Transverse Abominis Plane (TAP) Block by POP Method: A Novel Technique of Postop-Analgesia Method in Lap Cholecystectomy in a Secondary Care Peripheral Hospital

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ABSTRACT

Introduction: Although laparoscopic cholecystectomy is a minimally invasive procedure, it can cause significant pain in the postop period. It is a challenge for anaesthesiologist to tackle pain relief in the modern era of multimodal analgesia techniques. Recently the transversus abdominis plane block (TAP Block) has been used as a part of multimodal analgesia with promising results. This study evaluated the efficacy of the TAP block with Ropivacaine in laparoscopic cholecystectomy compared with intravenous paracetamol and intramuscular diclofenac sodium in a secondary care peripheral hospital which was devoid of ultra sound machine for USG guided TAP block.

Material and Methods: One hundred and twenty adult patients in ASA physical status I and II adult who were scheduled for elective laparoscopic cholecystectomy were selected in this prospective study in a pheripheral hospital. These patients were allocated in one of two groups: Group I received IV paracetamol and IM diclofenac sodium intraoperatively and Group II who received bilateral TAP block with 0.25% Ropivacaine. Twenty-four hours postoperative opioid(Tramodol) consumption, opioid dose in the recovery unit (PACU) and PACU length of stay were evaluated. The quality of analgesia was assessed by the Visual Analogue Scale (VAS) at specific interval of 0 hrs,4,8,12 and 24 hrs during 24 h, at rest and with movement.

Results: The mean 24 h opioid/tramadol requirement was statistically significant between the two groups (22.76+/-10.26mg vs 79+/-16.7 mg, $p < 0.001$).Length of stay in Post Anaesthesia Care Unit was significantly lower for group II patients compared with group I patients (21.67+/-10.27min vs 40.57+/-13.42 min, $p < 0.001$). The TAP Ropivacaine group(GroupII) had a significant lower pain score than the IV paracetamol and IM diclofenac Sodium group(GroupI) at 0, 4,8, 12, 24 h, both at rest and with movement. There were no case of local anaesthetic systemic toxicity or other complications were detected in our study.

Conclusion: TAP block by POP method with Ropivacaine 0.25% can provide effective analgesia up to 24 hours after laparoscopic cholecystectomy when combined with conventional multimodal analgesia regimen in a secondary care peripheral hospital.

Keywords: Transversus Abdominis Plane (TAP) Block, POP Method, Tramadol, Laparoscopic Cholecystectomy, Analgesia

INTRODUCTION

Laparoscopic removal of gall bladder is a minimal invasive surgical technique that is widely followed all over the world for symptomatic gall bladder stones treatment. In spite of minimal invasive nature of the surgery, patients feel a large amount of pain in the immediate post operative period. There are many postop pain relief methods, like patient controlled analgesia with opioids,thoracic epidural analgesia,intraperitoneal injection of local anesthetics which can have specific side effects of each modalities of analgesia technique.[1-4]

Transverse abdominis block (TAP block), first described by Rafi et al[5] has become a standard method of post op analgesia after abdominal surgeries like lapcholicystectomy,hernia repair surgeries etc.TAP block proved to be effective method in reducing postop pain, opioid consumption in abdominal surgeries[6,7]. TAP is a neurovascular plane located between the internal oblique and transverse abdominis muscles and nerves supplying abdominal wall pass through this plane before supplying anterior abdominal wall.[8] So, if the local anesthetic is deposited in this space, myocutaneous sensory blockade results.[9,10] As postoperative pain after lapcholicystectomy is predominantly due to abdominal wall incision we hypothesized that the TAP block if used as a part of post op analgesia will reduce the need of additional analgesic during 24 h after surgery, severity of pain and prolong the demand for first analgesic and improve patient satisfaction during postoperative period.

This study was done to evaluate the post op pain relief for lapcholecystectomy cases by bilateral TAP block with 0.25% Ropivacaine with I V analgesic Paracetamol 1gm and IM Diclofenac 75 mg by blind POP method where ultra sound machine for TAP block is not available in a secondary care peripheral hospital. The primary goal of the study were the assessment of VAS in the immediate post op period i.e. 24 hrs. The other aims were perioperative opioid consumption in the form of fentanyl/tramadol and discharge time.

MATERIAL AND METHODS

The present study was done in admitted patients who were planned for elective lapcholecystecomy after obtaining the

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clearance from the ethical committee. Informed written consent was obtained and the procedure was explained to the patients during the detailed pre anaesthesia checkup which was done before the surgery in advance. 120 patients of ASA physical status I and II who were planned for laparoscopic Cholecystectomy were randomized into 2 groups, based on computer generated program. Group I which received general anaesthesia and IV paracetamol 1 gm and IM diclofenac 75 mg. Group II received general anaesthesia, bilateral TAP block by POP method with 0.25% ropivacaine with IV paracetamol 1 gm and IM diclofenac 75 mg.

All the patients more than 18 yrs of age, planned for elective Lap Cholecystectomy were included in the study. Patients refused to participate in the study, allergic to pain killers, allergic to local anaesthetics, ASA physical status III and more, and chronic pain disorders were excluded from the study.

Preoperatively patients were explained about the visual analog scale (VAS) and how to quantify the pain severity between 0 to 10. All the patients were kept nil orally as per the standard NPO guidelines. Previous night of surgery patient received tablets of Alprazolam 0.25mg, Ranitidine150 mg and Metoclopromide 10mg at 2300 hours.On the morning of surgery, patients were shifted to operation theatre and connected to standard monitors in the form of Pulse,NIBP,Spo2,ECG and end tidal Co2 along with temperature. Patients were premedicated with glycopyrrolate 0.01 mg/kg IV, Midazolam at 0.01mg/kg IV, Fentanyl 2mcg/kg IV, Ondansetrone 0.05 mg/kg IV. Patients were induced with Propofol intravenously at 2 mg/kg and muscle relaxation in the form of Cisatracurium at the dose of 0.15 mg / kg. Airway was secured with normal endotracheal tube of PVC material of size 8.0 mm ID and cuffed tube. Anaesthesia was maintained with Sevoflurane (1-2%), Nitrous oxide and oxygen at the ratio of 1:1.For the TAP block in 60 patients (GroupII) just after closure of the port site and before extubation by double POP method 20 ml of 0.25% ropivacaine on each side in the triangle of Petit by using the 23G spinal needle was used. Paracetamol 1 gm IV and Diclofenac 75 mg IM was given soon after the intubation. Group I received only Paracetamol 1GM IV and 75mg IM Diclofenac soon after the intubation. At the end of the surgery, extubation was performed with the patient awake and fulfilled the extubation criteria.

In the ward patients received tramodol 50 mg Slow IV for moderate to severe cases of pain and in cases of vomiting inj.Ondansetrone 4 mg was given. Pain evaluation and recording were made by anaesthesiologist who was blinded to the study at 0 hrs,4,8,12 and 24 hrs.

	Group I (n=60)	Group II (n=60)	P Value
Age(years)	52.5(28-70)	51(26-68)	0.967
Sex (F/M)	40/20	36/24	0.789
ASA I / II	28/32	40/20	0.19
Weight(Kgs)	74.13 +/-18.1	73.5+/-11.3	0.87
Surgery time (min)	35.3+/- 16.5	31.33+/-12.24	0.35
P value more than 0.05= significant			

Table-1: Demographic Data

	Group I (N=60)	Group II (N=60)	P value
VAS 0 hr	2.93+/-1.17	1.33+/-1.09	P<0.001
VAS 4 hr	3.27+/-1.5	1.23+/-1.006	P<0.001
VAS 8 hr	2.5+/-0.86	0.67+/-0.71	P<0.001
VAS 12Hr	1.7+/-0.98	0.33+/-0.6	P<0.001
VAS 24Hr	1.27+/-0.69	0.23+/-0.43	P<0.001
P < 0.05 considered significant			

Table-2: VAS Score at Rest

	Group I (N=60)	Group II (N=60)	P value
VAS 0 Hr	3.13+/-1.25	1.36+/-1.07	P<0.001
VAS 4 Hr	4.01+/-1.67	1.91+/-1.25	P<0.001
VAS 8 Hr	2.57+/-0.9	0.71+/-0.84	P<0.001
VAS 12 Hr	1.84+/-1.03	0.53+/-0.72	P<0.001
VAS 24 Hr	1.28+/-0.7	0.28+/-0.512	P <0.001
P< 0.05 considered significant			

Table-3: VAS Score at movement

STATISTICAL ANALYSIS

The SPSS statistical package version 15 was used for statistical analysis, and chi square test was used for parametric use. P value of less than 0.05 was considered significant.

RESULTS

120 patients who were scheduled for elective laporoscopic Cholecystectomy were included in the study. Patient charecteristics were similar in both the groups (Table 1). In case of post op pain relief there was a significant differences between the two groups. The patients who received TAP block along with paracetamol and diclofenac had a significant less postop pain compared to other group who didn't receive the TAP block (Table 2, Table 3) both at rest and at movements. Post op rescue analgesia (Tramadol) requirement in Group II was significantly less when compared to Group I. Post Anaesthesia care Unit (PACU) stay was significantly less in the Group who received TAP blocks (Table 4).

DISCUSSION

Pain is as we all know is multi factorial in origin. In cases

	Group I (N=60)	Group II (N=60)	P value
Rescue Analgesia in PACU	36+/-16.49	12+/-14.92	P<0.001
PACU Stay (min)	40.57+/-13.42	21.67+/-10.27	P<0.001
Resue analgesia in 24 Hrs	79+/-16.7	22.76+/-10.26	P<0.001
P<0.05, considered significant			

Table-4: comparision of efficacy of analgesia with 0.25% Ropivacaine in TAP block and without TAP block

of lap Cholecystectomy it may be due to trocar insertion i.e, abdominal wall pain, visceral pain or peritoneal in origin[14]. Abdominal wall is supplied by neural afferents between T6 and L1. Efficient pain control after any surgerical procedure permits early mobilization, decreases the postoperative complication rate, and allows early hospital discharge. The standard methods for postop analgesia after laparoscopic cholecystectomy consist of opioid administration, which causes respiratory depression,itching, late bowel movements and delayed recovery[15].Other conventional method is epidural analgesia at the level of thoracic level, difficult to perform in some cases and with potential severe side effects such as spinal haematomas or abscess, dural puncture and other complications[16].

Recent literature suggests that TAP block as an efficient method in multimodal analgesia after laparoscopic cholecystectomy[12,14,17,18]. The TAP block was first described in 2001 by Rafi et al.[5] using the 'Petit' triangle, and performed with so-called "pop" or "double-pop" method. In order to reduce the potential local side effects, Hebbard et al.[11] described the ultrasound-guided block that enables direct visualization of all anatomical structures, the needle, and the spread of local anaesthetic by ultrasonographic guidance. Many of the secondary care hospitals are devoid of ultrasound machines for the USG guided TAP blocks because of the economical constraints. The first use of the TAP block for laparoscopic cholecystectomy was described by El-Dawlatly in 2009 using the posterior approach or blind POP method. To date, many of the studies or research papers advised this technique in laparoscopic cholecystectomy. The methodology used in these studies are not simillar. Ra et al.[14], Peterson et al.[12] and El-Dawlatly[18] reported good postop analgesia after TAP, but Ortiz et al.[13] did not find any statistical significance in postoperative pain and analgesic consumption in patients who received a TAP block, compared to those who received port-site local infiltration with ropivacaine. These different types of results might be explained by differences in the technique used in these studies regarding the type of block like different types of approaches i.e, subcostal approach, posterior approach, blind technique or ultrasound guided TAP, the timing of the block (before or after surgery), the drug and the dose of local anesthetics used.

In our study of 120 patients, the results are similar with those studies and sustain the efficiency of TAP block using local anesthetics for postoperative analgesia in laparoscopic cholecystectomy. Also TAP block with ropivacaine shortened the PACU stay. We consider that PACU stay time correlates with the amount of opioid used in the post operative period, patients needing less opioid reached early discharge from the PACU. The VAS scores were significantly reduced in our study at 0, 4, 8, 12 and 24 hours. This efficient analgesia might be explained by the TAP block which is done by POP method without any special equipment in a small hospital (Secondary Care Hospital) without USG machine in laparoscopic cholecystectomy cases with good anatomical knowledge and experience. This helps in early recovery and good patient satisfaction. We did not find any significant differences in postoperative nausea and vomiting (PONV) and also we did not record any complications due to the TAP technique with good anatomical knowledge of the layers of abdominal wall and practice even though we had some failures which were in insignificant number of patients.

This study has some limitations. Firstly, the block was performed by blind technique when patient is under general anaesthesia, so we were unable to appreciate block installation time or its extension. Secondly, the standard doses and volumes of local anaesthetic drugs used in the TAP block are not yet established. We used 20 ml of ropivacaine 0.25% bilaterally. Transversus abdominis plane is not highly vascular, so we considered safe the volume of local anaesthetic used. Also study was limited to the assesment of pain relief for first 24 hours after the surgery. The study was not large enough to study the side effects like inadvertent peritoneal puncture, even though we didn't have any such complications.

CONCLUSION

TAP with 0.25% Ropivacaine can provide effective analgesia up to first 24 h after laparoscopic cholecystectomy when combined with a conventional multimodal analgesia regimen. The block is easily performed in peripheral hospitals, it is safe, and provides effective analgesia with significant opioid sparing effect.TAP block reduces total analgesic drug requirements in first 24 hrs of postop period which directly helps in early recovery and better patient satisfaction.

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