e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15 (12); 1028-1039

Original Research Article

A Prospective Randomised Study Comparing the Analgesic Efficacy of Intraperitoneal Instillation of Ropivacaine with Dexmedetomidine and USG Guided Erector Spinae Plane Block with Same Drugs in Patients Undergoing Elective Laparoscopic Cholecystectomy

Dilip Kumar S.N.[1], Shreyas Gomedic Ramachandra[2], Shashikala T.K.[3], Deepa Kattishettar[4]

[1]Senior Resident, PESU IMSR, Konappana Agrahara, Electronic city, Bangalore
[2]Assistant Professor, Department of Anaesthesiology, Sri Chamundeshwari Medical College Hospital & Research Institute, Channapatna, Ramanagara
[3]Professor, Dept. of Anaesthesiology, Mysore Medical College & Research Institute, Mysuru
[4]Associate professor, Department of Anaesthesiology, Mysore Medical College and Research Centre, Mysuru, 570001

Received: 25-09-2023 / Revised: 28-10-2023 / Accepted: 30-11-2023
Corresponding author: Dr. Shashikala T.K.
Conflict of interest: Nil

Abstract:

Introduction: Laparoscopic cholecystectomy is a commonly performed surgery for cholelithiasis, associated with moderate to severe pain despite multimodal analgesics. The aim of our study is to compare the procedures like USG-guided ESPB versus IP instillation in prolonging the postoperative analgesia.

Methodology: 60 ASA I and II patients were randomly assigned into two groups of 30 each. ESPB group: USG-guided ESPB was given bilaterally using Ropivacaine 0.375% plus Dexmedetomidine 50mcg (total 32mL), 16 mL each side. IP (Intraperitoneal instillation) group: same volume and concentration of study drug instilled at gallbladder bed and peri-hepatic region (16ml each site) just before removal of trocar, followed by Trendelenburg position for 5 minutes. Hemodynamic parameters like SBP, DBP, MAP, HR recorded. The total duration of analgesia, VAS score, the time of rescue analgesia and total analgesic consumption in first 24 hours after surgery were assessed.

Results: The total duration of analgesia in ESPB group was 462.5±34.0 minutes when compared to 447.7±62.5 minutes in IP group which was not significant ($p>0.05$). Hemodynamic parameters were statistically significant in ESPB group when compared to IP group at various intervals of time ($p<0.05$). The total analgesic consumption in first 24 hours was significantly less in ESPB group when compared to IP group.

Conclusion: To conclude the total duration of analgesia was not significantly changed in either group. Though there was significant increased consumption of analgesics in first 24 hours in IP group, either of the procedures can be used as multimodal analgesia in laparoscopic cholecystectomy.

Keywords: cholecystectomy, intraperitoneal instillation, ESPB, Ropivacaine, Dexmedetomidine.

Introduction

Laparoscopic cholecystectomy (LC) is a frequently performed elective procedure for cholecystitis when compared to open cholecystectomy (OC). It has many advantages over the OC such as less bleeding, less scar, less post-operative pain, early recovery, shorter duration of hospital stays and cost effectiveness. [1] [2] however reduced post-operative pain is the worthiest achievement from the patient point of view.

Gas insufflation by surgeons during the procedure raises the intraperitoneal pressure that results in peritoneal inflammation and neuronal injury, leading to visceral type of abdominal pain and gets aggravated on coughing, deep breathing and upon movement. [3] [1] [4]

Visceral pain is also due to surgical handling and diaphragmatic irritation by dissolved carbon dioxide and somatic component of the pain is due to the holes made in abdominal wall by trocars. Shoulder pain is due to peritoneal insufflation or exaggerated Trendelenburg position which frequently leads to postoperative complications.[5] [6] It is a major hurdle for early post- operative ambulation, so there is increased risk of venous thromboembolism and respiratory complications leading to lengthening of the hospital stay. [7]

Multimodal analgesia, including parenteral opioids, NSAIDS or local infiltration with local anaesthetics, despite their efficacy all has their own adverse effects. [8]

Several other techniques have been tried such as neuraxial opioids; intraperitoneal instillation of local anaesthetics with adjuvants, oblique subcostal transverse abdominus plane block, USG guided erector spinae plane block, a novel truncal interfascial block. These techniques successfully reduce the post-operative pain and opioid consumption post operatively. [9] [10] [11] [12] [13] [14] [15]

Intraperitoneal instillation of local anaesthetics with adjuvants reduces the immediate postoperative pain, nausea, vomiting and duration of hospital stay. [16] Local anaesthetics have the advantages of causing less respiratory depression, reduced potential for drug abuse, early return of bowel movements, lesser nausea and vomiting and faster recovery. Local anaesthetics can reduce postoperative visceral pain by blocking the splanchnic nerves which transmit the nociceptive pain signals from the surgical site to the central nervous system. [17] [18] Local anaesthetics provide antinociception by affecting nerve membrane-associated proteins and by inhibiting the release and action of prostaglandins which stimulates the nociceptors and cause inflammation.

The USG guided erector spinae plane block is a novel truncal inter fascial block. The injection site is either at the level of T5 transverse process or at the level of T7 to T9 transverse process depending upon the type of surgery, either thoracic or abdominal procedure. The spread of the local anaesthetics in erector spinae plane block is anteriorly through the costotransverse foramina to the paravertebral space, hence it is described as indirect paravertebral block. [19]

Ropivacaine, a newer amide group of local anaesthetic with longer duration of action, has a better toxicity profile compared to Bupivacaine. It inhibits sodium ion influx thereby blocks impulse conduction of nerve fibres, and has got dose dependant inhibition of potassium channels also. It has lower lipid solubility when compared to bupivacaine, hence ropivacaine induced sensory and motor blocks are dose dependant.

Dexmedetomidine is a highly selective alpha-2 adrenergic agonist. The antinociceptive effect of dexmedetomidine occurs at dorsal root neuron level. Dexmedetomidine has got sedative, analgesic, antianxiety and anti-sympathetic effect without causing respiratory depression. [20] Studies have shown the topical application of dexmedetomidine can enhance the analgesic effect of local anaesthetics, reduce the dosage of local anaesthetics. [21] Hence the present study was done to compare the analgesic efficacy of intraperitoneal instillation of ropivacaine with dexmedetomidine and USG guided erector spinae plane block in patients planned for elective laparoscopic cholecystectomy.

Materials and Methods

The study was conducted in 60 subjects of ASA 1 and 2, aged between 20 to 60 years undergoing elective laparoscopic cholecystectomy under general anaesthesia.

The patients excluded from the study were those belonging to ASA 3, 4 and 5, patients with cardiac, renal, hepatic, cerebral diseases and peripheral vascular disease. Pregnant and lactating women were also excluded from the surgery. After obtaining ethical and scientific committee clearance, the study population were randomly divided into 2 groups with 30 subjects in each group using shuffled opaque sealed envelopes containing the name of the group and by asking patients to choose an envelope.

Group IP: received intraperitoneal instillation of 30ml 0.375% ropivacaine + 50mcg dexme detomidine in 2ml of NS (total 32ml)

Group ESP: received USG guided erector spinae plane block of 30ml of 0.375% ropivacaine + 50mcg of dexmedetomidine in 2ml of NS (total 32ml), 16ml on each side at T7 level before induction of anaesthesia.

After thorough pre anaesthetic evaluation, the day before surgery informed consent was taken, patient was advised for nil per orally for 6 hours for solid food and advised to take Tab. Alprazolam 0.5mg + Tab. Ranitidine 150mg orally on the previous night of surgery. On the day of surgery patient was shifted to ward, multi parameter monitor was connected (EDAN iM80), baseline readings of SBP, DBP, MAP and HR were recorded, IV access was taken in non-dominating hand using 18G IV cannula, crystalloid fluids NS/RL was connected. In group ESP, patients were positioned in lateral position with the support of OT assistant. The preliminary scan was done to identify T7 vertebra from below upwards. The spinous process was identified and marked as midline, bilaterally 3cm from the midline was marked with the help of marking pen, which was needle entry point. The parts were painted with povidone and draped; the linear probe was also painted with povidone. The scan was started from midline to lateral after adjusting USG machine. The anatomical landmarks were identified from midline to transverse process, at T7 transverse process 3 layers of muscles from posterior to anterior (trapezius, rhomboid and erector spinae) were identified. After identifying Sono-anatomy at T7 level 10cm 23G needle was inserted in plane to USG probe aiming the needle

towards T7 transverse process. After touching the transverse process 16ml of ropivacaine 0.375%+ 25mcg dexmedetomidine was injected, unzipping of muscle plane was appreciated by USG scan. Injection was repeated on the other side also with the same amount of drug at the same level. Following erecter spinae plane block patient turned supine and premedicated with injection midazolam 1mg+ injection fentanyl 2mg/kg+ injection dexamethasone 8mg+ injection glycopyrrolate 0.01mg/kg+ injection ondansetron 4mg. simultaneously patient was preoxygenated for 3minutes with 100% oxygen. Patient was induced with (injection Lidocaine 1.5mg/kg prior to injection of propofol) injection propofol 2mg/kg + injection vecuronium 0.1mg/kg. Patients were ventilated for 3minutes with O2+ N2O+ 1% isoflurane and intubated with appropriate endotracheal tube and ventilated throughout the procedure. Based on the existing literature lower umbilical part will not be covered by ESP block, so requested the surgeon to instil 5ml of 0.5% ropivacaine through the umbilical port.

After extubation of patient pain was monitored using visual analogue scale score at various interval of time from 0 point of time. The 0 point of time was defined the moment patient recovered from general anaesthesia and responding to the verbal commands. In the post-operative recovery room, if VAS score was >4, patients were given injection paracetamol 1gm IV 6th hourly. If the pain was not subsided even after 30minutes of injection paracetamol, if the VAS score remains >4 then injection tramadol 100mg was given as per patients request. Total analgesic consumption in first 24hours post operatively was recorded based on amount of IV paracetamol and tramadol usage. Patients were monitored for any adverse effects like nausea, vomiting, sedation, respiratory depression, hypotension and bradycardia.

In Group IP, the patients were premedicated, induced and intubated with the similar combination of drugs. Intraoperatively patients were monitored in a similar way as in Group ESP. At the end of the surgery, before removal of trocar (after peritoneal wash and suctioning) the study drug, which is 30ml of 0.375% ropivacaine with 50mcg of dexmedetomidine in 2ml NS, 16ml of prepared drug was instilled inferior aspect of diaphragm (8ml on each side) and 16ml on the operative site (gallbladder bed) via the umbilical port in Trendelenburg position. Patient is kept in same position for 5 minutes, then reverse Trendelenburg position is applied to the patient for 5 minutes. Reversal of the patient from the neuromuscular blockade was similar in both the groups. After extubation patient pain was monitored using VAS scale at 0 to 30 minutes after extubation at various intervals (0, 1st hour, 2nd, 4th, 6th , 8th, 10th, 12th, 16th, 20th, 24th hour). In the post-operative period, if the VAS score is >4 patients were given injection paracetamol 1gm IV 6th hourly, if the pain was not subsided with paracetamol even after 30minutes of injection and if the VAS score is >4 then the patients were given injection tramadol 100mg IV as per patient's requirement.

Time to first request of analgesia, total dose of analgesic consumption in first 24hours post-operatively (Inj. Paracetamol and Inj. Tramadol), VAS score at different interval of time (0, 1hour, there after every 2hours up to 24hours) were recorded. Adverse effects like shoulder pain, hypotension, bradycardia, nausea, vomiting and sedation were recorded.

Results

Results of both the groups were comparable in terms of demographic variables such as age, sex, MP class, BMI, ASA class and duration of surgery. ($p>0.05$) which was not statistically significant.

Table 1: Sex category by groups

	ESPB	IP	P value
Female	19 (63.3)	22 (73.3)	0.4
Male	11 (36.7)	8 (26.7)	
Total	30 (100)	30 (100)	

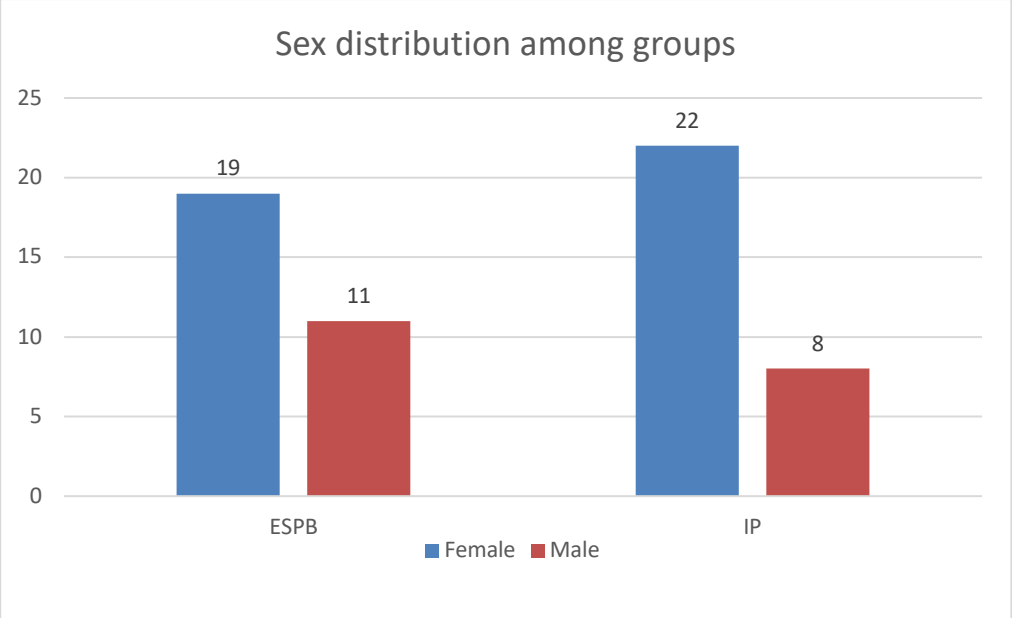

Figure 1: Sex distribution among groups

Table 2: MP class by groups

	ESPB	IP	P value
1	10 (33.3)	7 (23.3)	0.68
2	16 (53.3)	18 (60.0)	
3	4 (13.3)	5 (16.7)	
Total	30 (100)	30 (100)	

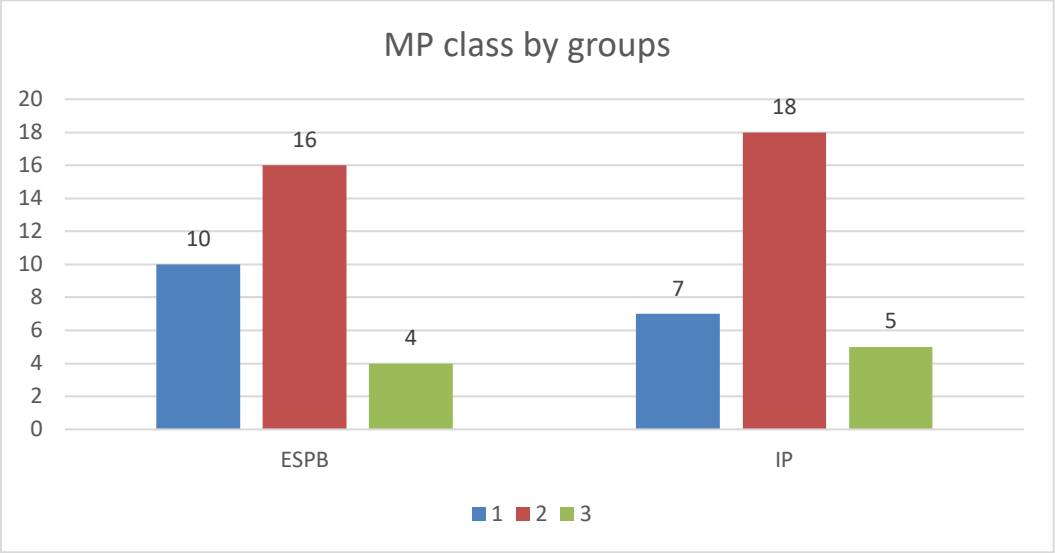

Figure 2: MP class by groups

Table 3: Age and BMI by groups

	ESPB	IP	P value
Age	36.0 (8.7)	36.0 (10.4)	0.9
BMI	23.9 (1.9)	23.4 (1.8)	0.49
Duration of analgesia	462.5 (34.0)	447.7 (62.5)	0.25

Table 4: ASA class by groups

	ESPB	IP	P value
1	18 (60.0)	14 (46.7)	0.31
2	12 (40.0)	16 (53.3)	
Total	30 (100)	30 (100)	

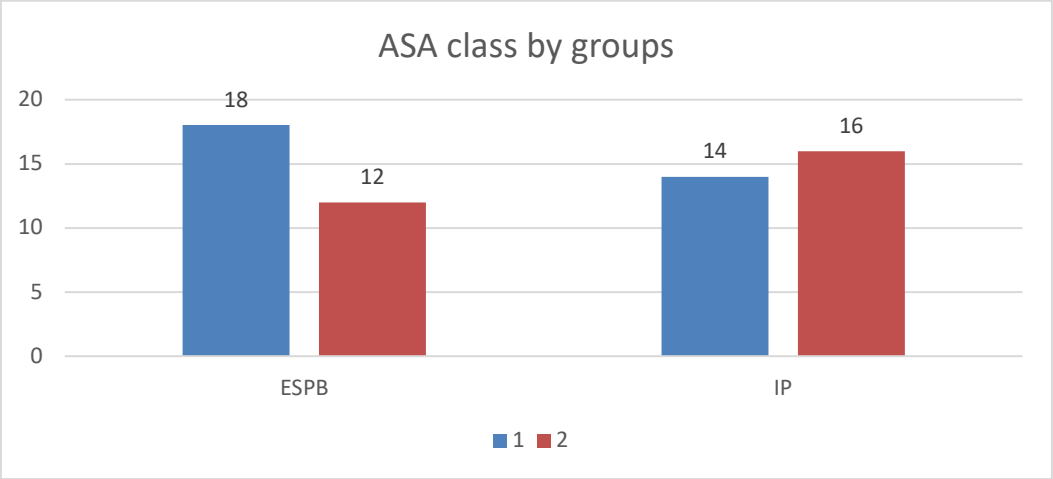

Figure 3: ASA class by groups

Table 5: Total duration of analgesia

	ESPB	IP	P value
Duration of analgesia	462.5 (34.0)	447.7 (62.5)	0.25

The total duration of analgesia in ESPB group was slightly higher (462.5 ±34.0 minutes) when compared to IP group (447.7 ±62.5 minutes), which was not significant (p>0.05).

Table 6: VAS score by groups

	ESPB	IP	P value
VAS at 1 hour	1.0 (0.2)	1.0 (0.0)	0.3
VAS at 2 hours	1.4 (0.6)	1.7 (0.5)	0.05
VAS at 4 hours	2.1 (0.5)	2.0 (0.4)	0.41
VAS at 6 hours	2.8 (0.8)	3.4 (0.8)	0.01
VAS at 8 hours	3.1 (0.9)	2.0 (0.8)	<0.001
VAS at 12 hours	2.8 (0.9)	1.5 (0.5)	<0.001
VAS at 16 hours	2.3 (0.8)	2.2 (0.7)	0.59
VAS at 20 hours	2.8 (0.9)	3.1 (1.2)	0.27
VAS at 24 hours	2.6 (1.0)	2.2 (0.9)	0.07

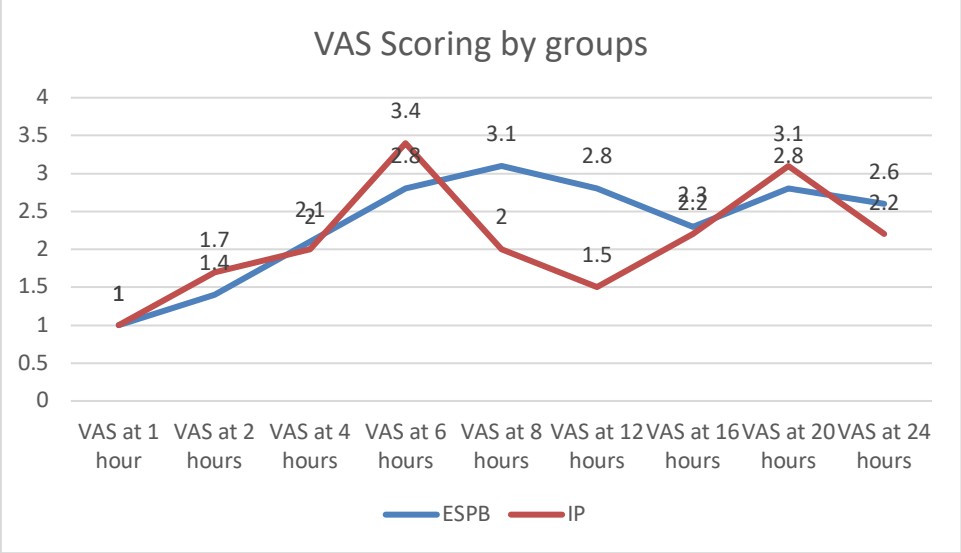

Figure 4:VAS Scoring by groups

By using VAS score pain was assessed, zero was no pain, 10 was unimaginable pain, if the VAS score > 4 then it is considered as treatable pain, then patients were given Injection Paracetamol 1gm IV, if patient does not respond to injection Paracetamol within 30 mins after injection, then injection Tramadol 100mg IV was given.

The VAS score was observed at 1, 2, 4, 6, 8, 12, 16, 20 and 24th hour, we have noticed there was a significantly high VAS score in group IP at 2nd, 6th, 8th and 12th hour, which was statistically significant (P < 0.05).

Table 7: PCT by groups

	ESPB	IP	P value
1gm	29 (96.7)	9 (30.0)	<0.001
2gm	1 (3.3)	19 (63.3)	
3gm	0 (0.0)	2 (6.7)	
Total	30 (100)	30 (100)	

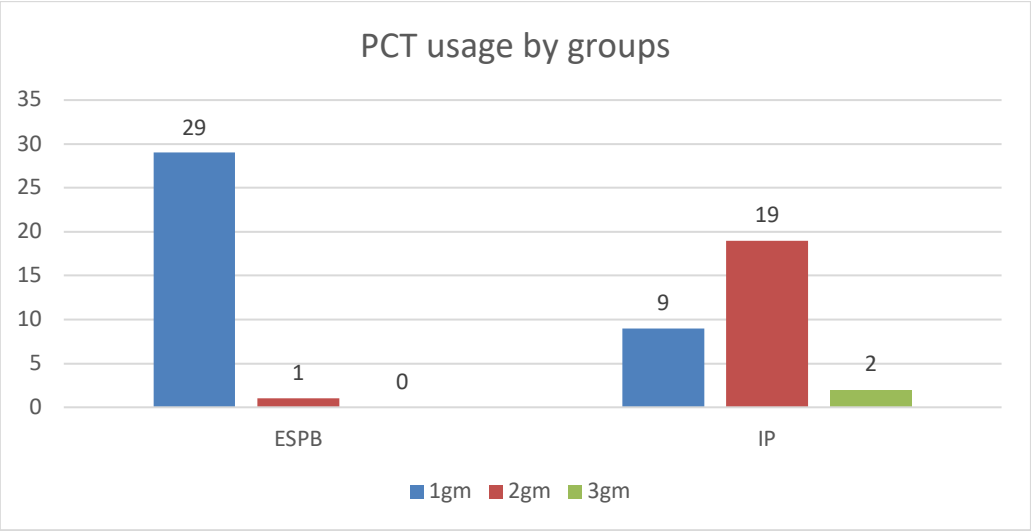

Figure 5:

Table 8: Tramadol by groups

	ESPB	IP	P value
0mg	1 (3.3)	1 (3.3)	0.05
100mg	20 (66.7)	11 (36.7)	
150mg	0 (0.0)	4 (13.3)	
200mg	9 (30.0)	14 (46.7)	
Total	30 (100)	30 (100)	

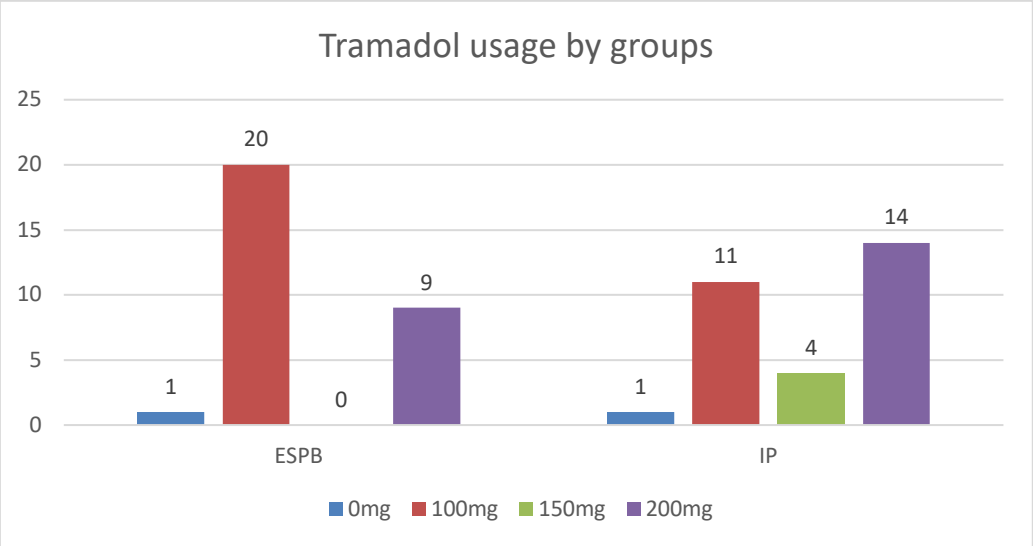

Figure 6: Tramadol usage by groups

If the VAS score > 4, then it is considered as treatable pain, patients were given injection Paracetamol 1gm IV, if the VAS score doesn't come down even after 30 mins of injection Paracetamol, then injection Tramadol 100mg IV was given.

In both the group's total amount of analgesic consumption in first 24 hours after surgery was observed. 29 patients of ESPB group consumed 1gm PCT and one patient consumed 2gm PCT, in group IP maximum of 19 patients consumed 2gm PCT, 9 patients consumed 1gm PCT, only 2 patients consumed 3gm PCT.

In group ESPB, 20 patients consumed 100mg of Tramadol, 9 patients consumed 200mg of Tramadol, in group IP, 11 patients consumed 100mg Tramadol, 4 patients consumed 150mg Tramadol, 14 patients 200mg Tramadol, 1 patient in each group has not consumed any Tramadol. The total consumption of PCT and Tramadol was statistically significantly less in ESPB group when compared to group IP ($P < 0.05$).

Table 9: Complications by groups

Complications	ESPB	IP	P value
Nausea	1 (3.3)	0 (0.0)	0.3
Vomiting	0 (0.0)	0 (0.0)	-
Shivering	3 (10.0)	0 (0.0)	0.07

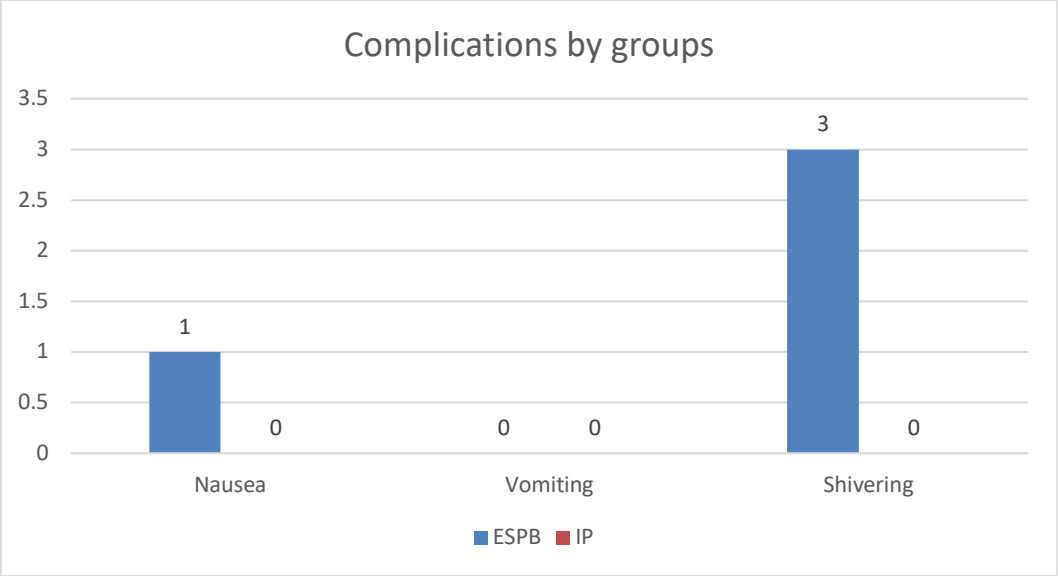

Figure 7: Complications by groups

None of the patients from either group had any significant adverse effects like nausea, vomiting and shivering.

Table 10: Ramsay score by groups

		ESPB	IP	P value
Ramsay at 1 hour	1	5 (14.6)	0 (0.0)	0.01
	2	13 (43.3)	25 (83.3)	
	3	12 (40.0)	5 (16.7)	
Ramsay at 4 hours	1	2 (10.7)	8 (23.6)	0.04
	2	18(60.0)	20 (83.0)	
	3	10 (36.8)	2 (6.7)	
Ramsay at 8 hours	1	4 (13.3)	12 (40.0)	0.02
	2	26 (86.7)	18 (60.0)	
Ramsay at 12 hours	1	3 (10.0)	25 (83.3)	<0.001
	2	27 (90.0)	5 (16.7)	
Ramsay at 18 hours	1	3 (10.0)	26 (86.7)	<0.001
	2	27 (90.0)	4 (13.3)	
Ramsay at 24 hours	1	0 (0.0)	29 (96.7)	<0.001
	2	30 (100.0)	1 (3.3)	

Ramsay sedation score at various interval (1, 4, 8, 12, 18 and 24 hours) recorded, all patients fall in 1 to 3 score of Ramsay sedation score system in both the groups. All patients in either group were calm and arousable which was significant in both the groups in all intervals. None of the patients had respiratory depressions.

Table 11: HR by groups

	ESPB	IP	P value
HR Baseline	87.0 (14.4)	94.8 (16.0)	0.05
HR After intubation	85.6 (11.6)	90.7 (12.1)	0.1
HR at 5 mins	82.5 (10.8)	88.1 (10.3)	0.04
HR at 10 mins	81.7 (10.0)	87.9 (9.0)	0.01
HR at 15 mins	80.9 (9.4)	86.2 (9.1)	0.03
HR at 30 mins	71.8 (7.4)	87.9 (8.4)	<0.001
HR at 60 mins	80.0 (9.0)	87.5 (8.3)	0.001
HR at 1 hr 30 mins	68.3 (7.7)	89.8 (7.7)	<0.001
HR at end of surgery	65.8 (7.0)	91.7 (7.7)	<0.001

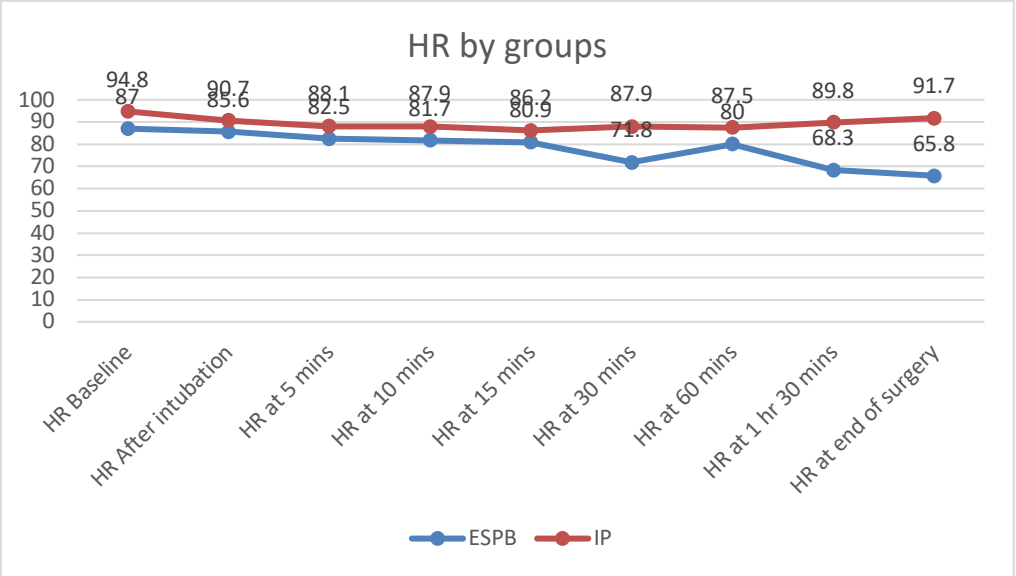

Figure 8: HR by groups

Heart rate in group ESPB was statistically less at various interval of time when compared to group IP which was statistically significant (P < 0.05).

Table 12: SBP by groups

	ESPB	IP	P value
SBP Baseline	126.6 (13.3)	134.7 (10.9)	0.01
SBP After intubation	125.1 (11.8)	134.3 (14.9)	0.01
SBP at 5 mins	118.3 (10.6)	126.5 (12.2)	0.007
SBP at 10 mins	118.7 (12.4)	125.6 (12.9)	0.03
SBP at 15 mins	117.6 (12.7)	126.8 (13.9)	0.01
SBP at 30 mins	117.6 (9.6)	129.1 (13.3)	<0.001
SBP at 60 mins	116.5 (9.5)	128.8 (12.5)	<0.001
SBP at 1 hr 30 mins	118.4 (9.8)	129.3 (9.0)	<0.001
SBP at end of surgery	119.1 (10.7)	129.3 (10.2)	<0.001

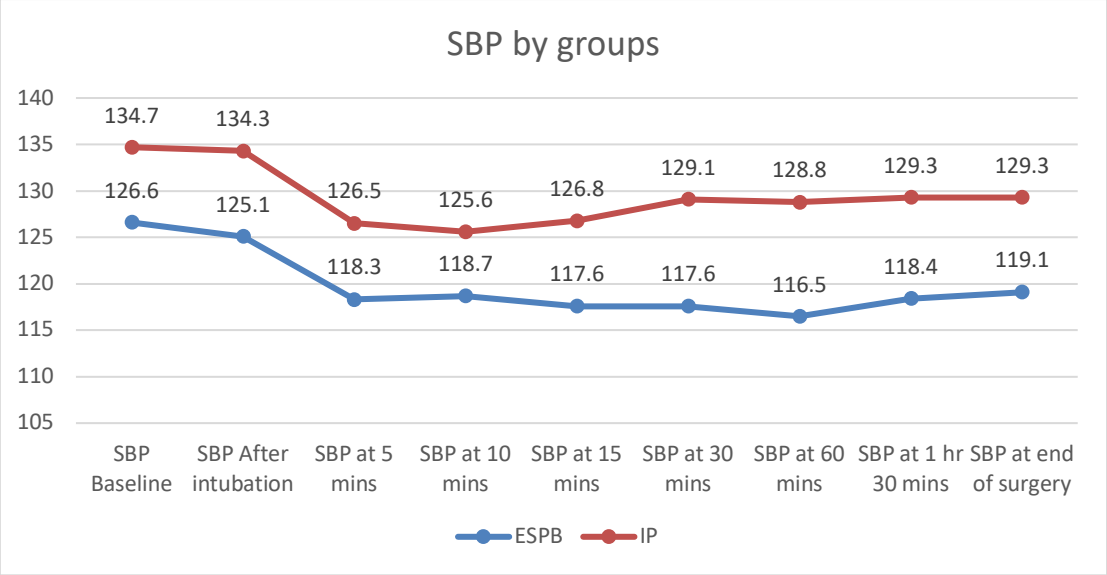

Figure 9: SBP by groups

SBP at various intervals was significantly less in ESPB when compared to IP Group ($P < 0.05$).

Table 13: DBP by groups

	ESPB	IP	P value
DBP Baseline	83.4 (12.7)	82.3 (8.7)	0.69
DBP After intubation	82.8 (10.4)	85.0 (10.9)	0.41
DBP at 5 mins	76.2 (11.3)	80.3 (9.5)	0.13
DBP at 10 mins	74.3 (10.1)	80.7 (8.9)	0.01
DBP at 15 mins	75.7 (9.2)	79.9 (8.6)	0.07
DBP at 30 mins	73.6 (10.3)	81.4 (9.7)	0.004
DBP at 60 mins	75.1 (8.8)	80.9 (7.8)	0.009
DBP at 1 hr 30 mins	73.8 (9.1)	81.0 (7.2)	0.001
DBP at end of surgery	74.3 (9.3)	85.2 (9.6)	<0.001

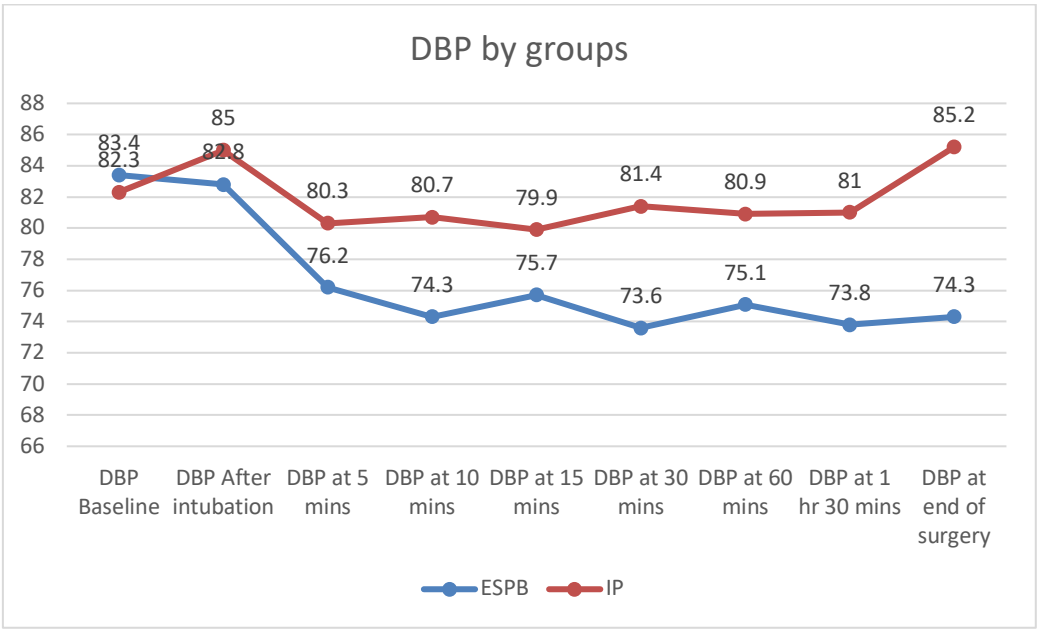

Figure 10: DBP by groups

DBP was significantly less in group ESPB at 10, 30, 60, 90 mins and end of the surgery when compared to group IP ($P < 0.05$).

Table 14: MAP by groups

	ESPB	IP	P value
MAP Baseline	97.8 (11.3)	99.8 (8.6)	0.44
MAP After intubation	96.9 (10.4)	101.4 (10.9)	0.1
MAP at 5 mins	90.3 (10.5)	95.7 (9.8)	0.04
MAP at 10 mins	89.1 (9.8)	95.7 (9.4)	0.01
MAP at 15 mins	89.7 (8.2)	95.5 (9.5)	0.014
MAP at 30 mins	88.2 (8.3)	97.3 (10.1)	<0.001
MAP at 60 mins	88.9 (8.5)	96.8 (8.2)	0.001
MAP at 1 hr 30 mins	88.6 (8.4)	97.1 (6.4)	<0.001
MAP at end of surgery	89.2 (9.1)	99.9 (8.4)	<0.001

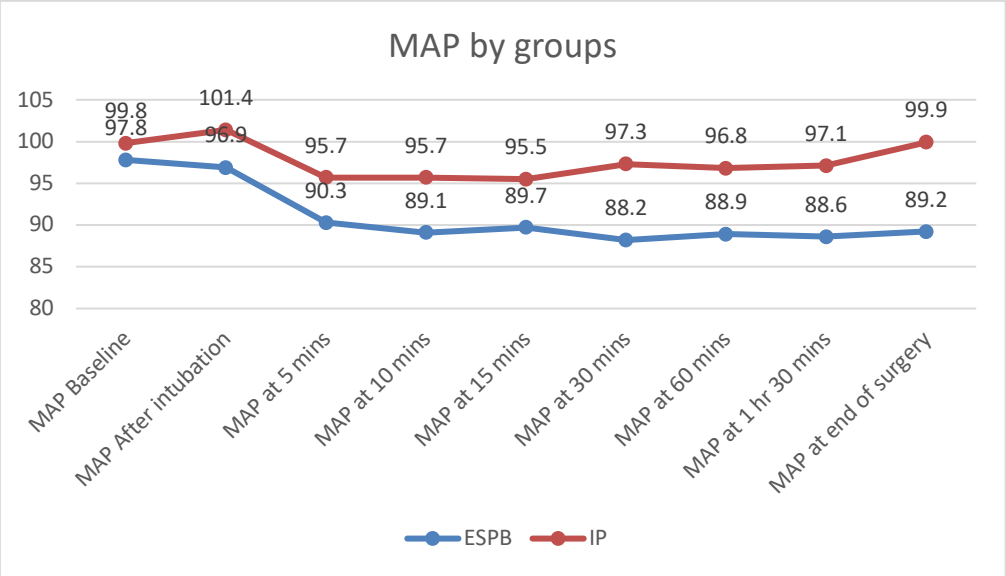

Figure 11: MAP by groups

MAP in group ESPB was significantly less from 5 mins to end of the surgery when compared to group IP ($P < 0.05$).

Discussion

The most commonly used surgical technique for cholelithiasis in recent time is laparoscopic cholecystectomy in comparison to open cholecystectomy, due to its advantages such as less post-operative pain, shorter hospitalisation, faster functional recovery. [22]

In laparoscopic cholecystectomy early post-operative pain is a major obstacle for early ambulation leading to increased risk of deep vein thrombosis and pulmonary complications, and prolongs the hospital stay. [23] The post-operative pain associated with laparoscopic cholecystectomy has got three components – one, somatic pain due to incision site and trocar insertion, second, visceral pain from gall bladder dissection and third, referred pain such as shoulder tip pain due to pneumoperitoneum, of which the major portion of pain is visceral pain.

Many different combinations of multi-modal analgesia have been tried which includes NSAIDs, opioids, local infiltration, epidural analgesia, Erector Spinae Plane Block and intraperitoneal infiltration of local anaesthetics. [24] The present study is to compare the analgesic efficacy of noval Erector Spinae Plane Block with Ropivacaine 0.375% + 50 mcg Dexmedetomidine (total 32cc - 16 ml each side), with same volume of drug for intraperitoneal instillation in elective laparoscopic cholecystectomy cases done under general anaesthesia. Erector Spinae Plane Block is given prior to induction under ultrasound guidance. Immediately after

Erector Spinae Plane Block standard general anaesthesia was given. VAS Score was assessed after extubation at various intervals. Hemodynamic parameters were also assessed at various intervals after intubation till the end of the surgery. The total consumption of analgesics in first 24 hours after surgery was calculated. Ramsay Sedation Score and postoperative complications like nausea, vomiting, shivering was compared with patients who received same volume intraperitoneally at gall bladder bed and peri-hepatic region.

The demographic data like age, sex, Mallampati class, ASA class, diagnosis and duration of surgery were comparable among the groups, which was not statistically significant($p>0.05$).

In the present study, the duration of analgesia in Erector Spinae Plane Block was 462.5 ± 34.0, in intraperitoneal instillation cases the total duration of analgesia was 447.7 ± 62.5, which was not statistically significant($p>0.05$). Our study group IP, the total duration of analgesia was comparable with Sara Mary Thomas et al. study, their results of IPRD was similar to our study (6.9±1.42 h), but they did only IP instillation comparing the different drugs (Ropivacaine + Fentanyl). Though Charulatha Deshpande et al, used the same concentration of 35ml without any additives but their results cannot be comparable with ours because in their cases the total duration of analgesia was 13.47 ± 1.38 h. Our study of IPRD group cannot be comparable with Liyan Miao, et al. and Sunil Chiruvella et al. because they have used different concentrations.

The total consumption of analgesics like Inj. Paracetamol (PCT) and Inj. Tramadol in first 24 hours of post-operative period. 29 patients in ESPB group consumed 1g and 1 patient consumed 2g of PCT whereas in IP group, 9 patients consumed 1g PCT, 19 patients consumed 2g PCT and 2 patients consumed 3g PCT which was statistically highly significant ($p< 0.001$). 1 patient from both the groups did not consume any Tramadol injection, 20 patients consumed 100mg Tramadol, 9 patients consumed 200mg Tramadol in ESPB whereas in IP group 11 patients consumed 100mg, 4 patients consumed 150mg and 4 patients consumed 200mg of Tramadol which was statistically not significant($p=0.05$).

In our study we have assessed VAS score at 1, 2, 4, 6, 8, 12, 16, 20 and 24 hours after extubation, both ESPB and IPI groups are comparable except at 6th, 8th and 12 h interval, no other readings were statistically significant among the group. The maximum VAS score of IP group was 3.4± 0.8 which was significant at 6th hour (ESPB 2.8 ± 0.8). The maximum VAS score we observed in ESPB was 3.1 ± 0.9 at 8th hour which was statistically significant ($p<0.001$) when compared to IPI (2.0± 0.8). Our study (IP group) can be comparable with Sunil Chiruvella et al group but their population was Hysterectomy group. Our study can also be comparable with Tae Han Kim et al. They have observed VAS score at different intervals, their results were also similar to ours but they have used 0-100mm VAS Scale. Our study can also be comparable with Sara Mary et al study but their VAS Scale was similar to Tae Han Kim et al.

We have also observed sedation by using Ramsay Sedation Score among the groups at various intervals (1, 4, 8, 12, 18 and 24 hours) after extubation. All patients in both the groups were calm and sleepy but arousable which was statistically significant among the groups ($p<0.01$).

In our study we also observed hemodynamic parameters like HR, SBP, DBP and MAP at various intervals (5, 10, 15, 30, 60 and 90 minutes) after intubation. HR, SBP, DBP and MAP was less in ESPB when compared to IP group which was statistically highly significant ($p<0.05$), that could be due to block being given before intubation. Our study IP group can be comparable with Sara Mary et al study, they have also observed similar hemodynamic results.

In the present study, we have noticed nausea in one patient and shivering in three patients in group ESPB. None of the patients in IP group had nausea, vomiting, or shivering but it was not statistically significant($p>0.05$).

Conclusion:

To conclude, USG guided bilateral erector spinae plane block and intraperitoneal instillation for the post-operative analgesia in a patient undergoing laparoscopic cholecystectomy. The duration of analgesia in both the procedures is not statistically significant but the analgesic consumption in first 24 hours postoperatively was significantly high in intraperitoneal group. Therefore, we recommend that ESPB and IP instillation of local anaesthetic with adjuvant, both the procedures are effective in postoperative analgesia, so either of the procedure can be included in the multimodal analgesia protocol. However, ESPB reduces the postoperative rescue analgesia requirements in first 24 hours.

References

1. Bhardwaj N, Sharma V, Chari P. Intraperitoneal bupivacaine instillation for postoperative pain relief after laparoscopic cholecystectomy. Indian J Anaesth. 2002; 46(1):49–52.
2. Bisgaard T, Kehlet H, Rosenberg J. Pain and convalescence after laparoscopic cholecystectomy. Eur J Surg 2001; 167:84-96.
3. Albanese AM, Albanese EF, Miño JH, Gómez E, Gómez M, Zandomeni M, et al. Peritoneal surface area: Measurements of 40 structures covered by peritoneum: Correlation between total peritoneal surface area and the surface calculated by formulas. Surg Radiol Anat. 2009; 31:369–77.
4. Tae H. Kim, et. Al, Intraperitoneal Ropivacaine Instillation for Postoperative Pain Relief after Laparoscopic Cholecystectomy, J Korean Surg Soc 2010; 79:130-136.
5. Pasqualucci A, de Angelis V, Contardo R, Colò F, Terrosu G, Donini A, et al. Preemptive analgesia: Intraperitoneal local anesthetic in laparoscopic cholecystectomy. A randomized, double-blind, placebo-controlled study. Anesthesiology 1996; 85:11-20.

6. Chiruvella, Sunil & Nallam, SrinivasaRao. (2016). intraperitoneal instillation of ropivacaine plus dexmedetomidine for pain relief after laparoscopic hysterectomy: A comparison with ropivacaine alone. Journal of Dr. NTR University of Health Sciences. 5. 93. 10.4103/2277-8632.185432.
7. Wills VL, Hunt DR. Pain after laparoscopic cholecystectomy. Br J Surg. 2000; 87:273–84.
8. Abdulla S, Eckhardt R, Netter U, Abdulla W. A randomized, double-blind, controlled trial on non-opioid analgesics and opioid consumption for postoperative pain relief after laparoscopic cholecystectomy. Acta Anaesthesiol Belg. 2012; 63:43–50.
9. Boddy AP, Mehta S, Rhodes M. The effect of intraperitoneal local anaesthesia in laparoscopic cholecystectomy: A systematic review and meta-analysis. Anesth Analg. 2006; 103:682-8.
10. Erol DD, Yilmaz S, Polat C, Arikan Y. Efficacy of thoracic epidural analgesia for laparoscopic cholecystectomy. Adv Ther. 2008; 25:45-52.
11. BuDawaty A4, Turkistani A, Kettner SC, Machata AM, Delvi MB, Thalla; A, ed al. Ultrasound-guided transversus abdominis plane block: Description of a new technique and comparison with conventional systemic analgesia during laparoscopic cholecystectomy. Br J Anaesth. 2009; 102:763-7.
12. Kadam RV, Field JB. Ultrasound-guided continuous transverse abdominis plane block for abdominal surgery. J Anaesthesiol Clin Pharmacol. 2011; 27:333-6.
13. Niraj G, Searle A, Mathews M, Misra V, Baban M, Kiani S, et al. Analgesic efficacy of ultrasound-guided transversus abdominis plane block in patients undergoing open appendicectomy. Br J Anaesth. 2009; 103:601-5.
14. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: A prospective randomized controlled trial. Anesth Analg. 2007; 104:193-7.
15. McDonnell JG, Curley G, Carney J, Benton A, Costello J, Maharaj CH, et al. The analgesic efficacy of transversus abdominis plane block after cesarean delivery: A randomized controlled trial. Anesth Anal. 2008;106:186-91
16. Shukla U, Prabhakar T, Malhotra K, Srivastava D, Malhotra K. Intraperitoneal bupivacaine alone or with dexmedetomidine or tramadol for post-operative analgesia following laparo scopic cholecystectomy: A comparative evaluation. Indian J Anaesth. 2015; 59:234–9.
17. Ruiz-Tovar J, Gonzalez J, Garcia A, Cruz C, Rivas S, Jimenez M, Ferrigni C, Duran M (2016) intraperitoneal ropivacaine irrigation in patients undergoing bariatric surgery: a prospective randomized clinical trial. Obes Surg 26:2616–2621.
18. Yong L, Guang B (2017) Intraperitoneal ropivacaine instillation versus no intraperitoneal ropivacaine instillation for laparoscopic cholecystectomy: a systematic review and meta-analysis. Int J Surg (London, England) 44:229–243.
19. Chin KJ, Malhas L, Perlas A. The erector spinae plane block provides visceral abdominal analgesia in bariatric surgery a report of 3 cases. Regional Anesthesia and Pain Medicine. 2017; 42(3):372-6.
20. Koo JM, Chung YJ, Lee M, Moon YE (2023) Efcacy of Dexmedetomidine vs. remifentanil for postoperative analgesia and opioid-related side efects after gynecological laparoscopy: a prospective randomized controlled trial. J Clin Med.
21. Thapa D, Dhiman D, Ahuja V, Gombar S, Gupta RK (2018) Tramadol sparing efect of dexmedetomidine as an adjuvant with lignocaine in preoperative stellate ganglion block for postoperative pain relief following upper limb surgeries. Br J Pain 12:26–34.
22. Jain K, Patodi V, Jonwal K, A study to assess the efficacy of erector spinae plane block (ESPB) for postoperative analgesia in patients undergoing laparoscopic cholecystectomy under general anesthesia. International J Medical Science in clinical research and review. 2022 25; 5(5):958-68.
23. Wills VL, Hunt DR. Pain after laparoscopic cholecystectomy. Br J Surg.2000; 87:273-84.
24. Liu Ss, Hodgson PS. "Local anesthetics, Clinical Anesthesia." Lippicott Williams &wilkins, 2001: 449-69.