Original Article

Evaluation of Analgesic Efficacy of Bupivacaine and Ropivacaine Given Through Landmark Guided Erector Spinae Plane Block for Post-Operative Pain Relief in Patients Undergoing Laparoscopic Cholecystectomy

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ABSTRACT

Introduction: Postoperative pain after Laparoscopic cholecystectomy can leads to increased consumption of opioids with subsequent nausea, delayed bowel function and prolonged postoperative recovery. Landmark guided erector spinae plane block is safe, easy to perform and less time consuming.

Method: 60 patients between aged 18-60 years, ASA physical status I, II and III undergoing Laparoscopic Cholecystectomy were divided into two groups: Group B (Bupivacaine) and Group R (Ropivacaine). Before induction of general anesthesia, bilateral erector spinae block was performed at the level of thoracic 9th vertebrae. General anesthesia was given with standard induction and maintenance technique. Total duration of post-operative analgesia i.e. time until request of rescue analgesia, frequency of additional analgesics in first 24 hr. were noted.

Result: VAS score was found lower in group R (Ropivacaine) as compared to group B (Bupivacaine). Total duration of analgesia with time until request of analgesia was longer in group R as compared to group B. In terms of post-operative VAS score and post-operative analgesia and additional analgesic requirement, group R was better as compared to group B.

Conclusion: As a promising novel post-operative pain relief related procedure, Landmark guided Erector spinae plane block is simple, safe,easy to perform and most effective analgesic technique as part of multimodal analgesia for laparoscopic Cholecystectomy patients.

Key words: Bupivacaine, Ropivacaine, Erector Spinae Plane Block, Laparoscopic Cholecystectomy

INTRODUCTION

The growing interest in minimally invasive surgeries has increased number of patients undergoing laparoscopic surgical procedures. Immediate post-operative pain relief could decrease post-operative consumption of opioids and avoids side effects of opioids like respiratory depression, urinary retention, constipation, etc.[2] Interfacial plane blocks revolutionized the management of acute perioperative pain.[2] After first description of Erector spinae plane block in 2016 by Forero et al has gained popularity in last 4 years for various indications. This new regional technique provides analgesia via its effects on the ventral rami and dorsal rami of the spinal nerves, depending on the level of site. As the Erector spinae fascia extends between nuchal fascia cranially and sacrum caudally, injected local anaesthetic agents spread over several levels.[1] However not all hospitals are equipped with ultrasound machines facilities or trained anaesthesiologists in developed world as well. Contemporary guidelines suggest using multimodal analgesic regimen to provide quality analgesia. While there are many analgesic techniques available for various thoracic and abdominal procedures, very few there for post-operative analgesia purpose in Laparoscopic Cholecystectomy. Somatic pain from supraumbilical area and visceral pain due to pneumoperitoneum and surgical manipulation felt during Laparoscopic procedures.[3] The standard procedure today for performing ESP block uses ultrasound to deposite local anesthetics deep to 3 columns of erector spinae group of muscles (iliocostalis, longissimus, spinalis), which runs along length of spine from base of skull upto medial crest of sacrum. As an alternative to ultra sound guidance, in 2019 hetalvadera et al described novel Landmark guided ESP block technique.[2] At present there is no study available in literature for utility of Landmark guided ESP block technique for

multimodal analgesic regimen using different local anaesthetic drugs for laparoscopic procedures.

MATERIAL AND METHOD

The prospective randomized study was conducted among indoor patients admitted to our tertiary care hospital. 60 patients of either sexes between 18-60 years, ASA physical status I,II and III undergoing Laparoscopic Cholecystectomy on elective basis were included in the study. Patients having history of known allergy to local anaesthetic agent, any infection at site of anatomical landmark, patients with altered coagulopathy, known case of epilepsy, pregnancy, patients with spine deformity and those who are unable to understand visual analogue score were excluded out from study.

Preoperative evaluation of patients was done before surgery by taking history, general, systemic examination, necessary investigation, relevant past history and fitness for anesthesia was decided according. NBM status was noted. After obtaining written informed consent i.v line was secured with 18/20G intravenous cannula for IV fluids. Patients were premedicated with inj. Glycopyrrolate (0.05-0.01mg/kg) intramuscularly 30 minutes prior to induction.

In operation theatre baseline vitals heart rate(HR), arterial blood pressure (SBP and DBP), % saturation of oxygen (SPO2) on air were noted. Under all aseptic and antiseptic precautions, the spinous process of thoracic 9th vertebrae and a point 3cm lateral to it were marked before performing block. Under aseptic precautions, needle (Quincke, 22G,8-10 cm beveled needle) was inserted and advanced perpendicular to the skin in all planes to contact the transverse process of T10 vertebrae. The transverse process of the 10th thoracic vertebrae lies at a variable depth of 2-4cm from depending on the build of individual. At this point, quincke needle tip lies between the erector spinae muscle and transverse process. After negative aspiration, 20 ml local anaesthetic solution was given bilaterally according to group allocation. Group B received 20ml 0.25% injection Bupivacaine and group R received 20ml 0.25% injection Ropivacaine.

Preoxygenation with 100% O2 for 3 mins. Induction was done with inj. Thiopentone sodium (4-7mg/kg) and inj. Succinylcholine (1-1.5mg/kg) with IPPV. Oral intubation done with adequate sized portex cuffed ET tube. Maintenance of anesthesia was done with 50% N20 in 50% 02 with 0.5-1% isoflurane and nondepolarisng skeletal muscle relaxant inj. Vecuronium 0.08-0.1mg/kg loading dose followed by 0.01-0.15mg/kg maintenance dose. Neuromuscular blockade was reversed with inj. Glycopyrrolate 0.01mg/kg and inj. Neostigmine 0.05mg/kg. Extubation was done after achieving adequate respiration, muscle tone, power and reflexes. Post-operative vitals were noted. Post-operative pain assessment was done at 3rd,6th,9th, 12th,16th,20th,24th hour for total duration of analgesia using visual analogue score(VAS),(0-no pain,1-2-mild pain,3-6 moderate pain,7-10-severe pain.) Time until request of rescue analgesia with inj. Tramadol (0.5mg/kg i.v followed by inj. Ondansetron 0.1-0.2mg/kg iv when VAS≥3 was noted. Frequency of additional analgesia in first 24hrs was noted.

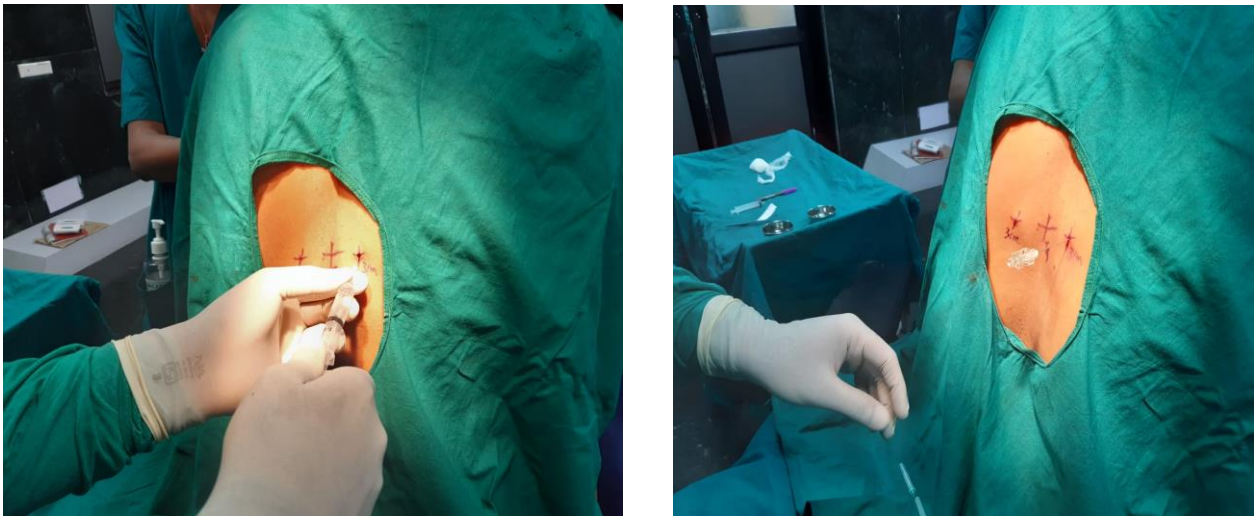

Figure 1: Landmark Guided Erector Spinae Plane Block

RESULTS

The prospective randomized study was conducted among indoor patients admitted to our tertiary care hospital. 60 patients of either sexes between 18-60 years, ASA physical status I, II and III undergoing Laparoscopic Cholecystectomy on elective basis were included in the study. In operation theatre baseline

vitals i.e. heart rate (HR), arterial blood pressure (SBP and DBP), % saturation of oxygen (SPO2) on air were noted. Under all aseptic and antiseptic precautions, landmark guided erector spine block was given at T9 vertebral level.20 ml local anaesthetic solution was given bilaterally according to group allocation. Group B(Bupivacaine) received 20ml 0.25% injection Bupivacaine and group R(Ropivacaine) received 20ml 0.25% injection Ropivacaine bilaterally before induction of general anaesthesia. The collected data was subjected to statistical analysis. Continuous variables were presented as mean ± SD. Quantitative data was analyzed using student's t-test.

Both groups were comparable in terms of demographic data like age, weight, duration of surgery and hemodynamic parameters such as heart rate, systolic blood pressure, diastolic blood pressure and % saturation of oxygen. There was statistically no significant difference between two groups in terms of the above parameters (P>0.05).

Table 1: Patient's demographic data

Characteristics	Group-B (Bupivacaine)	Group-R (Ropivacine)	p-value
Age (Years)	50 ± 5.2	51 ± 5.4	0.53
Weight (Kg)	53 ± 2.2	54 ± 1.6	0.09
Duration of surgery (mins)	120.25 ± 22.3	118 ± 21.1	0.45

Table 2: Duration of Analgesia

Group	Mean Duration of Analgesia ± SD
Group-B	540 ± 1.2
Group-R	720 ± 1.88

Table 3: Frequency of Additional Analgesia

Group	Mean ± SD
Group-B	3.15 ± 0.45
Group-R	1.2 ± 0.88

After extubation postoperative vitals were noted. Post-operative pain assessment was done at 3rd,6th,9th,12th,16th,20th,24thhour for total duration of analgesia using visual analogue score (VAS),(0-no pain,1-2-mild pain,3-6 moderate pain,7-10-severe pain.). Time until request of rescue analgesia with inj. Tramadol (0.5mg/kg i.v followed by inj. Ondansetron 0.1-0.2mg/kg iv when VAS>3 was noted. Frequency of additional analgesia in first 24hrs was noted.

The time until request of rescue analgesia i.e. duration of analgesia was (540 ± 1.2) min in Group-B (Bupivacaine group) while it was (720 ± 1.88) min in Group-R(Ropivacaine group). It was comparable among both the groups with (p<0.001) and there was statistically significant difference among them.

Frequency of additional analgesia in first 24 hr was (3.15 ± 0.45) times in Group-B (Bupivacaine group) while it was (1.20 ± 0.88) times in Group-R (Ropivacaine group). There was statistically significant difference among them. (p<0.001).

DISCUSSION

Improved surgical outcome and reduction in post-operative stress response, morbidity and length of hospital stay are the benefits of providing good post-operative analgesia.[3] Post-operative analgesia should include strategies to reduce side effects. Multimodal analgesia including peripheral nerve blocks decrease use of other analgesics and therefore side effects. Intravenous analgesics are generally considered to be adequate for pain management for laparoscopic Cholecystectomy but opioids leads to nausea, vomiting and itching and NSAIDS affect hepatic, renal systems and wound healing. The Erector spinae plane block in laparoscopic surgeries have shown to be effective in reducing pain scores and opioids consumption.

In our study 60 patients between aged 18-60 years, ASA physical status I, II and III undergoing Laparoscopic Cholecystectomy were divided into two groups: Group B and Group R. Before induction of general anaesthesiae, Bilateral erector spinae block were performed at level of thoracic 9th vertebrae. Then general anaethesiae was given with standard induction and maintenance technique. Total duration of post-operative analgesia, time until request of rescue analgesia was noted. Post-operative VAS score was compared between group B(Bupivacaine) and group R(Ropivacaine).

Basak Altiparmak et al conducted a study in 2019 of efficacy of ultrasound- guided erector spinae plane block for analgesia after laproscopic Cholecystectomy. They observed that ultrasound guided ESP block significantly reduced post-operative tramadol consumption and NRS scores 15- and 30-minutes post-surgery and, 12 and 24 hours post-surgery. Moreover, the intraoperative fentanyl requirements and rescue analgesic consumption in the ESP group were significantly lower than control group. In our study similar findings of reduced analgesic consumption in post-operative period observed.

Serkan Tulgar et al conducted a study in 2019 of evaluation of Ultrasound guided erector spinae plane block and oblique subcostal transverse abdominis plane block in laparoscopic Cholecystectomy. They observed significantly lowered NRS at rest and coughing/movement in the first 3hour and led to less analgesic requirement in the first 24hour. In our

study similar findings of reduced analgesic consumption in post-operative period observed.

In 2019 **Hetal Vadera** et al. described a landmark guided technique wherein a bilateral erector spinae plane block (based on anatomical landmarks) was described. In many centers USG machine is not available. So landmark guided technique is very fruitful in this scenario. It is also Easy to approach and safe.

In this study, we described a technique that is safe, easy to perform, less time consuming, and does not require any extra equipment.

CONCLUSION

As a promising novel post-operative pain treatment procedure, landmark guided Erector spinae plane block is simple, safe and most effective supplemental techniques as part of the multimodal post-operative analgesic regimen.

REFERENCES

1. Başak Altıparmak, Melike Korkmaz Toker, Ali Ihsan Uysal, Yağmur Kuşçu, Semra Gümüş Demirbilek. Ultrasound-guided erector spinae plane block versus oblique subcostal transversus abdominis plane block for postoperative analgesia of adult patients undergoing laparoscopic cholecystectomy. Journal of clinical anaesthesia 2019:57;31-36
2. Hetal K. Vadera, Tuhin Mistry. Erector spinae plane block: Anatomical landmark-guided technique. Saudi Journal of Anesthesia 13(3);268-269
3. Tulgar S, Kapakli MS, Kose HC, Senturk O, Selvi O, Serifsoy TE, et al. Evaluation of ultrasound-guided erector spinae plane block and oblique subcostal transversus abdominis plane block in laparoscopic cholecystectomy: Randomized, controlled, prospective study. Anesth Essays Res 2019;13:50-6