Comparison of Transversus Abdominis Plane Block with Control Group for Intraoperative Hemodynamic Stability and Post Operative Pain Relief in Laparoscopic Cholecystectomy

Narendra P Varma[1], Piyush B Wani[2], Dinesh Kumar Sahu[3], Atul Sharma[4], Reena Parampill[5]

ABSTRACT

Introduction: Laparoscopic cholecystectomy is the treatment of choice for cholelithiasis. This study was undertaken to compare transversus abdominis plane block with control group for intraoperative hemodynamic stability and postoperative pain relief in laparoscopic cholecystectomy surgeries.
Material and methods: A randomized prospective observational study in the operating room and surgical ICU of a tertiary level centre. Total 76 patients aged 20 to 70 years, of either sex, ASA I and II, undergoing elective laparoscopic cholecystectomy were enrolled. They were equally divided in two groups by computer generated randomization table. In group I, ultrasound- guided TAP block using 15 ml of 0.25% bupivacaine was given on each side before induction of general anaesthesia. In group II, only general anaesthesia was given. Inj. paracetamol 1000mg was given in all the patients before start of pneumoperitoneum. Hemodynamic parameter was compared at intubation, at 5 mins, at insufflation, at 5, 10, 15, 30, 45, 60, 75 and 90 minutes post gas insufflations and at extubation. Post operatively patients were monitored for pain by VAS score and assessed at 30 mins, 1, 2, 4, 8, 12 and 24 hrs.
Results: Demographics data was similar in both groups. There was statistically significant difference in the intra-operative systolic blood pressure between the two groups. There was statistically significant difference in the post-operative VAS score in both the groups, with group I having less VAS score.
Conclusion: TAP block provide very good intraoperative and postoperative pain relief compare to standard general anaesthesia. It has inconsistent effect on intraoperative hemodynamic stability.

Keywords: TAP Block, Ultrasound Guided, Laparoscopic Cholecystectomies, Intra Operative Hemodynamic, Postoperative Pain.

INTRODUCTION

The pneumoperitonium produces significant physiological changes, particularly in cardiovascular system. These are characterized by an increase in arterial pressure, systemic and pulmonary vascular resistances. Both mechanical and neurohumoral factors contribute to these hemodynamic changes.[1,2]

The use of neuraxial anaesthesia or instillation of intra-peritoneal local anaesthetics has been shown to increase the efficacy of perioperative pain therapy and reduce the consumption of analgesic drugs. Peripheral regional anaesthesia techniques could be considered as an attractive alternative to central neuraxial blocks or high dose intra-peritoneal anaesthetic agents. These blocks have also been shown to reduce analgesics use during surgery. In addition, these blocks do not induce hypotension and can be safely performed even in patients taking anticoagulants and/or antiplatelet agents. Such characteristics may prove favorable in maintaining hemodynamics stability during abdominal surgery. Ultrasound guidance has made peripheral nerve blocks achievable with a high degree of reliability.

The transversus abdominis plane (TAP) block is a regional anaesthesia technique that provide analgesia to the anterior abdominal wall and the parietal peritoneum. It involves the myocutaneous sensory nerve supply of the anterio-lateral abdominal wall, where the T7- T12 intercostal nerves, the ilio-inguinal and ilio-hypogastric nerves, and the lateral cutaneous branches of the dorsal rami of L1-3 are blocked with an injection of local anaesthetic between the plane of internal oblique and the transversus abdominal muscle.

This study is done to compare the efficacy of ultrasound-guided TAP block for laparoscopic cholecystectomy as a part of balanced anaesthesia with the standard general anaesthesia. Hemodynamic stability during intraoperative period and sparing effects on analgesic drugs in postoperative period were evaluated.

MATERIAL AND METHODS

After approval by the institutional research and ethical committee and taking informed written consent from patients, this randomized, prospective, open level, clinical study was conducted on 76 adult patients of either sex, ASA I and II of age 20 to 70 years posted for elective laparoscopic cholecystectomy. Exclusion criteria were unwillingness, hypersensitivity to local anaesthetic drug, anticipated difficult airway, body mass index (BMI) >25, history of

[1]Assistant Professor, Department of Anaesthesiology, [2]Assistant Professor, Department of Anaesthesiology, [3]Sr DMO, Department of Anaesthesiology, [4]Department of Anaesthesiology, [5]Department of Anaesthesiology, Jagjivanram Western Railways Hospital, Mumbai, India

Corresponding author: Dr Piyush B Wani, 24, Shreeniwas, Anandmayee Society, Deonar Farm Road, Deonar, Mumbai, 400088, India

How to cite this article: Varma NP, Wani PB, Sahu DK, Sharma A, Parampill R. Comparison of transversus abdominis plane block with control group for intraoperative hemodynamic stability and post operative pain relief in laparoscopic cholecystectomy. International Journal of Contemporary Medical Research 2021;8(2):B5-B10.

DOI: http://dx.doi.org/10.21276/ijcmr.2021.8.2.7

cardiopulmonary diseases, psychiatric illness and therapy with adrenergic agonists, methyldopa, MAO inhibitors, tricyclic antidepressant and benzodiazepines.

Sample size was calculated on the basis of earlier study.[3] The Mean difference was 7.38 in mean arterial blood pressure at start of pneumoperitoneum, at 80% power and 95% confidence interval and sample size came out to be 38 per study group. Patients were randomly divided using a computer generated random number table from www.randomization.com into 2 groups of 38 each. GROUP I received TAP Block with Standard General anaesthesia and GROUP II received Standard General anaesthesia as per hospital protocol.

All patients were explained the use of Visual analog scale (VAS) score prior to surgery. Preoperative baseline heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean blood pressure (MBP) using multipara monitor in both the groups were noted.

In group I patients, an experienced anaesthesiologist, who was not a part of the anaesthesia team performed ultrasound-guided TAP block using Portable USG machine (Titan™, Sonosite Inc., US) before induction of general anaesthesia. He was blinded from postoperative observation including data analysis. Inj. Midazolam 0.02mg/kg was given before performing the TAP block. Oxygen at 2L/min started. Using aseptic preparation, a high frequency (7 to 12 MHz) linear ultrasound probe was placed obliquely on the upper abdominal wall along the subcostal margin near the midline. The rectus abdominis muscle was identified first, then probe was gradually moved laterally and obliquely along the subcostal margin and the transverses abdominis muscle identified lateral to the rectus muscle. The skin and the subcutaneous tissue near needle entry point was anaesthetized with 2% lignocaine after identification of the transverses abdominis neurofascial plane between the internal oblique and the transverses abdominis muscle. Then 23 G, 8.9 cm long needle was introduced medial to lateral with in-plane approach to reach transverses abdominis plane (Fig 1). On entering the facial plane, 15 ml of 0.25% bupivacaine was injected after negative aspiration. The injectate solution spread in the plane was confirmed by formation of dark oval pocket (Fig 2). Same procedure was performed on other side.

In both the groups, for standard anaesthesia, premedication with inj. Glycopyrolate 0.004mg/kg, inj. Pentazocine 0.6mg/kg was given, induction with inj. Propofol 2mg/kg and inj succinylcholine 1.5mg/kg was done, endotracheal intubation done and maintained with 1 MAC Sevoflurane in 60% Nitrous oxide/40% oxygen mixture and Inj Atracurium intermittently. Controlled mechanical ventilation was given to maintain end tidal carbon dioxide ($etCo_2$) between 30-40 mmHg. Inj. Paracetamol 1000mg slow IV infusion was given in all the patients before start of pneumoperitoneum. Pneumoperitoneum was created by insufflations of CO_2 and operation table was tilted to about 15° head-up and 10^0 left oblique. Intra- abdominal pressure (IAP) was not allowed to exceed 12 mmHg. Inj. Dynapar 75 mg was given to all the patients. Hemodynamic parameters, Respiratory rate (RR) and $EtCO_2$ were recorded prior to induction, at intubation, 5 mins after intubation, at insufflation, 5, 10, 15, 30, 45, 60, 75, 90 mins after insufflation and at extubation. Any changes in hemodynamic parameter more than 20% on either side of baseline was considered significant. At the end of surgery, neuromuscular blockade was reversed with neostigmine 50 µg/ kg and glycopyrrolate10 µg/kg intravenously. After fulfilling the parameter patients were extubated and transferred to post-anesthesia care unit. Time duration of pneumoperitoneum and surgery were noted.

Post operatively patients were monitored for pain using visual analogue scale (VAS) at 30 minutes, 1, 2, 4, 8, 12 and 24 hour intervals. Any adverse events like nausea, vomiting and shoulder tip pain were recorded. Inj Tramadol 50mg intravenously was used as rescue analgesic if VAS score was more than 5. Time and total dose required was noted.

Data analysis was done with the help of SPSS Software version 15 and Sigma Plot version 12. Quantitative data variables were presented with the help of Mean, Standard Deviation, Median and Interquartile range. Comparison among study group was done with the help of Unpaired T test or Mann-Whitney test as per results of Normality tests. Intra group analysis was done with the help of Paired T test. Qualitative data variables were presented with the help of Frequency and Percentage table association among study group was assessed with Chi-Square test. P value less than 0.05 was taken as significant level.

RESULTS

The two groups were comparable in terms of age, sex, weight, ASA grading, mean duration of surgery, mean duration of anaesthesia and mean duration of insufflations (Table-1). The baseline HR, SBP, DBP, MBP and RR values were comparable in both groups (Table-2).

The two groups were comparable in terms of intraoperative $EtCO_2$ and respiratory rate. Comparison of heart rate at regular intervals with basal heart rate, P value was significant

Study parameter	Group I	Group II	P value
Age	47.50	48.82	0.572
Sex M/F	11/27	15/23	0.333
Weight	60.37	60.13	0.662
ASA grading I/II	12/26	10/28	0.613
Duration of surgery	1.84	1.79	0.431
Duration of anesthesia	2.24	2.16	0.229
Duration of insufflation	1.57	1.49	0.625

Table-1: Demographic data were comparable in both the groups

Study parameter	Group I	Group II	P value
Heart rate	92.47	87.82	0.439
Systolic blood pressure	136.39	142.39	0.121
Diastolic blood pressure	82.71	79.21	0.086
Mean blood pressure	100.61	100.27	0.895
Respiratory rate	14.34	14.95	0.205

Table-2: Baseline hemodynamic data were comparable in both the groups

Time	Heart rate Mean (SD)			Resp rate Mean (SD)			$ETCO_2$ Mean (SD)		
	Grp l	Grp ll	P value	Grp l	Grp ll	P value	Grp l	Grp ll	P value
Baseline	92.47 (22.21)	87.82 (15.78)	0.439	14.56 (2.01)	14.87 (2.08)		34.24 (6.23)	34.54 (5.87)	
(AI) At Intubation	90.84 (13.50)	84.92 (15.42)	0.066	14.34 (2.40)	14.95 (2.32)	0.205	34.53 (5.97)	33.55 (4.91)	0.537
5 MIN AI *	88.42 (9.65)	83.45 (13.91)	0.151	12.26 (0.83)	12.21 (0.62)	0.969	31.97 (4.56)	32.29 (4.37)	0.938
Insufflation	86.18 (11.61)	82.50 (19.06)	0.154	12.32 (0.87)	12.16 (0.55)	0.440	28.92 (3.80)	30.05 (3.25)	0.097
5 min	88.37 (14.59)	86.08 (13.78)	0.484	12.32 (0.99)	12.16 (0.55)	0.468	30.58 (2.56)	30.66 (3.42)	0.687
10 min	91.11 (15.84)	87.21 (12.04)	0.231	12.26 (1.06)	12.16 (0.55)	0.689	32.24 (2.99)	32.16 (3.16)	0.913
15 min	92.68 (17.07)	86.66 (12.00)	0.079	12.26 (1.06)	12.16 (0.55)	0.689	33.53 (3.58)	32.34 (2.53)	0.146
30 min	89.97 (16.23)	84.37 (9.89)	0.073	12.32 (1.09)	12.16 (0.55)	0.486	32.68 (4.08)	32.16 (3.25)	0.734
45 min	87.55 (14.10)	82.45 (9.71)	0.070	12.32 (1.09)	12.16 (0.55)	0.486	32.37 (4.77)	31.66 (3.72)	0.676
60 min	84.94 (12.48)	80.39 (8.23)	0.067	12.28 (1.19)	12.16 (0.55)	0.647	31.72 (5.14)	31.29 (3.35)	0.794
75 min	84.29 (13.08)	79.36 (9.43)	0.099	12.29 (1.20)	12.21	0.852	31.14 (5.24)	30.96 (2.91)	0.983
90 min	80.71 (10.87)	77.08 (9.78)	0.194	12.32 (1.28)	12.23	0.801	31.55 (5.91)	29.38 (3.01)	0.108
Extubation	89.95 (12.63)	87.47 (12.43)	0.392	16.89 (1.29)	17.58	0.006	30.23 (6.45)	29.98 (4.32)	

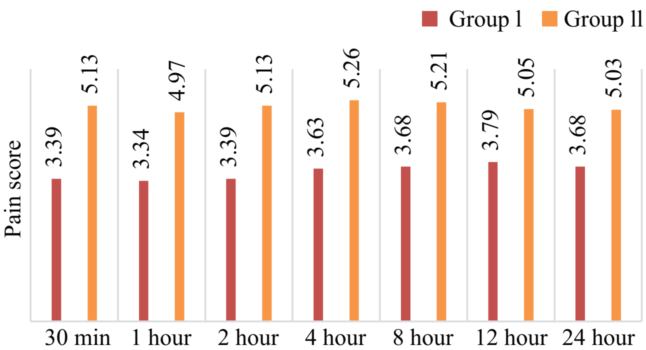
Table-3: Comparison of HR, RR and EtCo2 among study groups

Time	SBP Mean (SD)			DBP Mean (SD)			MBP Mean (SD)		
	Grp l	Grp ll	P value	Grp l	Grp ll	P value	Grp l	Grp ll	P value
Baseline SBP	136.39 (14.52)	142.39 (18.60)	0.121	82.71 (11.21)	79.21 (8.88)	0.086	100.61 (11.14)	100.27 (10.89)	0.895
(AI) At Intubation	130.00 (18.48)	139.13 (25.96)	0.081	82.82 (12.80)	83.29 (13.51)	0.897	98.54 (13.83)	101.90 (15.90)	0.329
5 min AI	117.39 (21.37)	118.92 (20.67)	0.513	76.05 (14.85)	74.79 (8.22)	0.747	89.83 (16.33)	89.50 (11.53)	0.783
insufflation	123.05 (16.42)	128.55 (30.97)	0.337	85.26 (15.03)	85.79 (17.98)	0.884	97.86 (14.77)	100.04 (22.04)	0.613
5 min	135.50 (22.43)	145.45 (22.89)	0.060	95.47 (17.75)	94.76 (13.71)	0.493	108.82 (18.43)	111.66 (16.12)	0.477
10 min	145.05 (15.01)	150.95 (20.00)	0.150	100.00 (14.15)	96.76 (9.92)	0.151	115.02 (12.64)	114.82 (11.90)	0.946
15 min	143.68 (15.12)	139.18 (19.36)	0.262	98.50 (11.90)	90.76 (11.97)	0.009	113.56 (11.00)	106.90 (13.47)	0.021
30 min	132.97 (16.70)	150.21 (9.97)	0.000	88.58 (9.61)	83.66 (6.39)	0.019	103.38 (10.67)	105.84 (6.81)	0.192
45 min	132.11 (17.69)	151.82 (13.80)	0.000	87.87 (10.16)	79.34 (8.00)	0.000	102.61 (11.73)	103.50 (9.18)	0.715
60 min	129.47 (13.35)	149.92 (13.85)	0.000	87.17 (8.91)	78.84 (8.22)	0.000	101.27 (8.96)	102.54 (9.34)	0.578
75 min	130.83 (14.80)	147.71 (13.91)	0.000	88.31 (8.04)	79.18 (10.73)	0.001	102.49 (9.15)	102.02 (10.35)	0.830
90 min	132.13 (11.90)	149.88 (14.59)	0.000	89.39 (8.27)	79.81 (10.29)	0.000	103.63 (8.86)	103.17 (11.36)	0.537
Extubation	145.47 (19.59)	148.53 (16.60)	0.611	90.42 (14.77)	92.03 (14.45)	0.708	108.77 (15.31)	110.86 (14.29)	0.763

Table-4: Comparison of SBP, DBP and MBP among study groups from 45 minutes to 90 minutes in both the groups (Table 3). Comparison of SBP among study groups, the difference was statistically significant from intervals of 30 minutes to 90 minutes, P values < 0.05 with group I having lesser values. Comparison of SBP at regular intervals with basal SBP, the difference was not statistically significant from 30 minutes to 75 minutes in group I, while the difference was statistically significant in group II. In comparison of DBP among study groups, the difference was statistically significant from intervals of 15 minutes to 90 minutes. In comparison of DBP at regular intervals with basal DBP, the difference was not statistically significant at intervals of 45 to 90 minutes in both the groups. In comparison of MAP at regular intervals with basal MAP, the difference was not statistically significant at intervals from 30 to 90 minutes in both the groups (Table 4). In comparison among the study groups for VAS score, the difference between the median values among the two groups was statistically significant with group I having lower VAS score(Table 5) (graph 1). In comparison among study group for inj. Tramadol given, p valve was significant with group I having lower requirement for the drug. In comparison among study group for incidence of shoulder pain, the difference was not statistically significant between the two groups.

Time	Grp I		Grp II		P value
	Mean	SD	Mean	SD	
30 min	3.39	1.10	5.13	1.14	8.53E-08
1 hour	3.34	0.97	4.97	1.28	1.92E-07
2 hour	3.39	1.03	5.13	1.60	3.08E-06
4 hour	3.63	1.05	5.26	1.45	4.83E-07
8 hour	3.68	1.02	5.21	1.32	5.70E-07
12 hour	3.79	1.07	5.05	1.43	3.52E-05
24 hour	3.68	0.93	5.03	1.40	6.53E-06

Table-5: VAS score comparison among both groups



Graph-1: VAS score comparison among both groups

Figure-1:

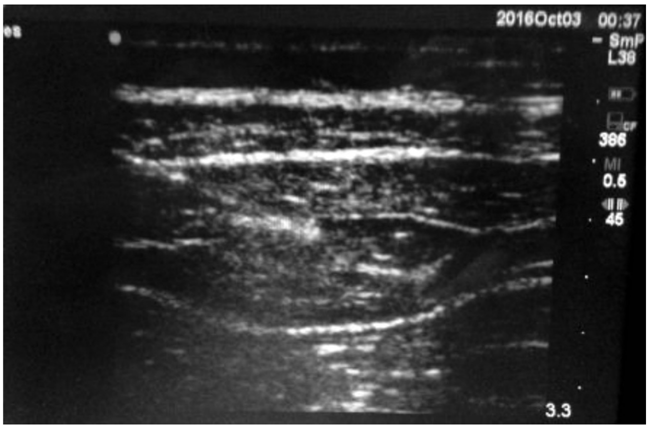


Figure-2:

DISCUSSION

The establishment of laparoscopic cholecystectomy as an outpatient procedure has accentuated the clinical importance of stabilizing intraoperative hemodynamic changes, reducing early postoperative pain and hasten early discharge. Pain can induce hemodynamic changes both intraoperatively and postoperatively. Improved postoperative pain treatment using opioid-sparing methods may facilitate a high success rate of outpatient laparoscopic cholecystectomy.[4] Although the pain following a laparoscopic cholecystectomy is less intense than open surgery, patients often suffer visceral pain with coughing, respiratory movements and mobilization and shoulder pain secondary to peritoneal insufflations. TAP block to reduce postoperative pain has been studied, but there are limited studies to evaluate intraoperative hemodynamic stabilization effect of the block with local anaesthetics.

Mandy Perrin et al[5] conducted a study to show that pneumoperitonium causes increase in IAP which along with alteration in the patient's position and effects of carbon dioxide absorption cause changes in physiology, especially within the cardiovascular and respiratory systems. Ishizaki et al[6] tried to evaluate the safe IAP during laparoscopic surgery. They observed a significant fall in cardiac output at 16 mm Hg of IAP. Hemodynamic alterations were not observed at 12 mm Hg of intra-abdominal pressure. Taking into consideration these factors IAP was preset to maximum 12 mm Hg in our study.

In a study done by Chen CK et al[7] to determine the area covered by the type of TAP block, concluded that ultrasound guided oblique subcostal TAP block provides a wider analgesic blockade than the posterior approach, with the possibility of being suitable for surgery both superior and inferior to the umbilicus. So in our study we decided to give subcostal TAP block rather than using the classical approach. When the block is performed by the so-called "pop" or "double pop" technique in the anatomical area of the Petit triangle, inadvertent needle position can result in severe complications like bowel puncture, nerve injury and puncture of the liver. A. A. El-Dawlatly et al[8] performed a study to describe a method of ultrasound-guided TAP block. USG guidance enables exact placement of the local anaesthetic for the block. In our study we preferred using USG rather than the landmark technique for correct placement of drug and avoid complications.

Yoon Suk Ra et al[9] conducted a study to compare efficacy of local anaesthetics according to the concentration in patients undergoing laparoscopic cholecystectomy. They concluded that the US-TAP block with 0.25% or 0.5% levobupivacaine 30 ml significantly reduced postoperative pain, and there is no significant difference in the quality of pain control by the concentration of levobupivacaine. In our study we used 0.25% bupivacaine plain, as using higher concentration has no additional benefits.

Qianlin Zhu et al[10] conducted a study to investigate the effects of CO_2 insufflation on hemodynamic and respiratory function during laparoscopic inguinal hernioplasty. It was observed that blood pressure, $EtCO_2$ and $PaCO_2$ increased significantly, whereas heart rate and pH decreased significantly ($P < 0.05$). In our study it was found that the HR values during insufflation had deviated from the baseline values and were significant ($p < 0.05$) from 45 to 90 minutes in both the groups. This was in accordance with the earlier study. We also observed that giving TAP block did not prevent the heart rate variability. We compared the HR of control group to study group. Baseline of both groups were comparable. Also comparison between the two groups at insufflation and at regular intervals was not significant ($p > 0.05$). This was not in accordance with the studies done by Al-Sadek WM[11] which states that giving TAP block controls hemodynamic variability. The possible explanation can be the small sample size of our study and needs further evaluation with a large sample size.

In our study it was observed that the SBP values in group II during insufflation had deviated from the baseline values and were significant ($p < 0.05$) from 30 to 60 minutes. The DBP values during insufflation had not deviated from the baseline at 45 to 90 minutes. Also the MAP values during insufflation had not deviated from the baseline at 45 to 90 minutes. This was in partial accordance with the study done by Joris JL et al[2] who observed that laparoscopic cholecystectomy in head-up position results in significant hemodynamic changes in healthy patients, particularly at the induction of pneumoperitonium. Our study showed that creation of pneumoperitonium leads to significant changes in SBP after 30 minutes.

M. Tsuchiya et al[12] performed a prospective, randomized study to compare a group receiving general anaesthesia and TAP block with a group receiving general anaesthesia alone for intraoperative hemodynamic stability in high risk abdominal surgery patients. They concluded that for abdominal surgery in patients with severe cardiovascular disease, combining TAP block with general anaesthesia promotes intraoperative hemodynamic stability and early emergence from anaesthesia. In our study we found that the SBP values during insufflation had not deviated from the baseline values and the difference was not statistically significant from 30 to 75 minutes ($p > 0.05$) in group I. This was in accordance with the earlier study. The control of SBP after 30 minutes must be due to the time taken for the local anaesthetics to act on the peripheral nerve. The DBP and MAP values were neither deviated in control group or in study group after 45 minutes of insufflation.

Similarly when the SBP, DBP and MAP were compared between the two groups, it was not significant initially ($p > 0.05$). But SBP values became statistically significant at intervals from 30 minutes to 90 minutes. Our study showed that giving TAP block has no effect on hemodynamic variability initially, but after 30 minutes it has effect on SBP upto 90 minutes. This might be due to the time taken by the drug to act on the peripheral nerves.

SBP is getting affected by many factors and pain is one of the major factor. TAP block controls pain at port insertion site and intraoperative pain by blunting the neuro-humoral response to abdominal insufflation as well as intraoperative procedures, so SBP gets controlled. In our study TAP block doesn't influences HR, DBP and MAP, this may be a due to smaller sample size.

In our study, the pain scores were compared by VAS scale and was significantly low in group I ($p < 0.05$) at all the times. It was found that preoperative administration of TAP block results in better postoperative pain outcomes.

Main limitation of our study was sample size. Further studies needs to be done with larger sample size.

CONCLUSION

Laparoscopic cholecystectomy is associated with significant hemodynamic changes intra-operatively and visceral pain postoperatively. Preoperative TAP block provide good intraoperative pain relief and as a preemptive analgesia for postoperative pain relief is a safe option. Postoperative pain score and reduction in analgesic drugs requirement leading to improved overall patient satisfaction and recovery. It has less effect on intraoperative hemodynamic stability.

REFERENCES

1. Wahba RWM, Beique F, Kleiman SJ. Cardiopulmonary function and laparoscopic cholecystectomy. Can J Anaesth 1995;42:51-63.
2. Joris JL, Noirot DP, Legrand MJ, Jacquet NJ, Lamy ML. Hemodynamic changes during laparoscopic cholecystectomy. Anesth Analg 1993;76:1067-71.
3. Singh S, Arora K. Effect of oral clonidine premedication on perioperative haemodynamic response and postoperative analgesic requirement for patients undergoing laparoscopic cholecystectomy. Indian J Anaesth 2011;55:26-30.
4. Kehlet H, Rung GW, Callesen T. Postoperative opioid analgesia: time for a reconsideration. J ClinAnesth 1996;8:441-5.
5. Perrin M, Fletcher A. Laparoscopic abdominal surgery.

Br J Anaesth 2004;4:107-10.
6. Ishizaki Y, Bandae Y, Shimomura K, Abe H, Ohtomo Y, Idezuki Y. Safe intra abdominal pressure of carbon dioxide pneumoperitoneum during laparoscopic surgery. Surgery 1993;114:549-54.
7. Chen CK, Phui VE. The efficacy of ultrasound-guided oblique subcostal transversus abdominis plane block in patients undergoing open cholecystectomy. South Afr J AnaesthAnalg 2011;17:308-10.
8. El-Dawlatly AA, Turkistani A, Kettner SC, Machata AM, Delvi MB, Thallaj A et 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.
9. Ra YS, Kim C H, Lee GY, Han JI. The analgesic effect of the ultrasound-guided transversus abdominis plane block after laparoscopic cholecystectomy. Korean J Anaesth2010;58:362-8.
10. Zhu Q, Mao Z, Yu B, Jin J, Zheng M, Li J. Effects of Persistent CO(2) Insufflation During Different Laparoscopic Inguinal Hernioplasty: A Prospective, Randomized, Controlled Study. J of laparoendoscAdvSurg Tech A 2009;19:611-4.
11. Al-Sadek WM, Rizk SN, Selim MA. Ultrasound guided transversus abdominis plane block in pediatric patients undergoing laparoscopic surgery. Egyptian J Anaesth 2014;30:273-8.
12. Tsuchiya M, Takahashi R, Furukawa A, Suehiro K, Mizutani K, Nishikawa K. Transversus abdominis plane block in combination with general anaesthesia provides better intraoperative hemodynamic control and quicker recovery than general anaesthesia alone in high risk abdominal surgery patients. Minerva Anestesiol 2012;78:1241-7.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 04-01-2021; **Accepted:** 27-01-2021; **Published:** 28-02-2021