

Ultrasound guided bilateral transversus abdominis plane block versus Trocar site local anaesthetic infiltration for post-operative pain control in patients undergoing laparoscopic appendectomy: A prospective, randomized, open label study

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Abstract

Introduction: Laparoscopic appendectomy even though a minimally invasive surgery can present with a significant post-operative pain. Ideal postoperative pain management is linked with patient comfort, earlier recovery, and opioid consumption reduction. **Aim-** To compare the efficacy of ultrasound guided bilateral transversus abdominis plane block with Trocar site local anaesthetic infiltration for post-operative pain control assessed by VAS scores measured at different intervals in the first 24 hours post operatively. **Materials and Methods** – The present prospective observational study included 60 patients posted for laparoscopic appendectomy was conducted in GITAM medical college. Patients were allocated into two groups by simple randomization technique. Patients in Group A received USG guided TAP block with 20 ml of 0.25% bupivacaine + 4 mg dexamethasone bilaterally, whereas, patients in Group B received trocar site local anaesthetic infiltration with 20 ml 0.25% bupivacaine + 4 mg dexamethasone. VAS scores were recorded for 24 hours at 15 different intervals. P value of <0.05 was considered statistically significant. **Results** – Patients who were given ultrasound guided TAP-block post operatively had significantly lower VAS scores compared to Trocar site local anaesthetic infiltration. Time to first rescue analgesia and total tramadol consumption was also significantly lower in patients receiving ultrasound guided TAP-block when compared to patients receiving trocar site local anaesthetic infiltration. **Conclusion** – Ultrasound guided TAP-block proved to be significantly more effective in providing postoperative analgesia with longer time to first rescue analgesia requiring lesser dose of opioids when compared to trocar site local anaesthetic infiltration.

Keywords: TAP block, Trocar site infiltration, Bupivacaine, Ultrasound blocks, Laparoscopic appendectomy.



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INTRODUCTION

Compared to traditional open surgeries laparoscopic surgeries have an advantage of being minimally invasive, reduced post-operative morbidity and less postoperative pain. (1) By reducing or eliminating post operative pain for the patient we can minimize discomfort which in turn helps in early ambulation and recovery from surgery.

Pain associated with laparoscopic surgeries are often underestimated because of minimally invasive key hole entry even though the post-operative pain scores suggest otherwise. (2) Post operative pain can be relieved by the usage of analgesics (opioids in particular), carbon dioxide drainage and intra peritoneal local anaesthetics (3,4)

Peripheral nerve blocks and wound site infiltration have also been suggested, especially when there are contraindications for opioids.

Transversus abdominis block can be used for post operative pain management for abdominal wall procedures. Local anaesthetic drug is deposited between the internal oblique and transversus abdominis muscle which contain thoracolumbar nerves T6 to L1. (5) TAP interfascial plane contains the intercostal, subcostal, iliohypogastric, and ilioinguinal nerves, its blockade provides somatic analgesia to the anterior and lateral abdominal walls. Trocar site local anaesthetic infiltration is done around the port site incisions. Laparoscopic appendectomy typically requires 3 ports, One camera

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port and two working ports. Local anaesthetic port site infiltration has been shown to provide early post-operative pain control in laparoscopic surgeries.

MATERIALS AND METHODS

This is a hospital based prospective, randomized, open label study which was conducted at Gitam institute of medical sciences and research, Visakhapatnam. The institutional ethics committee has reviewed and approved the study prior to conduct this study. Oral and written informed consent were obtained from all the patients willing to participate in this study.

Inclusion criteria: Patients posted for laparoscopic appendectomy between the age 20 and 60 with ASA physical status 1 or 2.

Exclusion criteria: Patients who refused, Allergic history to local anaesthetics, Coagulopathies, local infection, history of previous abdominal surgery that could alter anatomical landmarks, chronic pain conditions and severe hepatic or renal impairment.

Procedures and Intervention

Patients were allocated into two groups by simple randomization technique. Patients in Group A received USG guided TAP block with 20 ml of 0.25% bupivacaine + 4 mg dexamethasone, bilaterally. Patients

in Group B received trocar site local anaesthetic infiltration with 20 ml 0.25% bupivacaine + 4 mg dexamethasone. VAS scores were recorded for 24 hours at 15 different intervals.

All patients in the study underwent general anaesthesia as per institutional protocol. After surgery was completed and before extubating the patient participants were given either bilateral ultrasound guided TAP block with 20 ml of 0.25% bupivacaine + 4mg dexamethasone or were given local anaesthetic at trocar site with 20 ml of 0.25% bupivacaine.

Pain assessment was done using a visual analogue scale at 15 different intervals, immediate post operative, at 30 min, 1 hr, 2 hr, 3 hr, 5 hr, 7 hr, 9 hr, 12 hr, 14 hr, 16 hr, 18 hr, 20 hr, 22 hr, 24 hr. VAS scored from 0 to 10, where 0 was given for no pain and 10 for worst pain imaginable. If pain score reported was above 3, rescue analgesia was given and this time was noted as time to rescue analgesia.

Post operatively all patients were given Inj paracetamol 1gm IV BD, Inj Tramadol 100mg was given in 100ml NS if patient reported pain above 3 on VAS. Post operative VAS scores were compared between the groups as a primary objective and time required for rescue analgesia and total opioid consumption was secondary objective of the study.

RESULTS

Table 1 - Demographic characteristics

	Group A		Group B		p-value
	Mean	SD	Mean	SD	
Age	43.53	7.64	40.70	7.76	0.160
Height	158.97	7.95	160.63	8.83	0.445
Weight	65.03	8.69	68.00	9.73	0.218

Both groups were comparable in Demographic characteristics including Age, height and weight with no statistically significant differences ($p>0.05$), indicating well-matched study groups.

Table 2 – VAS scores

VAS	Group-A		Group-B		p-value
	Mean	SD	Mean	SD	
Post OP	1.13	0.35	1.33	0.48	0.069
30 min	1.00	0.00	1.50	0.51	< 0.001
1 hr	1.03	0.18	2.23	0.43	< 0.001
2 hr	1.07	0.25	2.23	0.43	< 0.001
3 hr	1.53	0.51	2.33	0.48	< 0.001
5 hr	2.17	0.38	2.57	0.50	< 0.001
7 hr	2.17	0.38	3.43	0.50	< 0.001
9 hr	2.60	0.62	4.43	0.50	< 0.001
12 hr	2.93	0.74	5.27	0.45	< 0.001
14 hr	3.77	0.68	5.53	0.51	< 0.001
16 hr	3.93	0.69	6.37	0.49	< 0.001
18 hr	4.20	0.66	6.33	0.48	< 0.001
20 hr	4.67	0.55	6.33	0.48	< 0.001
22 hr	4.67	0.55	6.27	0.45	< 0.001
24 hr	5.53	0.51	6.30	0.47	< 0.001

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Postoperative pain was assessed using VAS. Group A consistently reported lower pain scores at all measured intervals from 30 minutes, reflecting better postoperative analgesia with statistically significant values.

Table 3 – Time to rescue analgesia

	Group-A		Group-B		p-value
	Mean	SD	Mean	SD	
Time to rescue analgesia (min)	686.37	51.29	401.67	30.37	< 0.001

Group -A showed statistically significant values compared to group-B. Group-B patients has higher pain scores needing rescue analgesics earlier than group A

Table 4 – Total tramadol consumption

	Group-A		Group-B		p-value
	Mean	SD	Mean	SD	
Total Tramadol consumption (mg)	153.3	50.74	233.33	47.95	< 0.0001

Group-A showed statistically significant values compared to group-B. Total tramadol consumption was also higher in group -B

DISCUSSION

The Transversus Abdominis Plane block, a inter fascial plane block, provides analgesia to the anterior and lateral abdominal wall and significantly decreases postoperative pain in laparoscopic surgeries. Rafi et al (5) and McDonnell et al (6) were first to describe this abdominal field block. Studies have shown that lack of effective control of post-operative pain can result in adverse physiological effects and also can end in chronic pain. (7) Various methods to relieve post operative pain can be by the usage of opioids, TAP block, trocar port site infiltration carbon dioxide drainage, intra peritoneal instillation of local anaesthetics among which TAP block and trocar port site infiltration was compared in the present study. (8) Our study compared post operative analgesia with VAS scores between ultrasound guided TAP block and Trocar site local infiltration method.

Ultrasound guidance helps in clearly demarcating the anatomy which increases margin of safety, helps deposition of drug under direct visualisation and decreases the volume of drug needed for effective blockade of the nerves. (9) Trocar site infiltration has advantages of being safe, simple and of low cost and has been shown to produce desired analgesia in patients posted for laparoscopic cholecystectomy surgeries as shown by Nazir AK et al. (10) in a previous study.

Bupivacaine was used at a concentration of 0.25% in our study. Study conducted by Prabhu et al (11) compared concentration of bupivacaine at 0.125% and 0.25% for duration of action and pain scores in hernia patients who have been given ultrasound guided TAP block as post-operative analgesia. Their study concluded while pain scores were similar between the groups, 0.25% bupivacaine concentration improved the duration of

analgesia for significantly longer period (Group 0.125% - 355.67 ± 118.88 min and Group 0.25% - 635.73 ± 195.58 min; $P < 0.05$) while there were no complications noted in either group.

In our study pain scores were evaluated using a visual analog scale, recordings were made at 15 intervals from immediate post operative to 24 hours from the time of shifting to post operative care unit. In the immediate post-operative period, the VAS scores between the group were not statistically significant which could be due to residual analgesia from the use of intraoperative opioids. In the post anaesthesia care unit, the rest of the scores were statistically significant between the groups at all the time intervals measured. This result is consistent with studies done by Kadam p et al (12), Suseela I et al (13). This supports the use of ultrasound guidance to achieve classical or posterior TAP block which helps in clear visualisation and deposition of drug in the TAP plane. This result is not in congruence with studies done by Kadam VR et al (14) and Ortiz J et al (15) which did not show any improvement in post operative pain scores between USG TAP block and port site infiltration. This could be because of the use of a classical/posterior approach TAP block in patients undergoing laparoscopic cholecystectomy which requires blockade of upper thoracic dermatomes (T6) to cover analgesia for epigastric port.

In addition to ultrasound TAP block and port site infiltration patients received 1gm paracetamol IV BD, for breakthrough pain or when patients experienced pain ≥ 3 on VAS, 100mg tramadol was given in 100ml NS. Time to first rescue analgesia was noted in both groups and it was found to be statistically significant. In patients

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who received USG guided TAP block time for rescue analgesia was 686.37 ± 51.29 minutes, in patients who received trocar port site infiltration time for rescue analgesia was 401.67 ± 30.37 minutes. The results were statistically significant with p value < 0.001 . This result was consistent with studies done by Saxena R et al (16) and Tolchard S et al (17) showing better analgesia in USG TAP block group.

In our study total tramadol usage was calculated for the first 24 hours and is found to be statistically significant. In group which received USG TAP block the total usage (mg) was 153.3 ± 50.74 , whereas in group which received trocar port site infiltration the total usage was 233.33 ± 47.95 . This result was consistent with studies done by Kadam P et al (12) and Sussela I et al (13). This helps decrease usage of opioids in the post-operative period and thereby alleviating all the associated side effects with opioid usage for analgesia.

LIMITATIONS

1. Single centre study.
2. USG TAP block if given pre operatively would have helped with intraoperative pain and decrease of opioid requirement intraoperatively.
3. use of paracetamol in post operative period could also have led to decrease in opioid usage.
4. overall patient satisfaction scale assessment was not done in this study.

CONCLUSION

USG guided bilateral Transversus abdominis plane block is effective and superior to Trocar port site infiltration in providing post operative analgesia in patients undergoing laparoscopic appendectomy. TAP block provided longer duration of action, better VAS scores and less consumption of opioids in comparison with patients who received trocar port site infiltration.

CONFLICT OF INTEREST: None to declare

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