monitoring (SpO2, ECG, NIBP) were attached and baseline value were recorded.. All patients were premedicated and preoxygenated , GA was induced with injection propofol 2.0 mg/kg followed by injection Vecuronium bromide 0.1mg/kg to facilitate orotracheal intubation. The trachea was intubated with a cuffed orotracheal tube of appropriate size. Anaesthesia was maintained with oxygen and 1–2% sevoflurane. Vecuronium bromide 1 mg intermittently was used to achieve muscle relaxation. Minute ventilation was adjusted to maintain normocapnia (end tidal CO_2 between 35 and 38 mm Hg) and EtCO2 was monitored.

All patients received-intraperitoneal instillation of 0.75% ropivacaine 10ml + dexmedetomidine 1µg/kg making the volume 5 ml with normal saline. All patients received infiltration of 20mL of 0.75% ropivacaine at trocars insertion site, being 6mL in the umbilical incision, 6mL in the epigastric incision and 4mL in both working portals after removal of trocar.

The neuromuscular blockade was antagonized with neostigmine 0.05 mg/kg and glycopyrrolate0.01mg/kg and patients were extubated. The NG tube was removed, and the patient was shifted to Recovery Room. All patients stayed in Recovery Room for 2 h after the end of surgery. The postoperative pain was assessed using 10 point VAS at 0.5 ,1, 2, 4, 6, 8 ,12, 24 hrs. after surgery and over all VAS score.(VAS score 0 no pain ,VAS score 10 worst possible pain) Haemodynamic parameters (SBP, DBP, MBP, Pulse, SpO_2)-were recorded at 0.5, 1, 2, 4, 6, 8, 12, 24 hrs. postoperatively. Patients were regularly monitored

for episodes of hypotension (MAP<60 mmHg), and bradycardia (HR<60bpm) in post-operative period.

RESULTS

The present study was conducted among 50 patients to evaluate the efficacy of Ropivacaine and dexmedetomidine. Mean age was 38.26 ± 12.2 years. Study group consist of 10 (20%) males and 40 (80%) females. Mean weight was 55.8 ± 5.29 kgs.

Table 1: General characteristics

Characteristics	No. of subjects (n=50)	Percentage
Mean Age in years	38.26 ± 12.2	
Mean Weight (Kg)	55.8 ± 5.29	
Gender		
Male	10	20 %
Female	40	50 %

There was no significant difference in the mean heart rate, systolic blood pressure (SBP), diastolic blood pressure (SBP), mean arterial pressure (MAP) & SpO2 at any time interval. The mean duration of analgesia was 746.60±93.78 min, difference in the mean duration of analgesia was statistically highly significant (p <0.05).

Table 2: Mean Duration of Analgesia

	MEAN ± SD
Duration of Analgesia (min)	748.2 ± 91.87

Mean VAS scores were less than 2.5 till 24 hours post-operatively.

Table 3: Post-Operative Mean Pain Score (VAS)

Time interval (hours)	MEAN VAS SCORE
0	0±0
0.5	0.3±0.46
1	0.66±0.56
2	1.34±0.63
4	1.9±0.36
6	2.08±0.4
12	2.18±0.8
24	2.02 ±0.38

Mean sedation score in postoperative period was found to be less than 2 at all-time interval.

Table 4: Sedation Score (RSS)

Time interval (hours)	Mean RSS Score
0	2.14 ± 0.57
0.5	1.9 ± 0.3
1	1.9 ± 0.3
2	1.88 ± 0.33
4	1.88 ± 0.33
6	1.84 ± 0.37

In present study, none of the patients required 3 doses of rescue analgesic, 6 patients (12 %) required 2 doses and 44 (88 %) patients required only one dose of rescue analgesic. Mean doses required were 1.12 ± 0.33. The mean total rescue analgesic consumption was

84.0 ±24.62 mgs.

Table 5: Rescue Analgesic Required (in 24 Hours)

Number of Doses	No. of subjects (n=50)	Percentage
One	44	88 %
Two	6	12%
Three	0	0
Mean ± SD	1.12 ± 0.33	
Mean amount (mg) of rescue analgesic	84.0 ± 24.62	

The PONV was observed in 1 (2.5%) patient. There was no incidence of shoulder pain, bradycardia, hypotension and pruritus in the two groups.

Table 6: Comparison of Adverse Effects

Adverse Effects	No. of subjects (n=50)	Percentage
PONV	1	2.5

DISCUSSION

In present days, laparoscopic cholecystectomy is preferred over open cholecystectomy due to facts such as minimally invasive procedure, achieve cosmetic results, reduce complications like hemorrhage, relatively fast recovery, reduce hospital stay, less prone to post- operative infections, less severity of pain, minimizes use of(or) dependence on post-operative oral analgesics.[6]

The pain following laparoscopic and open cholecystectomy is visceral and parietal/somatic respectively. Parietal pain is sharp and can be localized by specific spot or point. Visceral pain is dull, non- localised, occurs when the nerves through the walls of an organ are stretched. If irritation of parietal peritoneum occurs, visceral pain may lead to somatic/ parietal pain. The intensity of pain following open cholecystectomy is higher than pain following laparoscopic cholecystectomy. Uncontrolled post- operative pain causes venous thrombo-embolism, it may lead to chronic regional pain syndromes.

Several literatures illustrate multiple modes and approaches to overcome the pain. Use of Non-Steroidal Anti Inflammatory Drugs (NSAIDS)/Parenteral analgesics/Opioids, local anaesthetic instillation, alpha 2 agonists has marked a tremendous change in pain management. The advantage of using local anesthetics is that, it provides adequate analgesia without drastic complications. Instillation of local anesthetic in to peritoneal cavity, blocks visceral afferent signaling and modifies visceral nociception and illness responses.

The backbone of intraperitoneal local analgesic instillation is “preemptive analgesia” which refers that previously administered medications modulate the arousal of nociception action in the post-operative period sparing pain-after analgesics. The preemptive analgesia prevents the formation of central sensitization to painful stimuli by decreasing response from pain sensation.[7,8]

In present study, all patients received-intraperitoneal ropivacaine & dexmedetomidine. Dexmedetomidine intensifies the motor blockage, prolongs duration of analgesia, and causes sedation without markable respiratory depression. It blocks substance P in the nociceptive pathway and acts on inhibitory G protein, thereby it increases the conductance through potassium channels. [5]

In present study, all patients received-intraperitoneal instillation of 0.75% ropivacaine 10ml + dexmedetomidine 1 µg/kg making the volume 5 ml with normal saline. All patients received infiltration of 20 mL of 0.75% ropivacaine at trocars insertion site, being 6mL in the umbilical incision, 6 mL in the epigastric incision and 4mL in both working portals after removal of trocar.

The mean duration of analgesia was 746.60 ±93.78 min with a range of 510 to 845 min. At 0.5 hours, mean VAS was 0.3 ± 0.46, at 1 hour, mean VAS was 2.02 ± 0.51, at 24 hours, mean VAS was 2.02 ± 0.38. Yeh CN et al.,[9] found that combined wound and intraperitoneal local anaesthetic after laparoscopic cholecystectomy significantly decreased the immediate postoperative pain. Similar findings were noted in present study.

Gopal Reddy Narra et al.,[10] noted that post- operative VAS pain scores were significantly lower in levobupivacaine 0.25% (39.58%) when compared to ropivacaine (52.08%). Neha T Das et al.,[11] noted that intraperitoneal infiltration of LA significantly reduces pain intensity score in early postoperative period and helps in improving the postoperative recovery after laparoscopic cholecystectomy.

Shrinivas Rapolu et al.,[12] compared the analgesic effect of intraperitoneal instillation of dexmedetomidine with 0.25 % bupivacaine (125 mg) 50ml v/s 0.25% bupivacaine (125mg) 50ml alone. There was statistically significant difference in VAS pain score at 6, 8, 12, 18, 24 hours after surgery in group BD (3.21 ±0.83) compared to group B (2.81 ±0.91) up to 24 hours. Time to requirement of first dose rescue analgesia for group BD was 7.61 hours compared to 5.81 hours for group.

According to total number of doses of rescue analgesic required, none of the patients required 3 doses of rescue analgesic, 6 patients (12 %) required 2 doses and 44 (88 %) patients required only one dose of rescue analgesic. Mean doses required were 1.12 ± 0.33. The mean total rescue analgesic consumption was 84.0 ±24.62 mgs.

Narasimhan et al.,[13] showed similar results that in elective laparoscopic cholecystectomy, intraperitoneal instillation of dexmedetomidine in combination with bupivacaine was more effective as an analgesic compared to bupivacaine alone or in combination with tramadol.

Shivhare P et al.,[14] did a randomized double blind study showing that intraperitoneal instillation of ropivacaine reduces the incidence and intensity of upper abdominal pain and shoulder tip pain after laparoscopic cholecystectomy. Similar findings were noted in present study.

Chhavi S Sharma et al.,[15] did a randomized prospective double blinded study concluding that intraperitoneal analgesia with local anaesthetic (ropivacaine and bupivacaine) is simple, effective method with minimal side effects.

Limitations of study were that pain is a highly personal experience and its ambiguity lies in that it is a subjective sensation and thorough objective observation of such is difficult. The population enrolled was in the age group of 18 - 60 years which were otherwise healthy patients of ASA Grade I and II, so the effect of Dexmedetomidine as an adjuvant in older patients with cardiovascular co morbidities is yet to be investigated. Total analgesic consumption could have been ascertained more precisely if the study were conducted for longer periods and sample size was large.

CONCLUSION

Intra-peritoneal instillation of ropivacaine with dexmedetomidine provides superior and prolonged pain relief without any adverse effects, making its use simple, safe and effective for postoperative analgesia in laparoscopic cholecystectomy.

Conflict of Interest: None to declare
Source of funding: Nil

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