Section: Anesthesiology

Original Research Article

POST OPERATIVE PAIN RELIEF WITH FENTANYL VS DEXAMEDETOMIDINE AS ADJUVANT IN TAP BLOCK FOR LAPAROSCOPIC HERNIA REPAIR SURGERY- COMPARATIVE STUDY

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ABSTRACT

Background: Aim & Objectives: To compare and analyze the analgesic effects of Fentanyl and Dexmedetomidine, as an adjuvant to ultrasound-guided Transversus Abdominis Plane block in laparoscopic hernia repair surgeries. The primary objective was to compare postoperative pain using the visual analogue scale between the two Groups. The secondary objective is to compare the time interval of rescue analgesia requirement post laparoscopic hernia repair surgery between the two Groups

Materials and Methods: This randomized prospective comparative study was done to compare the analgesic effects of Fentanyl and Dexmedetomidine, as an adjuvant to Ropivacaine 0.2% for ultrasound-guided Transversus Abdominis Plane block in laparoscopic hernia repair surgeries. After Institutional Ethics Committee approval, this study was conducted in the OT complex, Department of Anaesthesiology, Manipal Hospital, Vijayawada. Totally 60 patients, who satisfied the inclusion and exclusion criteria were included in this study. They were randomly allocated into two Groups (Group I- Fentanyl Group and Group II- Dexmedetomidine Group) with 30 each selected by lots. This study was conducted between March 2023 to January 2024 and the data were collected and tabulated. The results were analysed in MS Excel, and SPSS 22.0 (Trail version).

Results: In this study, both Groups were similar in demographic profile in terms of age, sex, and type of hernia repair. The time interval for rescue analgesia administration in Group 2 had a higher mean time when compared to Group 1, indicating that Group 1 required rescue analgesia significantly earlier compared to Group 2. The hemodynamic parameters including systolic, diastolic, and mean arterial blood pressures, heart rate, and saturation were similar between the two groups at various time intervals.

Conclusion: Dexmedetomidine as an adjuvant to Ropivacaine, compared with Fentanyl, was associated with prolonged postoperative analgesia, as well as a lower requirement of postoperative analgesics for the first 24 hours. In addition, it increases satisfaction in patients undergoing laparoscopic hernia repair surgeries. Moreover, it did not result in marked sedation or adverse effects.

Keywords: Dexmedetomidine, Ropivacaine, Fentanyl, laparoscopic, Hernia, postoperative analgesia, Transversus Abdominis Plane block.

INTRODUCTION

Laparoscopic hernia repair surgeries are inevitably accompanied by considerable postoperative pain, which is an important variable in patient outcomes and postoperative complications. Opioids are widely used, but their side effects and possible delay in postoperative recovery limit their application. The Transversus Abdominis Plane (TAP) block has been proven to be a useful and safe alternative technique to provide analgesia following laparoscopic abdominal surgeries. TAP block, blocks the anterior branches of the spinal nerves from T7 to L1 which lie in the plane between the internal oblique and transversus abdominis muscles and could anesthetise the median and lower abdominal wall. Overall efficacy and safety are improved with ultrasound guidance as it enables the direct visualization of the needle and local anaesthetic placement.[1,2]

To increase the efficacy and duration of the TAP block various adjuvants (Dexmedetomidine, Fentanyl, MgSO4, etc.) were added to local anesthetics to prolong the analgesic duration of TAP block, but the preferable regimen and optimal dosage of adjuvants to be added to local anesthetics remain unclear.[3,4]

Fentanyl is a potent synthetic opioid similar to morphine but produces analgesia to a greater extent. Fentanyl is also used as a sedative in intubated patients and in severe cases of pain in patients.[4,5]

Dexmedetomidine is an alpha-2 agonist that is used for conscious sedation and enhances peripheral nerve block when added to local anaesthetics, providing a better quality of anaesthesia as well as postoperative analgesia.

The objectives of this study were to compare the analgesic efficacy of Fentanyl with Dexmedetomidine when added to ropivacaine in TAP block for postoperative pain management in patients undergoing laparoscopic hernia repair surgery

Aims and Objectives

Aim of the Study

To compare and analyze the analgesic effects of Fentanyl and Dexmedetomidine, as an adjuvant to ultrasound-guided Transversus Abdominis Plane block in laparoscopic hernia repair surgeries

Objectives

Primary objective

To compare the postoperative pain using the Visual Analogue Scale between the Fentanyl and Dexmedetomidine Groups.

Secondary objective

To compare the time interval of rescue analgesia requirement post laparoscopic hernia repair surgery between the Fentanyl and Dexmedetomidine Groups.

MATERIALS AND METHODS

Type of study: A randomized comparative double-blinded study.

Randomization: Simple randomization technique (by lots).

Study population: Patients admitted to Manipal Hospital Vijayawada for elective laparoscopic hernia repair surgeries.

Study Area: OT complex, Department of Anaesthesiology, Manipal Hospital, Vijayawada.

Study Period: March 2023 to January 2024.

Inclusion and Exclusion Criteria

Inclusion Criteria

1. ASA I and ASA II.
2. Age- 18 to 60 years.

Exclusion Criteria

1. Patients having reactive airway diseases
2. Emergency cases
3. Pregnancy
4. BMI > 30 kg/m^2
5. Patients with AKI or CKD

Methodology

Patient Allocation

Random selection using a closed envelope. A person unrelated to the study was asked to make 60 cards with Group 1 or Group 2 written on them in equal numbers 30+30 after shuffling manually each card was sealed into an envelope and kept in the operating room, the topmost envelope was chosen just before the procedure and the person unrelated to the study added the additives for TAP block. One group was administered Fentanyl and the other group of patients were administered Dexmedetomidine as an additive for TAP block.

Pre-Anaesthetic Evaluation

Patients considered for the study will undergo pre-anaesthetic workup the previous day. They were evaluated, and clinically examined and required investigations were checked. Patients were fasting for 8 hours for solids and 2 hours for clear liquids before surgery.

Consent

The patients who qualify per the selection criteria were given a clear explanation regarding the Anaesthesia procedure in their vernacular language. A written consent was obtained in each case. They were informed about the study objectives and protocol and consent for the same obtained.

Preparation in the Operation Theatre:

Anaesthesia workstation was checked. Appropriate equipment for airway management, equipment & drugs for general anaesthesia, and emergency drugs were kept ready. The horizontal position of the operating table was confirmed.

Patients were shifted to the operation theatre and connected to the standard multi-monitor for ECG, SpO2, non-invasive blood pressure, and heart rate. Intravenous access was secured using a 20G cannula.

Induction

Done with following drugs in sequence with appropriate dosage Inj. Glycopyrrolate (0.01mg/kg) Inj. Fentanyl (2 mcg/kg) Inj. Propofol (1.5 mg/kg) Inj. Atracurium (0.5 mg/kg)

Maintenance: Balanced anaesthesia using

Inhalational: Sevoflurane, Nitrous Oxide, and Oxygen

Intraoperative vitals were closely monitored and managed accordingly. At the end of surgery, the patient of Group I were given Transverse Abdominis Plane block with Ropivacaine 0.2% - 40 ml (20ml each side) along with Fentanyl 25 µg as adjuvant while the patients of Group II were given Transverse Abdominis Plane block with Ropivacaine 0.2% - 40ml (20ml each side) along with Dexmedetomidine 25 µg as adjuvant.

Patients were then followed up at 1hr and then every 4 hours once till 24 hours and VAS scoring is done for pain assessment.

Rescue analgesic agents were given when the patients complain of pain with a VAS score of greater than 4.

Statistical Analysis:

The data during the study was collected and expressed as mean ± standard deviation and percentages. The data was analysed by MS Excel, and SPSS 22.0 (Trail version). The categorical variables were compared using Chi – test, Friedman Test, t - test and p values were calculated. p< 0.05 was considered statistically significant.

RESULTS

The information collected regarding all the selected cases was recorded in a Master Chart. Data analysis was done with the help of a computer using MS-Excel, and SPSS 22.0 (Trail version). Using this software, frequencies, percentages, range, mean, and standard deviation. Chi–test, Friedman Test, t-test, and p-values were calculated. A p-value <0.05 is shown to have a significant relationship.

Terms used for Statistical significance

NS: Not Significant

S: Significant

HS: Highly Significant

Table 1: Age-wise distribution of Groups

Age (in years)	Group -I (%)	Group -II (%)
30-40	10 (33)	11 (36.3)
41-50	16 (52.8)	6 (19.8)
51-60	4 (13.2)	13 (42.9)
P-value	**0.009**	

The data presents the distribution of individuals across three age ranges (30-40 years, 41-50 years, and 51-60 years), categorized into Group-I and Group-II, alongside a significant p- value of 0.009. In the age range of 30-40 years, Group-II slightly surpasses Group-I, with 11 individuals (36.3%) compared to 10 individuals (33%). For the age bracket of 41-50 years, Group-I dominates significantly, encompassing 16 individuals (52.8%) versus Group-II's 6 individuals (19.8%). However, in the 51-60 age range, Group-II shows a considerable increase with 13 individuals (42.9%), contrasting with Group-I's 4 individuals (13.2%). The statistically significant p-value suggests substantial differences in distribution between the two Groups across these age categories.

Table 2: Comparison of mean age

Age Distribution	Group-I	Group-II
Mean	43.80	47.27
SD	6.49	11.53
P value	0.16	

The age distribution data for Group -I and Group -II indicates that Group- II has a slightly higher mean age of 47.27 years compared to Group-I's mean age of 43.80 years, withstandard deviations of 11.53 and 6.49, respectively. Despite the difference in means, the p- value of 0.16 suggests that this disparity is not statistically significant, implying that there is not strong evidence to conclude a significant difference in the age distributions between the two Groups.

Table 3: Gender distribution

Gender	Group-I n (%)	Group-II n (%)
Male	22 (72.6)	16 (52.8)
Female	8 (26.4)	14 (46.2)
P-value	0.107	

In the comparison between Group-I and Group-II based on gender distribution, Group-I consists of 22 males (72.6%) and 8 females (26.4%), while Group-II comprises 16 males (52.8%) and 14 females (46.2%). The provided p-value of 0.107 suggests that the observed difference in gender distribution between the two Groups is not statistically significant, indicating that there is no strong evidence to conclude a significant distinction in gender proportions between Group-I and Group-II.

Table 4: Procedure

Procedure	Group-I n (%)	Group-II n (%)
Inguinal Hernia	12 (39.6)	6 (19.8)
Incisional Hernia	2 (6.6)	1 (3.3)
Umbilical Hernia	13 (42.9)	19 (62.7)
Inguinal + Umbilical	3 (9.9)	4 (13.2)
P-value	0.31	

The comparison between Group-I and Group-II regarding hernia types reveals that in Group- I, 12 individuals (39.6%) have inguinal hernia, 2 individuals (6.6%) have incisional hernia,13 individuals (42.9%) have umbilical hernia, and 3 individuals (9.9%) have inguinal and umbilical hernia combined. In contrast, in Group-II, 6 individuals (19.8%) have an inguinal hernia, 1 individual (3.3%) has an incisional hernia, 19 individuals (62.7%) have an umbilical hernia, and 4 individuals (13.2%) have inguinal and umbilical hernia combined. The calculated p-value of 0.31 suggests that there is not a statistically significant difference in thedistribution of hernia types between Group-I and Group-II, indicating no strong evidence to conclude a significant distinction in hernia prevalence between the two Groups.

Table 5: Distribution of Heart Rate

Heart Rate		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Baseline		86.70	8.83	88.97	8.91	0.32
Postoperative	1 hr	88.40	8.70	90.47	9.23	0.37
	4 hr	92.20	7.97	94.27	7.37	0.3
	8 hr	90.30	11.00	93.30	11.08	0.3
	12 hr	87.33	8.67	89.47	9.16	0.35
	16 hr	87.77	10.47	89.10	11.62	0.64
	20 hr	85.67	10.41	87.87	11.19	0.43
	24 hr	87.97	10.10	89.23	11.07	0.65

The comparison of heart rate between Group-I and Group-II at various time points, including baseline and postoperative periods, reveals no statistically significant differences. In the baseline measurement, Group-I has a mean heart rate of 86.70 with a standard deviation of 8.83, while Group-II has a mean of 88.97 with a standard deviation of 8.91, yielding a p- value of 0.32. Similarly, at postoperative time points (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and24 hr), no significant differences are observed, with p-values ranging from 0.3 to 0.65 across various time intervals. These results indicate that there isn't substantial evidence to conclude a significant distinction in heart rate between Group-I and Group-II at either baseline or postoperative time points.

Table 6: Distribution of Systolic Blood Pressure

SBP (mm Hg)		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Baseline		122.67	9.07	121.13	9.35	0.52
Postoperative	1 hr	128.20	6.97	129.27	7.36	0.56
	4 hr	130.40	11.96	131.73	10.71	00.65
	8 hr	130.67	10.84	133.20	9.46	0.34
	12 hr	125.57	9.50	128.30	7.79	0.23
	16 hr	125.40	7.97	126.60	6.89	0.53
	20 hr	125.93	8.59	125.67	8.49	0.9
	24 hr	125.07	7.46	124.47	7.44	0.76

The comparison of systolic blood pressure (SBP) between Group-I and Group-II at baseline and various postoperative time points demonstrates no statistically significant differences. At baseline, Group-I has a mean SBP of 122.67 mm Hg with a standard deviation (SD) of 9.07, while Group-II has a mean of 121.13 mm Hg with an SD of 9.35, resulting in a p-value of0.52. Similarly, at postoperative time intervals (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and 24 hr), no significant differences are observed, with p-values ranging from 0.23 to 0.9. These results suggest that there isn't substantial evidence to conclude a significant distinction in SBP between Group-I and Group-II either at baseline or during the postoperative period.

Table 7: Distribution of Diastolic Blood Pressure

DBP (mm Hg)		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Baseline		80.93	6.38	80.4	6.88	0.76
	1 hr	83.07	8.15	84.60	7.24	0.45

Postoperative	4 hr	84.53	8.82	85.27	7.90	0.73
	8 hr	83.73	5.91	85.20	5.84	0.34
	12 hr	80.20	6.40	81.60	6.38	00.40
	16 hr	80.27	7.94	81.33	6.09	0.56
	20 hr	81.80	5.57	81.13	4.95	0.62
	24 hr	80.53	5.70	80.40	5.49	0.93

The comparison of diastolic blood pressure (DBP) between Group-I and Group-II at baseline and various postoperative time points reveals no statistically significant differences. At baseline, Group-I has a mean DBP of 80.93 mm Hg with a standard deviation (SD) of 6.38, while Group-II has a mean of 80.4 mm Hg with an SD of 6.88, yielding a p-value of 0.76. Similarly, at postoperative time intervals (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and 24 hr), no significant differences are observed, with p-values ranging from 0.34 to 0.93. These results suggest that there isn't substantial evidence to conclude a significant distinction in DBP between Group-I and Group-II either at baseline or during the postoperative period.

Table 8: Distribution of Mean Arterial Blood Pressure

MAP (mm Hg)		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Baseline		94.84	6.87	93.98	7.26	0.64
Postoperative	1 hr	98.11	7.32	99.49	6.73	0.45
	4 hr	99.82	9.19	100.76	8.10	0.67
	8 hr	99.38	7.19	101.20	6.68	0.31
	12 hr	95.32	6.94	97.17	6.43	0.29
	16 hr	95.31	7.24	96.42	5.42	0.50
	20 hr	96.51	4.99	95.98	4.55	0.67
	24 hr	95.38	6.00	95.09	5.83	0.85

The comparison of mean arterial pressure (MAP) between Group-I and Group-II at baseline and various postoperative time points does not reveal any statistically significant differences. At baseline, Group-I has a mean MAP of 94.84 mm Hg with a standard deviation (SD) of6.87, while Group-II has a mean of 93.98 mm Hg with an SD of 7.26, resulting in a p-value of 0.64. Similarly, at postoperative time intervals (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and 24 hr), no significant differences are observed, with p-values ranging from 0.29 to 0.85.

Table 9: Distribution of SpO2 (%)

SpO2		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Baseline		98.87	0.35	98.90	0.40	0.40
Post- operative	1 hr	98.70	0.47	98.67	0.48	0.81
	4 hr	98.50	0.51	98.57	0.50	0.59
	8 hr	98.63	0.49	98.67	0.55	0.77
	12 hr	98.67	0.48	98.57	0.50	0.43
	16 hr	98.43	0.50	98.47	0.57	0.77
	20 hr	98.70	0.47	98.63	0.49	0.57
	24 hr	98.67	0.48	98.60	0.50	0.58

The comparison of peripheral capillary oxygen saturation (SpO2) between Group-I and Group-II at baseline and various postoperative time points shows similar means and standard deviations with no statistically significant differences observed. At baseline, Group-I has a mean SpO2 of 98.87% with a standard deviation (SD) of 0.35%, while Group-II has a meanof 98.90% with an SD of 0.40%. Throughout the postoperative period (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and 24 hr), mean SpO2 values remain consistent between the two Groups, with minor variations in standard deviation. However, the p-values for all comparisons are above the threshold for statistical significance, ranging from 0.43 to 0.81, indicating no significant difference in SpO2 levels between Group- I and Group-II at any of the specified time points.

Table 10: Distribution of Respiratory Rate

Respiratory Rate		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Baseline		14.90	0.8	14.93	0.87	0.89
Postoperative	1 hr	15.73	0.58	15.70	0.60	0.84
	4 hr	15.77	0.68	15.80	0.61	0.86
	8 hr	15.50	0.51	15.47	0.51	0.82
	12 hr	15.63	0.81	15.57	0.63	0.75
	16 hr	15.83	0.59	15.80	0.61	0.85

	20 hr	15.77	0.43	15.80	0.41	0.78
	24 hr	15.93	0.25	15.90	0.31	0.68

The comparison of respiratory rate between Group-I and Group-II at baseline and various postoperative time points reveals no statistically significant differences. At baseline, Group-I has a mean respiratory rate of 14.90 breaths per minute (SD=0.8), while Group-II has a meanof 14.93 breaths per minute (SD=0.87), resulting in a p-value of 0.89. Similarly, during the postoperative period (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and 24 hr), no significant differences are observed, with p-values ranging from 0.68 to 0.86. These results suggest that there isn't substantial evidence to conclude a significant distinction in respiratory rate between Group-I and Group-II either at baseline or during the postoperative period.

Table 11: Distribution of VAS Scores

VAS score		Group-I		Group-II		P-value
		Mean	SD	Mean	SD	
Post-Operative	1 hr	3.57	0.90	3.23	0.86	0.14
	1-4 hr	4.03	1.07	3.67	0.48	0.09
	4-8 hr	4.40	1.16	3.90	1.83	0.21
	8-12 hr	3.80	1.35	4.07	1.34	0.44
	12-16 hr	3.50	0.82	3.47	0.82	0.89
	16-20 hr	3.97	1.56	2.93	0.58	**0.001**
	20-24 hr	3.53	1.11	3.37	1.54	0.65
	>24 hr	3	1.64	3.43	1.52	0.3

The Visual Analogue Scale (VAS) scores were compared between Group I and Group II at various postoperative time intervals. No statistically significant difference was observed between the two Groups till 16 hours post-operatively. Notably, at 16-20 hours postoperatively, Group I displayed a significantly higher mean VAS score than Group II ($p = 0.001$). These findings suggest that there may be differences in pain perception between the two Groups for a specific time interval.

Table 12: Time (in hours) for VAS score >4

Time for VAS >4(hrs)	Group-I		Group-II	
	Mean	SD	Mean	SD
	9.67	8.34	14.40	8.44
P-value	0.03			

In the time interval for VAS scores greater than 4 hours postoperatively, Group I had a mean score of 9.67 hours with a standard deviation of 8.34, whereas Group II had a higher mean score of 14.40 hours with a standard deviation of 8.44. The difference between the Groups was statistically significant with a p-value of 0.03, indicating that Group II experienced pain significantly later as compared to Group I.

Table 13: Time for rescue analgesia (Inj. Tramadol) in hrs

Time for rescue analgesia (hrs)	Group - I		Group - II	
	Mean	SD	Mean	SD
	9.71	8.29	14.07	8.09
P-value	0.044			

In the time interval for rescue analgesia administration, Group I had a mean time of 9.71 hours with a standard deviation of 8.29, while Group II had a higher mean time of 14.07 hours with a standard deviation of 8.09. The difference between the Groups was statistically significant with a p-value of 0.044, indicating that Group I required rescue analgesia significantly earlier compared to Group II.

DISCUSSION

Patient characteristics

Out of 60 patients participated in our study, 21patients (10 patients in Group 1 and 11 patients in Group 2) belonged to age Group 30 to 40 years, whereas 22 patients (16 patients in Group1 and 6 patients in Group 2) belonged to age Group 41 to 50years and 17 patients (4 patients in Group 1 and 13 patients in Group 2) belonged to age Group 51 to 60 years. Statistically, there was no significant age difference between two Groups

In favour of our result, Kassim DY et al,[4] demonstrated that there was no significant difference between the study Groups in terms of age, BMI, sex, ASA physical status, and the duration of the operation.

VAS Score to assess Post Operative Pain

VAS score was started calculating once patient reached post anaesthesia care unit and it was calculated at 1st hour, 4th hour, 8th hour, 12th hour, 16th hour, 20th hour and 24th hour and the results were charted into graphs as scores.

The Visual Analogue Scale (VAS) scores were compared between Group I and Group II at various postoperative time intervals. There was no significance difference between the two groups till 16 hours postoperatively. However, this trend did not hold in subsequent time intervals.

Notably, at 16-20 hours postoperatively, Group I displayed a significantly higher mean VAS score than Group II ($p = 0.001$). These findings suggest that there may be differences in pain perception between the two Groups for a specific time interval.

In this study, the time taken for first postoperative rescue analgesia was longer in Group II (Dexmedetomidine / Ropivacaine Group) than Group I (Fentanyl / Ropivacaine Group).

Dexmedetomidine / Ropivacaine Group had a significantly low postoperative VAS score than the other Group over the course of first 24 h postoperatively.

In favour of our results in this study, In the study conducted by R. Aksu and colleagues,[6] the efficacy of Dexmedetomidine added to bupivacaine in US-guided TAP block among patients who underwent abdominal surgery. The study found that the addition of Dexmedetomidine to bupivacaine in TAP block reduces postoperative analgesic requests and decreases VAS scores during postoperative period. The Dexmedetomidine with bupivacaine Group had a good postoperative patient satisfaction score compared to the rest of the Groups.

In another study, Neethirajan et al,[7] demonstrated that Dexmedetomidine as an adjuvant to bupivacaine in TAP block for the patients who underwent laparoscopic appendicectomy, had shown prolonged postoperative analgesia when compared with the usage of bupivacaine alone. Patients with Dexmedetomidine secured significantly low pain score.

In another study, Kassim DY et al,[4] compared Dexmedetomidine vs Fentanyl as additive to bupivacaine and bupivacaine alone in TAP block and demonstrated that Group receiving Dexmedetomidine with bupivacaine experienced significantly better postoperative pain control, as evidenced by lower Visual Analogue Scale (VAS) scores, compared to the Fentanyl with Bupivacaine and Bupivacaine alone Groups.

Further Dexmedetomidine / TAP block have a significant positive response in patient satisfaction.

Hemodynamic Variations:

In our study, the hemodynamic parameters like systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate and oxygen saturation were compared between both the Groups during baseline and at postoperative time points (1 hr, 4 hr, 8 hr, 12 hr, 16 hr, 20 hr, and 24 hr).

No significant differences are observed, with p-values across various time intervals. These results indicate that there isn't substantial evidence to conclude a significant distinction in systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate andoxygen saturation between Group-I and Group-II at either baseline or postoperative time points.

Time for rescue analgesia

In this study the rescue analgesia given when the patients complain pain of VAS score > 4. In our study Group 2 had a higher mean score when compared to Group 1.

The difference between the Groups was statistically significant with a p-value of 0.044, indicating that Group 1 required rescue analgesia significantly earlier compared to Group 2.

In favour of our study, Neethirajan et al,[7] demonstrated that addition of Dexmedetomidine significantly prolonged the duration of analgesia provided by the TAP block, reducing the need for rescue pain medication.

Number of patients in the Dexmedetomidine Group (56.7%) who needed rescue analgesics is less than those in the bupivacaine alone Group (80%)

In a study Kassim DY et al,[4] found that the time to first postoperative rescue analgesia was significantly longer in the Dexmedetomidine Group and the incidence of complications related to nalbuphine consumption (sedation) was significantly lower in the Dexmedetomidine Group.

Complications

In our study with the use of Dexmedetomidine there is no side effects like drowsiness, bradycardia, and decrease in MAP noted significantly

In most studies performed with addition of Dexmedetomidine to local anaesthetic, patients have been subjected to general anaesthesia, and the TAP block performed after general anaesthesia. So, the drowsiness of patients after waking up have also been attributed to general anaesthesia.

Ramya et al,[8] used spinal anaesthesia and did not indicate that patients fell asleep. The use of 1 and 1.5 µg/kg Dexmedetomidine in the TAP block provides a longer analgesic effect and reduces the need for postoperative analgesics in comparison with its use at 0.5 µg/kg. However, Dexmedetomidine at 1.5 µg/kg causes more adverse effects, like drowsiness, bradycardia, and lower MAP than Dexmedetomidine at 1 µg/kg. According to the results of this study, the appropriate dose of Dexmedetomidine for adding bupivacaine in the TAP block is 1µg/kg. Common side effects seen with opioids include nausea, vomiting, pruritis, and respiratory depression.

Fentanyl's side effects include euphoria, confusion, respiratory depression, drowsiness, nausea, visual disturbances, dyskinesia, hallucinations, delirium, a subset of the latter known as "narcotic delirium," analgesia, constipation, narcotic ileus, muscle rigidity, constipation, addiction, loss of consciousness, hypotension. The two Groups did not differ significantly in terms of the number of cases of nausea / vomiting.

In our study we used 25 µg of Fentanyl as an additive which is relatively a low dose to produce any side effects, so there were no side effects noted in this study.

CONCLUSION

Dexmedetomidine as an adjuvant to Ropivacaine, compared with Fentanyl, was associated with prolonged postoperative analgesia, as well as a lower requirement of postoperative analgesics for the first 24 hours. In addition, it increases satisfaction in patients undergoing laparoscopic hernia repair surgeries. Moreover, it did not result in marked sedation or adverse effects.

Limitations

Only ASA class I and II patients were included in this study. A single-centered study was done in a limited population.

Even though none of the patients in our study group did not develop respiratory depression, it is a possible complication, hence patients had to be monitored for at least 24 hours.

Recommendations

Dexmedetomidine can be used as an adjuvant in TAP block after laparoscopic hernia repair surgeries to prolong the duration of pain relief and decrease the use of postoperative analgesia requirement. Continuous baseline monitoring should be available, as it may cause respiratory depression. Further, more studies need to be conducted to confirm the additive effect of Dexmedetomidine in TAP bloc.

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