Original Article

Evaluation of postoperative pain scores following ultrasound guided transversus abdominis plane block versus local infiltration following day surgery laparoscopic cholecystectomy-retrospective study

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Abstract

Background and Aims: Postoperative pain for day surgery laparoscopic cholecystectomy has traditionally been managed with the surgeon infiltrating the wound with local anesthetic (LA). However, transversus abdominis plane (TAP) block has recently been used, although its superiority over LA remains uncertain. The primary aim was to compare LA and TAP block pain scores and analgesia used. The secondary aim was to assess satisfaction score and cost.

Material and Methods: This retrospective study was commenced after ethics committee approval and ANZ clinical trial registry (ACTRN: 12612000737831). The data were collected from the theatre database and medical records of patients presenting for day case laparoscopic cholecystectomy. The sample included patients who received either bilateral port site LA infiltration with 20 ml of 0.25% Bupivacaine or bilateral TAP block with 20 ml of 0.5% ropivacaine and fentanyl postoperative pain protocol. The patients with incomplete medical records were excluded as were those admitted to an inpatient ward. Demographics and clinical characteristics were obtained from the hospital record along with pain score and postsurgery analgesia use. Postoperative pain satisfaction scores were collected by telephonic interview 30-180 days postsurgery.

Results: Of 51 patients analyzed, 19 were in TAP group 29 in LA group. There were no significant differences between the LA and TAP groups with respect to postoperative pain scores ($P = 0.31$) or patient satisfaction scores (1 and 2+) ($P = 0.36$). However, fentanyl consumption in the recovery room was significantly lower in TAP group ($P = 0.0079$.). The consumables cost were >3 times higher in the TAP when compared to LA group.

Conclusion: The performance of the TAP block with respect to pain management was comparable to LA. However, LA remains more cost effective.

Key words: Cholecystectomy, postoperative pain, transversus abdominis plane block

Introduction

Previous studies have demonstrated the efficacy of transversus abdominis plane (TAP block) in providing adequate postoperative analgesia for up to 24 h after lower abdominal surgery.[1-8] Laparoscopic cholecystectomy is associated with moderate postoperative pain in the early postoperative period, and multimodal analgesia approach may be necessary.[9-11] For day care surgical procedures, pain and issues with surgery and anesthesia may prevent same-day discharge. Postoperative pain treatment with opioids increases the likelihood of side effects such as nausea and sedation. Recently the surge in use of TAP block, which may provide up to 24 h of analgesia, promises to be an interesting analgesic option.[4,10,12]

However, it has been questioned whether a TAP blockade at the umbilical level can provide analgesia in an upper abdominal surgical procedure such as laparoscopic cholecystectomy.

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Conflicting results are evidenced from studies on TAP versus local anesthetic (LA) to treat postoperative pain for laparoscopic cholecystectomy.[13,14] A recent review showed no significant difference in clinical outcomes between these two techniques but TAP block reduces pain scores.[15]

The aim of this study was to investigate the effect of LA infiltration and TAP block on postoperative pain, opioid consumption and subsequent side effects. The secondary outcome was quality analysis by doing patient satisfaction and cost in these two methods.

Material and Methods

The study was approved by The Ethics Committee and registered at the clinical trial registry. (ACTRN: 12612000737831). In this retrospective study, the data were collected from hospital theatre database and medical records for the years 2011-2012. The sample included day surgery patients who underwent a laparoscopic cholecystectomy and who met the following inclusion and exclusion criteria.

Inclusion criteria

Aged 18-84 years, had laparoscopic cholecystectomy via day surgery during December 2011-May 12, receiving either LA infiltration with 20 mL 0.25% bupivacaine or bilateral subcostal TAP block with 20 mL 0.5% ropivacaine on each side.

Exclusion criteria

Patients who had other modality of pain relief and patients whose records were incomplete.

The primary outcome was pain scores and fentanyl analgesia used as indicated in the recovery record. As per our institutional protocol, pain management includes fentanyl 20 mcg/3 min bolus for 15 min then oxycodone 5-10 mg. The pain scores recorded were on numerical rating scale, many times but two documented scores, the first on arrival to the recovery and second after 1 h in recovery. Other analgesics given were intravenous paracetamol 1 g and paracoxib 40 mg. The quality of pain provided by each technique used was assessed 30-180 days after surgery by telephone using a Likert satisfaction scale (satisfaction score rating on scale of 1-4 as follows: Completely relieved; 2. relieved; 3. somewhat relieved; and 4. not relieved). The cost involved in managing pain relief was calculated based on the consumables used. Any side effects like nausea and vomiting noted in the recovery records were noted.

Table 1: Demographic characteristics and PACU time

Patient characteristics	LA		TAP		*P*
	Mean	SD	Mean	SD	
Age	45.42	16.30	44.37	13.95	0.97
Weight	88.03	25.88	83.39	20.96	0.59
PACU (time) (min)	97.03	68.68	103.05	68.13	0.82

SD: Standard deviation, LA: Local anesthetic group, TAP: Transversus abdominis plane block group, PACU: Post anesthesia care unit

Statistical analysis

Continuous variables were summarized using means and standard deviations. The Student's *t*-test or Wilcoxon (Mann-Whitney) was used to assess group differences. Dichotomous measures were reported as percentages and were assessed using the Pearson's Chi-square statistic or Fisher's Exact test.

Results

120 patients assessed for the year 2012. Of these, 39 patients did not fulfil the inclusion criteria, and 30 had incomplete data. The remaining 51 patients were included in the analysis, with 19 patients in the TAP group, and 29 in the LA group. The groups did not significantly differ in terms of age, sex, weight or postanesthesia care unit time [Table 1].

There were no significant differences between the LA and TAP groups with respect to postoperative pain scores [Table 2] ($P = 0.31$) and patient Likert scale of 1-4 satisfaction scores [Table 3] ($P = 0.36$). Majority of them were scores of 1 and 2. Mean fentanyl consumption in the recovery room was significantly higher in the LA group compared to TAP group ($P = 0.0079$) [Table 2] although recovery room oral oxycodone consumption did not differ between the groups [Table 2] ($P = 0.66$). Consumables cost for the TAP block were more than three times that for LA group [Table 4].

Discussion

In this study, the performance of TAP block was equivalent to LA infiltration technique at least in terms of pain scores and satisfaction scores. Mean fentanyl consumption in the

Table 2: Postoperative outcomes

Pain score and analgesia	LA		TAP		*P*
	Mean	SD	Mean	SD	
Pain recovery 1 (on arrival in recovery)	2.93	3.07	2.47	2.44	0.77
Pain recovery 2 (one hour post arrival in recovery)	3.00	2.17	3.67	2.20	0.31
Fentanyl in recovery (mcg)	86.90	73.97	33.16	54.17	0.0079
Oral oxycodone (mg) in recovery	7.41	4.93	7.89	4.51	0.66

LA: Local anesthetic group, TAP: Transversus abdominis plane block group, SD: Standard deviation

Table 3: Demographic characteristics, nausea, vomiting and satisfaction scores

Patient characteristics	*n* (%)	*n* (%)	*P*
Sex			
Female	20 (68.97)	16 (84.21)	0.32
Male	9 (31.03)	3 (15.79)	
Satisfaction score			
1	16 (55.17)	13 (68.42)	0.36
2+	13 (44.83)	6 (31.58)	
Nausea vomiting			
No	19 (70.37)	17 (89.47)	0.16
Yes	8 (29.63)	2 (10.53)	
Difficult surgery			
No	18 (62.07)	9 (47.37)	0.32
Yes	11 (37.93)	10 (52.63)	

recovery room was significantly higher in the LA group when compared to TAP group though the oral oxycodone consumption was not significant. Nonconsumable factors like time spent by medical personnel were not considered in this study.

These observations are consistent with the findings reported elsewhere. For instance, Ortiz *et al*. found that bilateral ultrasound-guided TAP block was equivalent to LA infiltration technique in a prospective randomized trial in patients undergoing laparoscopic cholecystectomy.[13]

We found the fentanyl consumption in the recovery room was significantly lower amongst patients in the TAP group. However, it is possible that fentanyl consumption represents a more objective marker of postoperative pain than the pain scores on the hospital record, and if this were the case, then the superiority of TAP block over LA would be clearly demonstrated. This is consistent with the recent review showing reduced pain and analgesia with TAP block.[15]

In our study, both TAP block and LA infiltration were performed postprocedure. Studies report an additional reduction in use of intraoperative opioids if TAP block is instituted preoperatively.[16-18] The preoperative TAP block resulted in a 63% reduction of intraoperative analgesic requirement and a 54% reduction in early postoperative analgesic requirements in one study,[4] while a second study reported 44% reduction in intraoperative opioid consumption (remifentanyl) but no clinically significant reduction in postoperative opioid consumption.[9]

Transversus abdominis plane block results in substantially higher consumables costs when compared to LA infiltration. However, other costs have not been considered, including theatre and surgeon cost and costs associated with inpatient admission resulting from persisting pain. It's not clear whether the cost differential would persist once these additional costs were included.

Table 4: Cost analysis

Product	LA group	Tap block
	Cost (INR)	Cost (INR)
Sterile disposable tray, ultrasound sleeve, gel	0.00	2519.00
Gloves, gown and preparation	1045.50	574.00
Epidural 18 g needle	0.00	1125.00
23 gauge needle and syringes	13.00	24.00
Bupivacaine	223.00	223.00
Total	1281.00	4465.00

INR: Indian rupees

In previous studies where TAP and LA were compared using either posterior or subcostal approach TAP blocks, sensory assessment was demonstrated.[13,14] The former approach may not be sufficient to reach sensory dermatomes to cover analgesia for portal incisions in the subcostal regions. Although the latter approach covers analgesia, which had reduced recovery time and pain score, but the studies used other oral analgesics like Tramadol and Codeine. Furthermore nausea and vomiting (NV) were not recorded despite the fact that these may contribute to recovery discharge time in the TAP group. Our study didn't found any differences in NV between the groups. We recommend a prospective randomized study comparing posterior TAP or rectus sheath block and subcostal TAP block with LA infiltration technique to determine its efficacy.

Limitations of Study

Transversus abdominis plane block is compartmental and the dose required was more in comparison to LA group, hence dose variability may cause a considerable difference. In addition surgeon practice is limited to bupivacaine and anesthetist doing TAP block using ropicavcaine, hence drug variation can differ. The time duration for LA infiltration and TAP block were not available in the medical records. The pain scores were only two readings taken and dynamic pains scores (coughing) would have been valuable. There was no documentation of sensory assessment that may be vital in assessing whether the block was successful block rather than just assuming it was working. Satisfaction scores assessment time varied from 30 to 180 days, which may have a chance of bias.

Conclusion

The performance of the LA technique was comparable to the bilateral TAP block in respect to pain scores amongst patients

presenting for day surgery laparoscopic cholecystectomy. The fentanyl consumption may favor TAP block. However, the LA procedure was more cost effective.

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