



INTRAPERITONEAL BUPIVACAINE ALONE OR WITH DEXMEDETOMIDINE FOR POST-OPERATIVE ANALGESIA FOLLOWING LAPAROSCOPIC CHOLECYSTECTOMY: A COMPARATIVE STUDY.

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ABSTRACT

Background And Aims: Intraperitoneal instillation of local anaesthetics has been shown to minimize post-operative pain after laparoscopic surgeries. We compared the antinociceptive effects of intraperitoneal bupivacaine alone and combined with dexmedetomidine in patients undergoing laparoscopic cholecystectomy.

Methods: Total of 162 patients was selected in which 81 were randomly allocated in each group using table of randomisation. Patients received intraperitoneal bupivacaine 50 ml 0.25% & 5 ml normal saline (NS) in Group B (n = 81) and intraperitoneal bupivacaine 50 ml 0.25% & dexmedetomidine 1 µ [mcq]/kg (diluted in 5 ml NS) in Group BD (n = 81) before removal of trocar at the end of surgery. The quality of analgesia was assessed by visual analogue scale score (VAS). Time to the first request of analgesia, total dose of analgesic in the first 24 h and adverse effects were noted. Statistical analysis was performed using Win Pepi computer software and Microsoft (MS) Office Excel Software with the Student's t-test and Chi-square test (level of significance P = 0.05).

Results: VAS at different time intervals, overall VAS in 24 h was significantly lower (2.70 ± 0.27 , 4.16 ± 0.39), time to first request of analgesia (hours) was longest (3.12 ± 0.718 , 1.54 ± 0.526) and total analgesic consumption (mg) was lowest (179.01 ± 35.676 , 292.59 ± 45.319) in Group BD than Group B.

Conclusion: Our study showed that intraperitoneal instillation of dexmedetomidine 1µ[mcq]/kg in combination with bupivacaine 0.25% in elective laparoscopic cholecystectomy significantly reduces the post-operative pain and significantly reduces the analgesic requirement in post-operative period as compared to bupivacaine 0.25% alone.

KEYWORDS : Bupivacaine hydrochloride, dexmedetomidine hydrochloride, intraperitoneal injection

INTRODUCTION

Gallstone disease is one of the most common problems affecting the digestive tract.^[1] Laparoscopic cholecystectomy is better and most accepted surgical procedure than open cholecystectomy for cholelithiasis.^[2] Laparoscopic procedures have many advantages over open procedures such as lesser haemorrhage, better cosmetic results, lesser post-operative pain, and shorter recovery time, leading to shorter hospital stay and less expenditure.^[3] Pain results from stretching of the intra-abdominal cavity^[4] peritoneal inflammation, and diaphragmatic irritation caused by residual carbon-dioxide in the peritoneal cavity.^[5] Many methods have been proposed to relieve post-operative pain following laparoscopic cholecystectomy.^[6] Intraperitoneal instillation of local anaesthetic agents alone^[6] or in combination with opioids,^[7,8] α-2 agonists such as clonidine^[9] and dexmedetomidine^[7] have been found to reduce post-operative pain following laparoscopic cholecystectomy. The aim of this study was to compare the antinociceptive effects of intraperitoneal dexmedetomidine combined with bupivacaine to intraperitoneal bupivacaine alone in patients undergoing laparoscopic cholecystectomy.

METHODS

After getting approval from Institutional Ethical Committee, written informed consent was obtained from all the patients before surgery. 162 patients of ASA physical status I-II of both sexes, aged between 18 and 60 years undergoing laparoscopic cholecystectomies were included in this prospective, randomized, double-blind study conducted. Intraoperative monitoring of electrocardiography, non-invasive blood pressure, oxygen saturation (SpO₂) was started and a baseline value was recorded. Pre-oxygenation with 100% oxygen (O₂) was done for 3 min. General anaesthesia was induced with IV fentanyl 1.5-2 µg/kg, propofol 2.0-2.5 mg/kg followed by succinyl choline 2 mg/kg to facilitate orotracheal intubation. The trachea intubated with a cuffed orotracheal tube of appropriate size, lubricated with

lidocaine jelly 2% & maintained with 60% N₂O in oxygen with 0.5-1% isoflurane. Vecuronium bromide will be used to achieve muscle relaxation, minute ventilation adjusted to maintain normocapnia and EtCO₂ monitored. Hypotension/hypertension defined as fall/rise in systolic blood pressure of >20% from the baseline values and bradycardia/tachycardia defined as fall/rise in pulse rate of >20% from the baseline values were recorded. Patients placed in 15-20° reverse Trendelenberg's position with the left side tilt position. During laparoscopy, intra-abdominal pressure maintained at 12-14 mm Hg. Patients were randomly allocated to one of the groups using table of randomization are Group B (n = 81): Intraperitoneal bupivacaine 50 ml 0.25% + 5 ml normal saline (NS), and Group BD (n = 81): Intraperitoneal bupivacaine 50 ml 0.25% + dexmedetomidine 1µ [mcq]/kg (diluted in 5 ml NS), and the end of the surgery, the study solution was given intraperitoneally before removal of trocar in Trendelenberg's position into the hepato-diaphragmatic space, on gall bladder bed and near and above hepatoduodenal ligament. The neuro-muscular blockade was antagonized with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg and extubated and the patient was shifted to post-anaesthesia care unit. All the study patients will be instructed about the use of the VAS score before induction of anesthesia (VAS score 0 - no pain, VAS score 10 - worst possible pain). Patients who will be reported VAS 3 or >3 will be given diclofenac 75 mg intramuscularly as rescue analgesia. Time to the first request of analgesia (considering the extubation as time 0), total dose of analgesia and adverse or side effects over 24 h postoperatively will be noted.

A total sample size of 162 patients (n = 81 each for two groups) was analyzed statistically by performing using Microsoft Office Excel Software 2007, Win Pepi computer software. Results were expressed as mean ± standard deviation, number and percentage (%). Data were analysed using *post hoc* analysis method. Normally distributed data were assessed using unpaired Student's t-test (for comparison of parameters

among groups). Comparison was carried out using Chi-square (χ^2) test with a P value reported at 95% confidence level and level of significance used was $P = 0.05$.

RESULTS

There was no significant difference with respect to age, sex, ASA physical status and MPG Grade. [Table 1].

Table 1: Demographic Characteristic Of Patient's Data In Studied Groups (Mean ± Sd)

Variable	Group B (n=81)	Group BD (n=81)	P
Age (years)	38.32 ± 11.28	36.37 ± 12.06	0.289
SEX			
MALE	16 (19.8%)	30 (37.0%)	0.015
FEMALE	65 (80.2%)	51 (63.0%)	
Total	81 (100.0%)	81 (100.0%)	
ASA Grade			
I	61 (75.3%)	75 (92.6%)	0.003
II	20 (24.7%)	6 (7.4%)	
Total	81 (100.0%)	81 (100.0%)	
MPG Grade			
I	68 (84.0%)	74 (91.4%)	0.152
II	13 (16.0%)	7 (8.6%)	
Total	81 (100.0%)	81 (100.0%)	

Table 2: Post-operative VAS Score (Mean±Sd) In Studied Groups

Time (in hrs) VAS	Group B Mean ±SD	Group BD Mean ±SD	t value	p value
0.5	2.00 ±0.158	1.36 ±0.508	10.86	0.000
1	3.79 ±1.902	1.86 ±0.379	8.93	0.000
2	4.89 ±.908	2.91 ±0.925	13.71	0.000
4	4.00 ±1.351	3.64 ±0.841	2.025	0.045
6	4.95 ±.820	3.67 ±0.725	10.56	0.000
12	5.80 ±.401	3.17 ±1.138	19.61	0.000
24	3.72 ±0.480	2.30 ±0.732	14.59	0.000

VAS: Visual analogue scale, SD: Standard deviation

Visual analogue scale at different time intervals were statistically significantly lower at all times in Group BD than Group B [Table 2]. Furthermore, overall VAS in 24 h was also significantly lower in Group BD (2.70 ± 0.27) than and Group B (4.16 ± 0.39). [Table 3]

Table 3: Post-operative Overall VAS Score And Analgesic Requirements (mean ± Sd) In Studied Groups

Variable	Group B (n=81)	Group BD (n=81)	t value	P
Overall VAS over 24 h post-op	4.16 ± 0.39	2.70 ± 0.27	27.700	0.010
Time to first request of analgesia in postoperative period (hours)	1.54 ± 0.526	3.12 ± 0.781	-15.111	0.000
Total dose of diclofenac (mg) in 24 h	292.59 ± 45.319	179.01 ± 3 5.676	17.723	0.000

VAS: Visual analogue scale, SD: Standard deviation

Time to first request of analgesia was longest in Group BD (3.12 ± 0.781h) as compared to Group B (1.54 ± 0.526h). Total diclofenac consumption was also lowest in Group BD (179.01 ± 3 5.676 mg) than Group B (292.59 ± 45.319 mg) [Table 3]. Overall analysis showed that adverse events were not statistically significantly different in all the two study groups (P = 0.4010).

DISCUSSION

Laparoscopic surgery, also called minimally invasive surgery

and pain after laparoscopic surgery is due to skin incision site, creation of pneumo-peritoneum, trauma created by surgical procedure.^[10] Postoperative pain after laparoscopic surgery are mainly due to stretching of intra-abdominal cavity (visceral pain), phrenic nerve irritation by residual carbon dioxide in the peritoneal cavity (shoulder pain) and surgical incision (parietal pain).^[11] Multimodal efforts like parenteral opioids, non-steroidal anti-inflammatory drugs or local wound infiltration have been done to reduce overall pain and benefit post-operative conditions of patients undergoing laparoscopic surgeries.^[5, 12] Despite their efficacy, with all parenteral medications, there are associated adverse effects. In this modern era of surgery, intraperitoneal instillation of local anaesthetic agents has become an important method to control post-operative pain, nausea, vomiting and reduced hospital stay.^[13,14] Intraperitoneal instillation of 0.25% bupivacaine provide effective analgesia, in addition to added dexmedetomidine to with bupivacaine our studies show increased antinociceptive efficacy. Time for the first analgesic dose was significantly prolonged and total analgesic doses required was significantly less in group BD compared to group B. Many side effects like hypotension, bradycardia, and sedation were observed in the patients group BD, whereas both groups few patients were observed with side effects of nausea, Vomiting. This findings that is comparable to a study done by Bhakhamees *et al.*¹⁵

All our study findings fulfilled the study objectives and proved the antinociceptive effect of intraperitoneal application of bupivacaine in combination of dexmedetomidine in laparoscopic surgery showed better results than the bupivacaine alone with quality VAS score, better hemodynamic values, less doses of analgesic requirement on post-operative period and minimal adverse events.

CONCLUSION

Hence our study showed that intraperitoneal instillation of dexmedetomidine 1 µ/kg in combination with bupivacaine 0.25% in elective laparoscopic cholecystectomy significantly reduces the post-operative pain and significantly reduces the analgesic requirement in post-operative period as compared to bupivacaine 0.25% alone.

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