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Port site infiltration versus subcostal TAP block in laparoscopic cholecystectomy for postoperative analgesia

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Abstract
Background/Aim: Many patients experience moderate to severe pain after laparoscopic cholecystectomy. We aimed to compare efficacy of subcostal TAP block vs port site infiltration for post-operative analgesia in these patients.
Methods: Patients undergoing elective laparoscopic cholecystectomy under general anaesthesia were divided randomly into two groups of 30 each to receive either ultrasound-guided bilateral subcostal TAP block (T) with 0.25% ropivacaine total 20 ml each side or port-site infiltration with 0.25% ropivacaine 5 ml each at 4 ports (I) at the end of the surgery before extubation. NRS for pain was assessed serially at 0 time point (after extubation), 1, 2, 3, 6, 12 and 24 h after surgery. Time for first rescue analgesia was noted. Inj.tramadol was used for rescue analgesia. Chi-square test and independent *t*-test were used to compare qualitative and quantitative data, respectively.
Result: Time to first rescue analgesia in group I was 5.7±0.98 hr and in group T was 9±1.29 hr (p value=0.0001). Mean tramadol consumption in group I was 200 ± 64.33mg and in group T was 113.33 ± 34.57mg (p value =0.0001). Mean NRS score in group T was significantly lower in group T as compared to group I.
Conclusion: Ultrasound guided subcostal TAP block provides better post-operative analgesia compared to port site infiltration in laparoscopic cholecystectomy patients.

Keywords: Subcostal TAP block, port site infiltration, laparoscopic cholecystectomy

Introduction
Pain is derived from a Latin word “poena”, which means penalty or punishment. But nowadays it is no longer considered as penalty or punishment, in fact; WHO and IASP have recognized relief from pain as a human right [1].
Surgical procedures can cause severe tissue damage causing pain in the post operative period which is experienced by most of the patients. After all the efforts taken to make the intraoperative period pain free and stress free, the patients often are left with severe pain and discomfort in the postoperative period. A pain free postoperative period leads to early recovery, shortened hospital stays, reduced hospital costs and increased patient satisfaction [2].
Laparoscopic cholecystectomy is considered a safe and effective procedure done for gall bladder disease condition and has become as the treatment of choice for symptomatic gall stones. Pain associated with laparoscopic cholecystectomy is largely underestimated owing to minimal access keyhole entry, even though it is being associated with significantly high postoperative pain scores [3].
A multimodal analgesic approach for management of pain is usually used for recovery of patient. As a part of this approach, TAP block is a popular modality for postoperative analgesia in laparoscopic abdominal surgeries [4]. It is an abdominal field block that acts on the myocutaneous nerve supply of anterior abdomen, targeting parietal and incisional components of pain [5, 6].
In the multiport laparoscopic cholecystectomy, the port site incisions, usually four in number are placed at sites – umbilical, epigastric, midclavicular and anterioraxillary ports on the right side. In literature the most common approach of performing TAP block with ultrasound for laparoscopic cholecystectomy is the classical or posterior one, which provide analgesia between T10 to the level of L1 dermatome [7]. Thus subcostal TAP block was chosen to achieve the extent of the block up to the T6 dermatome [8].

Ultrasound-guided TAP block helps in clearly demarcating the anatomy increases the margin of safety and help in deposition of local anaesthetic under vision which increases the success rate and reduces the volume of drug needed for effective block [9].

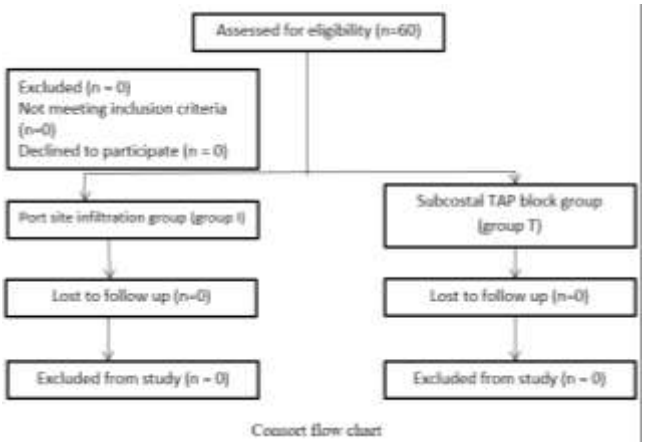
Port-site infiltration with local anaesthetics is also part of multimodal analgesia for providing analgesia after laparoscopic cholecystectomy [10]. It also has lot of advantages namely safety, simplicity and low cost. Postoperative port site infiltration with local anaesthetic also produces desirable analgesia in laparoscopic cholecystectomy patients [11].

The aim of the study was to compare efficacy of subcostal TAP block versus port site infiltration in providing postoperative analgesia in laparoscopic cholecystectomy.

Methodology

After getting approval of Institutional ethics committee and written informed consent of participants, a double blinded randomized controlled study was done at a tertiary care centre. Sixty participants with ASA I/II, aged between 20 and 65 years and BMI between 22 – 35 kg/m^2 were included in the study. Participants having infection at injection site, allergy to local anesthetics were excluded from the study. Participants were randomized into 2 groups using computer generated table; Group I (n=30) was the control group that received port site infiltration and Group T which received subcostal TAP block. In the preoperative period, all participants were educated about NRS scale. Participants were premedicated with inj. Pantopazrole 40 mg, inj. Ondensatron 4 mg, inj. Glycopyrrolate 0.2 mg, inj midazolam 1 mg. As per standard operating protocols, general anesthesia was induced with inj. Fentanyl 2 microgram/kg, inj. Propofol 2 mg/kg, inj. Vecuronium 0.1 mg/kg and intubated with appropriate size endotracheal tube. Inj. Paracetamol 1 gm was given at the beginning of surgery. Anesthesia was maintained with O2 + N2O (50:50) + inj Vecurnium. Top up of fentanyl was given as per variability in heart rate and blood pressure. Intraoperative monitors includedECG, non-invasive blood pressure, pulse oximeter and end-tidal carbon dioxide. At the end of surgery, before extubation, participants were given either port site infiltration (5ml at 4 ports with 0.25% ropivacaine) or subcostal TAP block (20 ml 0.25% ropivacaine using 6–13 MHz GE Healthcare USG & Colour Doppler Model – Logic-E linear transducer) as per randomisation. The participant was blinded and NRS for pain was assessed by independent investigator.

Postoperatively all participants were given inj Paracetamol 1 gm iv bd. Inj tramadol 100 mg in 100 ml NS was given as rescue analgesia. NRS for pain was assessed at 0(baseline – just after extubation), 1, 2, 3, 6, 12, 24 hours postoperatively. Rescue analgesia was given either on patient demand or when NRS ≥4. Time to first analgesia was noted and total tramadol consumption in 24 hours was noted. Our primary objective was to evaluate the effectiveness of USG guided subcostal TAP block and port site infiltration in providing post-operative analgesia in laparoscopic cholecystectomy patient with respect to Numeric Rating Scale for pain assessment, requirement for first rescue analgesia, total analgesia requirement in 24 hrs.Informative statistics included test of significance for comparing parameters in 2 groups, two independent sample T-test was used to test difference between mean of qualitative parameters in 2 comparison groups whiledifference in proportions of qualitative parameters in 2 groups was compared with chi square test.



Consort flow chart

Results

In our study we compare efficacy of subcostal TAP block vs port site infiltration in laparoscopic cholecystectomy in terms of Numeric Rating Scale for pain assessment, requirement for first rescue analgesia and total analgesia requirement in 24 hrs. As per the sample size calculated, there were 30 patients included in each group, i.e., 60 patients were taken for the study. Both the groups were comparable with respect to patient demographic variables such as age, sex, height, weight, BMI, ASA grade. The NRS score at baseline was 0 in both the groups. In group T the NRS score increased to 2.93 ± 0.45 at 24 hours whereas in group I it increased to 3.87 ± 1.22. The NRS score in group T was significantly lower as compared to group I at all time intervals.

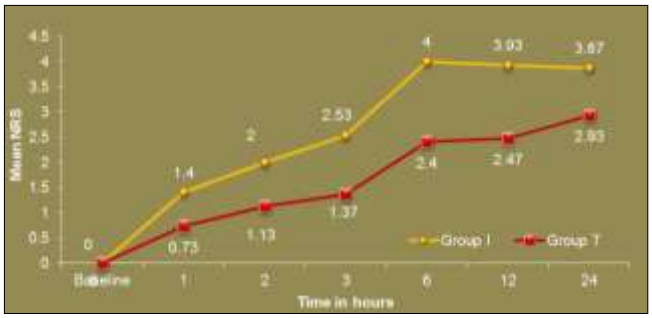


Fig 1: Comparison of Mean NRS in two groups

The mean time for first rescue analgesia in group I was 5.7 ± 0.98 and in group T was 9 ± 1.29 and this difference is statistically significant p=0.0001

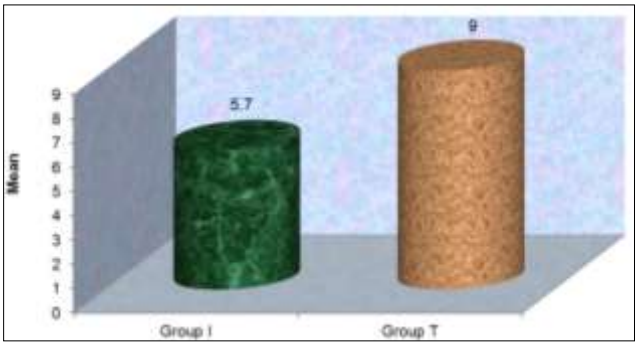


Fig 2: Mean time of First Rescue Analgesia of subjects in two groups

The total analgesic dose required in 24 hours was 200 ± 64.33 and 113 ± 34.57 respectively in group I and group T and this difference is significant.(p=0.0001)

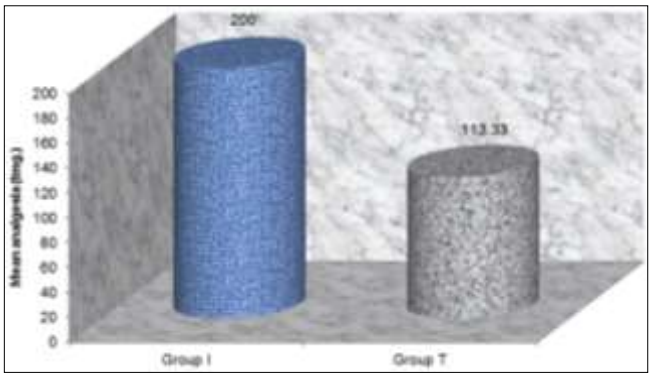


Fig 3: Mean total analgesia required (mg) by subjects in two groups

Discussion

The Transversus Abdominis Plane (TAP) Block is used to provide analgesia to the anterolateral abdominal wall. Rafi *et al.* (2001) [12] and McDonnell *et al.* (2004) [13] were the first to describe this abdominal field block. With the study they conducted they proved that injecting local anaesthetic in this TAP can help in blockade of mid to lower thoracic and upper lumbar spinal nerves. In literature search it was found that the most common approach of performing TAP block with ultrasound for laparoscopic cholecystectomy is the classical or posterior one [8], which provides analgesia between T10 to the level of L1 dermatome [9]. But in laparscopic cholecystectomy there was an epigastric port as well and thus the rationale for considering ultrasound guided bilateral subcostal TAP block was to achieve the extent of the block up to the T6 dermatome [10]. Hebbard *et al*. described ultrasound-guided subcostal transversus abdominis plane block.

Port site infiltration with local anaesthetics is also part of multimodal analgesia after laparoscopic cholecystectomy. Local anesthetics act by producing a blockade of conduction of neural impulses in the afferent nerve fibers thereby reducing nociception. It also has lot of advantages namely safety, simplicity and low cost. As described by Nazir AK *et al*. postoperative port site infiltration with local anaesthetic produces desirable analgesia in patients posted for elective laparoscopic cholecystectomy [11].

Ropivacaine is a long-acting amide local anaesthetic with safety profile better than as compared to bupivacaine. It is less lipophilic than bupivacaine and is thus less likely to penetrate large myelinated motor nerve fibres, causing relatively reduced motor blockade. It also has a greater degree of motor sensory differentiation. It has selective action on the pain-transmitting Aβ and C nerves rather than Aβ fibres involved in motor function. Studies between ropivacaine and bupivacaine suggested that ropivacaine produces less cardiac as well as central nervous system toxic effects, less motor block and a similar duration of action of sensory analgesia as bupivacaine and thus Ropivacaine was considered to be used in our study [14].

Mulroy MF conducted a study in which he used varying concentration of Ropivacaine i.e. 0.125%, 0.25 %, 0.5% was used for wound infiltration in patients posted for hernia repair. They found that 0.25% and 0.5% concentration provide comparable and adequate pain relief after surgery which was not seen with 0.125%. Hence it was decided to use 0.25% Ropivacaine concentration for our study [15]. Elamin *et al*. in their study mentioned that injection of local anesthetic higher than a standard volume of 20 ml can infiltrate the surrounding subcutaneous tissue at the port sites without any additional analgesic effect [16]. Thus it was decided to use 20 ml of 0.25% ropivacaine for both group T and group I, a total of 50 mg of ropivacaine was used to avoid confounding due to dose differences.

1. Numerical rating scale (NRS)

In our study it was found that none of the patients experienced pain at 0 time point (after extubation). This might be due to the residual analgesia of fentanyl used during induction. After that patient was observed in PACU for 1, 2, 3, 6, 12, 24 hours. It was found that NRS score was significantly lower in Group T compared to Group I at all other time frames. This result was similar to the study done by Toker M *et al.* [17], Janjua S *et al*. [18], Suseela I *et al.* [10]. This is subcostal TAP blockhelps in blockade of nerves from T6 to L1 and providing analgesia for anterolateral abdominal wall. Also ultrasound use helped in clearly demarcating the anatomy which helped in successful injection of local anaesthetic in the TAP under vision and thus helped in improving the analgesic efficacy of local anaesthetic in low dose.Studies done by Bava P *et al.* [19], Kadam V *et al.* [20], Ortiz J *et al.* [21] are not in concordance with our study and this can be attributed to the methodology of TAP block. Even though US guidance was used, they had used classical approach for TAP block which does not cover upper abdominal dermatome levels and hence pain scores may not be statistically significant in the patients receiving TAP block when compared with port site infiltration.

2. Mean tramadol consumption

In the present study, there was a significant difference noted in subcostal TAP block group with regards to mean tramadol consumption as compared to port site infiltration with p value of 0.0001. Similar results are seen in Toker M *et al.* [17], Janjua S *et al.* [18], Suseela I *et al.* [10]. The probable explanation of better analgesia after subcostal TAP block maybe the blockade of nerves innervating anterolateral abdominal wall (T6-L1) which couldn't be achieved after port site infiltration. The studies conducted by Bava P *et al.* [19], Ortiz J *et al.* [20], Kadam V *et al.* [21] are not in concordance with our study as they had used US guided posterior approach of TAP block which provides analgesia between T10 to L1 dermatomal level. Hence mean analgesic consumption was not statistically significant in these studies.

3. Time to first rescue analgesia

Time to first rescue analgesia is described as time taken from extubation till demand of analgesia or when NRS ≥4. In present study we found that time for first rescue analgesia was much later in group T as compared to group I and is statistically significant with p value = 0.0001.In our study it was found that time to first rescue analgesic was 9 ± 1.29 hr while in port site infiltration group I was 5.7 ± 0.98 hr. This indicates better analgesia in TAP block group as compared to port site infiltration group. Study conducted by Suseela I *et al.* [10], Baral B *et al.* [14], Ahmed A *et al.* [22] also shows similar result with later time to first rescue analgesia in TAP block group and is statistically significant. This might be due to better analgesia offered in TAP block group.

Conclusion

USG-guided bilateral subcostal TAP block is effective and found to be superior in providing postoperative analgesia after laparoscopic cholecystectomy with reduced pain scores, longer duration and less post-operative analgesic requirement compared to port-site infiltration.

References

1. Brennan F, Carr DB, Cousins M. Pain management: a fundamental human right. Anesth Analg 2007;105(1):205-221.
2. Garimella V, Cellini C. Postoperative pain control. Clinics in colon and rectal surgery 2013;26(03):191-6.
3. Wu Y, Liu F, Tang H, Wang Q, Chen L, Wu H, *et al.* The analgesic efficacy of subcostal transversus abdominis plane block compared with thoracic epidural analgesia and intravenous opioid analgesia after radical gastrectomy. Anesth Analg 2013;117:507-13.
4. Johns N, O"Neill S, Ventham NT, Barron F, Brady RR, Daniel T. Clinical effectiveness of transversus abdominis plane (TAP) block in abdominal surgery: a systematic review and meta-analysis. Colorectal Dis 2012;14(10):e635-42.
5. Kehlet H, Holte K. Effect of postoperative analgesia on surgical outcome. Br J Anaesth 2001;87(1):62-72.
6. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial. Anesth Analg 2007;104(1):193-7.
7. Shibata Y, Sato Y, Fujiwara Y, Komatsu T. Transversus abdominis plane block. Anesth Analg 2007;105(3):883.
8. Hebbard P. Subcostal transversus abdominis plane block under ultrasound guidance. Anesth Analg 2008;106(2):674-5.
9. Lancaster P, Chadwick M. Liver trauma secondary to ultrasoundguided transversus abdominis plane block. Br J Anaesth 2010;104:509-10.
10. Suseela I, Anandan K, Aravind A, Kaniyil S. Comparison of ultrasound-guided bilateral subcostal transversus abdominis plane block and port-site infiltration with bupivacaine in laparoscopic cholecystectomy. Indian journal of anaesthesia 2018;62(7):497.
11. Nazir AK, Merdan I. Port site infiltration of local anaesthetic in reduction of post-operative pain after laparoscopic cholecystectomy. Bas J Surg 2014;20:17-22.
12. Rafi A. Abdominal field block: a new approach via the lumbar triangle. Anaesthesia 2001;56:1024-26.
13. McDonnell JG, Laffey JG. Transversus abdominis plane block, Anesthesia and Analgesia 2007;105(3):883.
14. Baral B, Poudel PR. Comparison of Analgesic Efficacy of Ultrasound Guided Subcostal Transversus Abdominis Plane Block with Port Site Infiltration Following Laparoscopic Cholecystectomy. Journal of Nepal Health Research Council 2018;16(41):457-61.
15. Mulroy MF, Burgess FW, Emanuelsson BM. Ropivacaine 0.25% and 0.5%, but not 0.125%, provide effective wound infiltration analgesia after outpatient hernia repair, but with sustained plasma drug levels. Regional anaesthesia and pain medicine 1999;24(2):136-41.
16. Elamin G, Waters PS, Hamid H, O'Keeffe HM, Waldron RM, Duggan M, *et al*. Efficacy of a laparoscopically delivered transversus abdominis plane block technique during elective laparoscopic cholecystectomy: a prospective, double-blind randomized trial. Journal of the American College of Surgeons 2015;221(2):335-44.
17. Toker MK, Altiparmak B, Uysal AI, Demirbilek SG. The analgesic efficacy of oblique subcostal transversus abdominis plane block after laparoscopic hysterectomy: A randomized, controlled, observer-blinded study. Medicine 2019;98(1).
18. Janjua S, Aslam KZ, Sarfraz S, Qarni A, Niazi W, Sarfraz MB. Comparison of Modified Unilateral Ultrasound Guided Subcostal Transversus Abdominis Plane Block With Conventional Port-Site and Intraperitoneal Infiltration of Bupivacaine for Postoperative Pain Relief in Laparoscopic Cholecystectomy. Pakistan Armed Forces Medical Journal 2019;69(4)800-07.
19. Bava EP, Ramachandran R, Rewari V. Analgesic efficacy of ultrasound guided transversus abdominis plane block versus local anaesthetic infiltration in adult patients undergoing single incision laparoscopic cholecystectomy: a randomized controlled trial. Anaesthesia, essays and researches 2016;10(3):561.
20. Kadam VR, Howell S, Kadam V. Evaluation of postoperative pain scores following ultrasound guided transversus abdominis plane block versus local infiltration following day surgery laparoscopic cholecystectomy-retrospective study. Journal of anaesthesiology, clinical pharmacology 2016;32(1):80.
21. Ortiz J, Suliburk JW, Wu K, Bailard NS, Mason C, Minard CG, *et al*. Bilateral transversus abdominis plane block does not decrease postoperative pain after laparoscopic cholecystectomy when compared with local anesthetic infiltration of trocar insertion sites. Regional Anaesthesia & Pain Medicine 2012;37(2):188-92.
22. Mohammad A, Ahmed A, Messbah WE, Ashraf E. Comparison of Posterior and Subcostal Ultrasound-Guided Transversus Abdominis Plane Block Approaches for Postoperative Analgesia in Laparoscopic Cholecystectomy. The Medical Journal of Cairo University 2018;86:1759-66.