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The Study of Intraperitonel Instillation of Ropivacaine after Laproscopic Surgeries

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Abstract

Aims and Objectives: *To prove the efficacy of intraperitoneal instillation of 0.2% ropivacaine for postoperative pain management in patients undergoing laproscopic surgeries.*

Method of Collection of Data: *Forty patients aged between 20 years and 60 years, of physical status ASA grade 1 and ASA grade 2 undergoing elective laproscopic surgeries were included in the study after getting ethical clearance. All surgeries were carried out under general anaesthesia and patients were instructed about grading the intensity of pain as per visual analogue scale in the postoperative period. Patients received intraperitoneal instillation of 2mg/kg ropivacaine diluted in 100ml saline at the end of surgery before the removal of trocars.*

Results: *In our study, we observed that heart rate, systolic &diastolic blood pressure, respiratory rate, SPO_2 remained similar over the periods.VAS score at different time intervals and overall VAS in 8hours was significantly lower (1.06±0.76) and the time to first request of analgesia (min)was longest (451±12.85). No patient in our study developed any significant side effects.*

Conclusion: *On the basis of our study, we concluded that the intraperitoneal instillation of 2mg /kg ropivacaine provides excellent analgesia in the postoperative period after laproscopic surgery.*

Keywords: *Intraperitoneal ropivacaine, laproscopic surgery, postoperative pain, ropivacaine.*

Introduction

Nowadays laparoscopic surgeries are very commonly practiced by surgeons. Laparoscopic surgeries has many advantages over open surgeries with smaller and more cosmetic incision, reduced blood loss, reduced pain, early mobility, early enteral feed, lower incidence of postoperative wound infections and hence there will be reduced hospital stay[1,2]. However, the early post-operative pain experienced by patients may sometimes negate all the advantages of a laparoscopic procedure. Pain usually results from the stretching of intraabdominal cavity, peritoneal inflammation, and diaphragmatic irritation caused by residual carbondioxide in the peritoneal cavity. Intraperitoneal instillation of local anesthetics has been very popular nowadays to decrease post-operative pain effectively after laparoscopic

surgery[3]. Our study demonstrates the intraperitoneal instillation of ropivacaine reduces pain after laproscopic surgeries significantly. The reason for choosing the intraperitoneal route is to block the visceral afferent signaling, potentially modifying visceral nociception and providing excellent analgesia. The local anesthetic inhibits nociception by affecting nerve membrane associated proteins and by inhibiting the release and action of prostaglandins and other agents that sensitize the nociceptors which contribute to inflammation.[4]

Aims and Objectives of the Study

To assess the efficacy of intraperitoneal instillation of 0.2% ropivacaine at a dose of 2mg/kg in laproscopic surgeries with respect to duration of postoperative analgesia.

Materials and Methods

Source of data: Present study entitled "The study of intraperitoneal instillation of ropivacaine in laproscopic surgery" was carried out in the department of Anaesthesiology, Rajah Muthiah Medical College And Hospital, Chidambaram from April 2016 to August 2017.

Study Design: Experimental study

Sample Size: Forty members

Method of Collection of Data

Forty patients aged between 20 years and 60 years, of physical status ASA grade 1 and ASA grade 2 undergoing elective laproscopic surgeries were included in the study after getting ethical clearance from the college ethical committee.

Each patient was visited pre-operatively and the procedure explained and written and informed consent was obtained. Complete blood count, Blood grouping, Blood sugars, Bleeding time, Clotting time, Blood urea, Serum Creatinine, serum electrolytes (sodium, potassium, chloride) chest x-ray, ECG were done. All the patients were pre-medicated with tablet alprazolam 0.5mg and tablet raniditine 150mg overnight and the morning of surgery.

Inclusion Criteria: Patients aged between 20 years to 60 years under physical status ASA grade 1 and 2 of scheduled for elective laproscopic surgeries after obtaining written informed consent from patient/ patient attenders.

Exclusion Criteria: Patient's refusal, Known allergy to local anaesthetics, History of cardiovascular disorders, neuromuscular disorders, bleeding disorders or patient on anticoagulant therapy, hepatic failure, renal failure, pregnancy, ASA 3 & 4.

Procedure

On the day of surgery, a good intravenous (IV) line was established with an appropriate sizes IV cannula and an IV fluid was started.Standard multi parameter monitors ECG, Pulse oximeter, Noninvasive blood pressure were connected and monitored in all the patients and recorded at interval of 5 minute in the first 30 minutes and every 30 minutes thereafter. All the patients were pre-medicated 10 minutes prior to administration of induction agent, with intravenous Inj. Glycopyrrolate 0.2 mg, and Inj. Fentanyl 1.5µg/kg. All patients were pre-oxygenated with 100% oxygen for 3 minutes through Bain's circuit. A standard anaesthetic induction was carried out with Inj. Thiopentone sodium 5mg/kg body weight till there was loss of eye lash reflex followed by succinylcholine (2mg/kg) to facilitate tracheal intubation. Anaesthesia was maintained with 33% oxygen, 66% nitrous oxide. Muscle relaxation was achieved with intermittent vecuronium bromide. Ventilation (tidal volume 8 - 10 ml/kg) was adjusted to maintain end-tidal carbon dioxide between 34 and 40 mm Hg. During laparoscopy, intra-abdominal pressure was limited to 10 - 12 mmHg. At the end of surgery 0.2% ropivacaine 2mg/kg in 100 ml of saline was instilled intraperitoneally before the removal of trocars at the end of the surgery. The CO_2 was carefully evacuated at the end of surgery by manual compression of the abdomen with open trocars and the skin incision was sutured.

At the end of the surgical procedure all the patients were reversed with intravenous Inj. Neostigmine 0.05 mg/kg and Inj. Glycopyrrolate 0.01 mg/kg. Patients were extubated after ensuring adequacy of reversal.

Before the induction of anaesthesia, patients were instructed to use a 10mm visual analogue scale (VAS with the endpoint to be labeled "no pain" and "worst possible pain") The degree of postoperative pain was assessed using the VAS at 15min,30 min,45min,1hr, 2hr, 3hr, 4hr, 5hr, 6hr, 7hr, 8hours postoperatively. Those patients who had VAS >4, were administered a bolus of Diclofenac aqueous (75mg IM) as rescue analgesia. Ondansetron (4mg IV) was administered on complaint of nausea and vomiting. Duration of analgesia in the first 8 hours postoperatively, time to request first analgesic requirement and occurrence of adverse events were also recorded.

Statistical analysis was carried out by statistical packages of Social Sciences (IBM SPSS-21). Continuous data were described as mean ± standard deviation (SD) and categorical data were presented as absolute numbers or percentage. All data were presented as mean ± SD, percentage (%), or number.

Observation & Results

Table 1: Demographic Data

Variables	Group R(N=40)
Age (yrs) Mean + SD Range (min -max)	36.83 ± 11.64 (20-60)
Sex Males Females	21(52.5%) 19(47.5%)
Weight Mean + SD	59.38 ± 6.95
ASA Physical status Grade I Grade II	20(50%) 20(50%)
Lap.Appendicectomy Lap.Cholecstectomy	16(40%) 24(60%)
Dose of Drug (mg) Mean + SD	119.25± 14.34

Table 1 shows that mean age, weight and type of surgery and the mean dose ropivacaine instilled intraperitoneally.

Table 2: Comparison of Heart Rate, Blood Pressure, RR, SPO2 among Various time Intervals

	HR		SBP		DBP		RR		SPO_2	
	M	S.D	M	S.D	M	S.D	M	S.D	M	S.D
15 min	75.85	5.61	119.15	10.06	73.75	4.23	13.70	1.47	98.63	.49
30 min	74.67	5.87	119.15	9.70	73.23	3.83	13.37	1.08	98.63	.49
45 min	73.77	4.43	120.22	7.60	72.05	3.00	14.37	1.31	98.63	.74
60 min	73.37	5.07	118.75	8.09	71.58	2.98	14.15	1.05	98.60	.74
75 min	74.90	4.90	116.87	7.45	70.25	2.91	13.98	1.07	98.55	.99
90 min	74.83	5.51	116.78	7.92	69.75	3.79	13.95	1.18	98.85	.77
105 min	74.08	4.77	117.12	8.05	70.35	3.39	13.89	2.05	98.85	.74
2 hr	73.05	5.22	117.53	8.47	71.65	3.44	13.40	1.87	98.80	.69
3 hr	74.78	5.23	118.40	7.76	72.38	3.40	13.20	1.87	98.68	.86
4 hr	75.78	4.86	119.15	7.13	72.80	3.77	13.23	1.79	98.70	.88
5 hr	76.20	4.51	119.97	7.15	72.98	3.65	13.33	1.80	98.80	.72
6 hr	76.20	4.71	120.27	7.31	73.83	3.78	13.33	2.05	98.81	.67
7 hr	76.95	4.55	120.85	7.21	75.15	3.94	14.32	2.09	98.93	.62
8 hr	77.60	4.88	120.83	8.26	75.62	3.81	14.90	1.95	98.90	.63

In table 2, mean and standard deviations of vital parameters is presented at various time intervals. It shows that mean heart rate at 15th minute is 75.85 ±5.61 /min and at 480th minute it is 77.60 ± 4.88/min. The mean systolic blood pressure at baseline is 119.15±10.06 and at 480th minute, its

mean is 120.83 ± 8.26 mmHg and diastolic blood pressure at baseline is 73.75 ±4.23 mmHg and its mean at 480th minute is 75.62 ± 3.81 mmHg .It shows that there is no change in hemodynamic parameters in the immediate postoperative period after intraperitoneal instillation of ropivacaine and minimal change at the end of 480mins, when VAS score>4

Table 3 : VAS Pain Score

VAS	Mean ± SD
4 hr	0.45 ± 0.75
5 hr	0.60 ± 0.78
6 hr	0.70 ± 0.82
7 hr	1.30 ± 1.16
8 hr	2.33 ± 1.50

Table 3 shows that mean VAS score was zero upto 3 hours and from 4th hr is 0.45 ± 7.75 and progressed gradually to 2.33 ± 1.50 at 8th hour.

Table 4: Postoperative Overall VAS Score & Analgesic Requirements

Overall VAS over 8 hr postoperatively	1.06 ± 0.76
Number of patients given rescue analgesia (%)	13(32.5%)
Mean time for first request of analgesia (minutes)	451 ±12.85

From Table 4 it shows that time required for first request of anesthesia analgesia was longer and proved that intraperitoneal ropivacaine provides excellent pain relief.

Table 5: Postoperative Adverse Effects (%)

VARIABLES	GROUP R (%)
Nausea	3(7.5%)
Vomitting	3(7.5%)
Shoulder Pain	0
Hypotension	0
Bradycardia	0
Pruritus	0

Table 5 shows that there was no incidence of shoulder pain, pruritus, bradycardia, hypotension in our study.

Discussion

Although laparoscopic surgeries are minimally invasive procedure, providing adequate post-operative pain relief plays a major role in discharging the patients on the same day or another day. Pain can be multifactorial arising from incision site (somatic pain), surgical site (visceral pain), and due to pneumoperitoneum (referred pain)[5,6]. Out of the different regimens proposed for post-operative pain relief such as intravenous NSAIDS, opioids, and local infiltration, intraperitoneal instillation of local anesthetic has been the most promising. The main advantage of using local anesthetics is that they do not have any adverse effect like opioids.

Ropivacaine, a new long-acting amide local anesthetic that is formulated as the pure S-enantiomer, chemically related to bupivacaine, whose neuronal blocking potential seems to be equal or superior to bupivacaine[7]. Studies shows that it has significantly greater safety margin over bupivacaine because of lower CNS and Cardiac toxicity[8] and hence can be used in higher concentrations.

Our study demonstrates the intraperitoneal instillation of ropivacaine reduces pain after laproscopic surgery significantly. During the study no patients were excluded from the study because of uncontrolled pain or undesirable surgical outcomes. Pain is a highly personal experience which is whatever the experiencing person expresses and exist whenever the person appeals. The ambiguity of pain lies in that it is a subjective sensation or emotion and thorough objective observation of such is difficult. Because VAS scores are estimated by patients the accurate measurement is limited and objective estimation of pain could be deleterious. In our study the patients required the first dose of rescue analgesia was longest by 451 ± 12.85mins.

Narchi *et al*.[9] found that intraperitoneal instillation of local anesthetics are more effective in reducing pain upto 48 hours postoperatively in patients undergoing diagnostic laparoscopy. In 2007, Kucuk *et al*.[10] reported that intraperitoneal

instillation of 150 mg of ropivacaine provides excellent postoperative pain relief during laproscopic procedures. Papas-Gogos *et al*.[11] used 155 mg of ropivacaine, of which 80 mg was infiltrated intraperitoneally and the rest was infiltrated at trocar wounds. They observed adequate pain relief. Hence, in our study, we used 0.2% ropivacaine 2mg /kg (119.25±14.34) mg provides excellent postoperative pain relief.

Kim TH et al[12] also concluded that intraperitoneal instillation of ropivacaine at the beginning of laproscopic cholecstectomy combined with normal saline infusion is an effective method for reducing pain after laproscopic cholecystectomy. Our study is in accordance with this study for reducing pain after laproscopic surgery.

Joris et al.[6] reported that visceral pain accounts for the major discomfort experienced in early postoperative period whereas shoulder tip pain becomes the main complaint on the second day. However in our study no patients reported visceral pain in immediate postoperative period and shoulder pain until 8 hours.

In the study conducted by Cha sm *et al*[13] in 2012, patients who received peritrochar ropivacine significantly reduces parietal pain and intraperitoneal ropivacaine reduced both visceral (2-8hrs) and shoulder tip pain (2-12hrs) Similarly in our study no patients reported shoulder pain until 8 hrs and few patients have moderate pain at the end of 8 hour.

Limitations

There is no control group in this study since it is not a double blinded study it has to be evaluated further. Duration of analgesia provided could have been ascertained more precisely if this study would have been longer. We did not measure the plasma concentration of the drug.

Conclusion

We conclude that intraperitoneal instillation of 0.2% ropivacaine (2mg/kg) provides excellent postoperative analgesia for a longer period without any significant adverse events**.**

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