Erector Spinae Plane (ESP) block as an Analgesic Alternative in Patients Undergoing Laparoscopic Cholecystectomy: A prospective Randomized Controlled study

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Abstract

Background: Laparoscopic cholecystectomy (LC) became a widespread procedure with less invasive technique for treatment of gallbladder diseases. LC is associated with moderate to severe pain despite all currently available conventional analgesic regimes. Erector Spinae Plane (ESP) block is reported to lead to analgesic effect on somatic and visceral pain.

Objectives: evaluate the role of ESP block in control of post-operative pain following laparoscopic cholecystectomy and decrease the need to opioids and avoid their complications particularly postoperative nausea and vomiting (PONV), decrease duration of both Postanethestic care unit (PACU) and hospital stay.

Patients and methods: This was a prospective clinical trial involved 60 adult patients divided into Group E (ESP group) received ultrasound guided ESP block and Group C (control group) received conventional analgesia with general anesthesia for both groups. Postoperative pain was measured using the Visual Analogue Scale (VAS), and postoperative opioid consumption and PONV and other complications, and duration of stay in both PACU and hospital all were recorded.

Results: There was a significant decrease in group E when compared to group C regarding Follow up VAS score through the first day post-operative ($p < 0.05$). We found more opioid consumption in group C with mean 13.40±5.83 in comparison to a mean 2.40±4.05 for group E ($P<0.05$).Also results show less stay time in PACU or in hospital in group E with mean of 2.43± 0.504 hour and 2.27± 0.450 day respectively in comparison to group C.

Conclusion: ESB provided better pain control, less opioid consumption and also less PACU and hospital stay than control group.

Keywords: ESP; Postoperative Pain; opioid; Laparoscopic Cholecystectomy.

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Introduction

The favored therapy for gallbladder diseases rapidly changed to laparoscopic cholecystectomy (LC) instead of open cholecystectomy **(El Nakeeb et al., 2017)**. Laparoscopic cholecystectomy (LC) is associated with moderate to severe pain despite all currently available multimodal analgesic regimes **(Kehlet and Dahl, 1993)**.

In addition to somatic pain from the trocar entry incisions, peritoneal distention and diaphragm irritation due to high intra-abdominal pressure and CO2 insufflations lead to visceral pain **(Oksar et al., 2016)**. LC has clearly displaced open cholecystectomy (OC) in the management of simple biliary lithiasis. It is a safe, valid alternative to OC in patients with cholecystitis. The technique has a low rate of complications, implies a shorter hospital stay, and offers the patient a more comfortable postoperative period than OC **(Lujan et al., 1998)**.

The analgesic regimen for postoperative pain usually includes paracetamol , NSAIDs and opioids **(Bisgaard ,2006)**.The opioid epidemic side effects (sedation, respiratory depression, constipation, delayed patient mobilization) has led perioperative physicians to find a way of decreasing the use of opioids **(Benyamin et al., 2008**).

Ultrasound guided ESP block is a regional anesthesia technique. Erector Spinae Plane (ESP) block is reported to lead to analgesic effect on somatic and visceral pain by affecting the ventral rami and rami communicants that include sympathetic nerve fibers, as LA spreads through the paravertebral space **(Forero et al., 2016).** We hypothesized that ESP can effectively be used as an analgesic alternative for LC.

Patients and methods

This was a prospective randomized controlled clinical trial conducted at Qena University Hospital in duration from April 2023 to April 2024.

The eligibility criteria for inclusion encompassed inclusion criteria for adult patients between age of 18 and 60 years old , ASA class I & II patients , Informed written consent, Both males and females . Exclusion criteria: Patients who refused to consent, patients younger than 18 and older than 60 years old, patients ASA class > class II, patients with coagulopathy, allergy to local anesthetics, chronic pain conditions and drug abuse.

As detailed in the below flow chart **(Fig.1)**, sixty adult patients admitted for laparoscopic cholecystectomy were involved in the study. Randomization was done through a computer based randomization system and patients were assigned into one of two groups:

- Group E (n=30): ESP group received ultrasound guided ESP block
- Group C (n=30): control group received conventional analgesia.

All patients admitted to Operating Room (OR) and baseline heart rate (HR) and mean arterial blood pressure (MAP) recorded.

In both of group C and group E, induction of general anaesthesia was done by intravenous propofol (2mg /kg), atracurium (0.5 mg/kg), fentanyl (1 mcg/kg) , then endotracheal intubation was done and anasthesia maintained by inhalational isoflurane MAC 1.2. In both groups patients received analgesia in the form of IV Paracetamol and Diclofenac potassium.

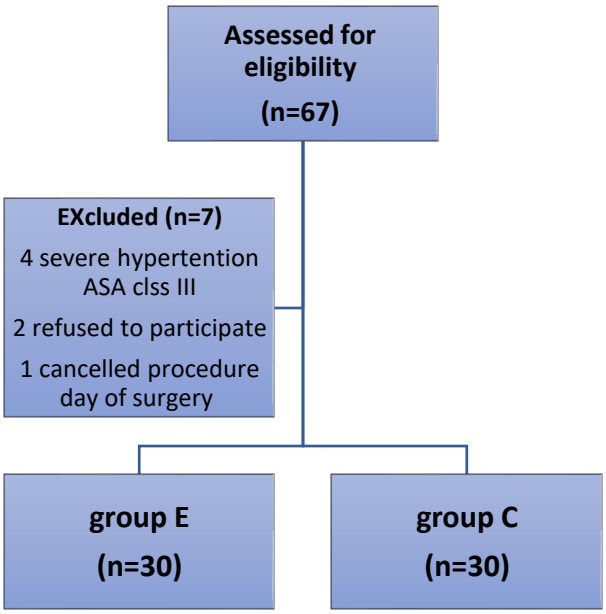

Fig 1. Flow chart for the two groups of the study and assessment of their eligibility

Patients in group E were prepared to receive a bilateral ultrasound guided ESP block. After skin sterilization and draping , T8 spinous process was identified by superficial ultrasonographic prope , Visualising the needle in-plane along its entire length, when it came in contact with the transverse process, 1 ml of anaesthetic solution was injected. To ensure hydro-dissection of the interfacial plane between the erector spinae muscle and the transverse process. Then, 20 ml of bupivacaine 0.5% in 5 ml aliquots was injected which was done bilaterally. Patients were monitored intra-operatively every 15 minutes with (MAP, HR) till the end of operation, and post-operative were recorded every 15 minutes in the Post Anesthetic Care Unit (PACU) until discharge from PACU when modified Aldrete Score was ≥9 **(Aldrete ,1995**).

Effectiveness of analgesia was evaluated postoperatively every 4 hours in the first 24 hours in the form of: first analgesic requirement, pain sensation level according to Visual Analogue Score (VAS) **(McCormack ,et al. 1988)**, opioid consumption (6 mg Nalbuphine is given per bolus when VAS score > 3), Post-Operative Nausea and Vomiting (PONV) were recorded in addition to complications like pruritus and urinary retention ,etc. The duration of stay in both PACU and hospital were recorded.

The primary outcome of the study is to assess analgesic effectiveness of ESP block in controlling post-operative pain following laparoscopic cholecystectomy. Secondary outcomes include evaluating ESP block ability to achieve intraoperative hemodynamic stability, decrease the need to opioids postoperatively and their side effects, early discharge from PACU and decrease the length of hospital stay.

Ethical code of the study: SVU-MED-APID-1-24-8-925

Statistical analysis

Data is depicted through either the utilization of mean and standard deviation (qualitative data representation) or numerical values and percentages (quantitative data representation). Group comparisons were conducted using the Chi-Square test or Ficher exact test for quantitative data, the Mann-Whitney U test for continuous data that did not adhere to normal distribution, and the Student's t-test for continuous data that adhered to normal distribution. Statistical significance was

established at a significance level of less than 0.05.

Results

Demographic data are represented in **(Table.1)** for both groups in the previous table show nearly same mean age for both groups with mean age 39.2 and 40.13 years old or group E and group C respectively .Also no significant difference in weight between two groups with mean 79.93 ± 9.11 in group E and mean 78.13 ± 9.39 for group C (p value > 0.05). The females represent 76 % of group E and 83 % of group C and males represent 23 % of group E and 16% of group C . There was no significant different between ages of the two groups or number of females or males between two groups (p value > 0.05).

Table 1. Demographic data of included subjects in both groups

Variables	Group E (N = 30)	Group C (N = 30)	P value
Age (Years)	39.21± 9.167	40.13± 9.702	0.687
Sex			
• Female	23 (76%)	25 (83%)	0.519
• Male	7 (23%)	5 (16%)	
Weight	79.93 ± 9.11	78.13 ± 9.39	0.815

The mean arterial pressure baseline parameters and heart rate are recorded preoperatively in **(Table.2)** and show us the MAP of group E is 73.60±10.4 and 75.77± 9.3 for group C. The HR baseline for group E is 75.87± 10.1 and 74.40 ± 10.047 for group C which shown in **(Fig.2).** There was no significant difference between two groups observed regarding the baseline of MAP and HR of both groups.

Table 2. Baseline (Pre-Operative) assessment of included subjects in both groups.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
Mean Arterial Blood Pressure(MAP)	73.60±10.401	75.77± 9.302	0.399 [t]
HR (Beat/min.)	75.87± 10.126	74.40 ± 10.047	0.575 [t]

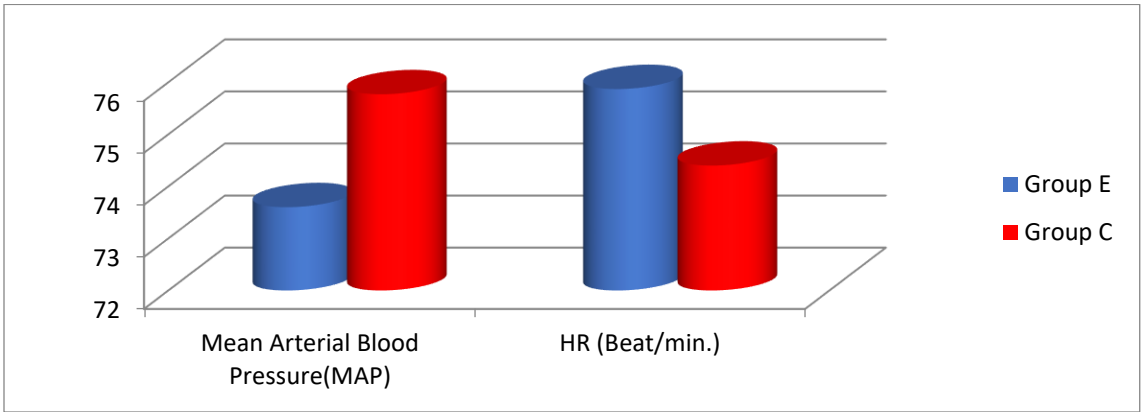

Fig.2. Baseline (Pre-Operative) assessment of included subjects in both groups

(Table.3) discuss the data recorded for intraoperative mean HR for both groups and show us a trend with decrease in HR throughout the time of operation in group E compared to group C with statistically significant difference between two groups except in the initial data recorded in first 30minutes show no statistically significant difference with slight elevation in HR in the initial settings.

Table 3. Intra-Operative HR of included subjects in both groups.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
15 min.	88.00±11.259	88.93± 7.978	0.712
30 min.	80.43± 11.572	88.63± 8.223	0.002*
45 min.	79.47± 10.947	88.30± 8.730	0.001*
60 min.	78.93± 10.382	86.87± 8.669	0.002*
75 min.	79.00± 10.706	86.00± 9.025	0.008*
90 min.	79.47 ± 8.901	86.33± 8.709	0.005*
105 min.	78.61± 9.024	86.38± 9.510	0.008*
120 min.	76.14± 9.239	84.80± 10.234	0.024*

The first 15 minutes of operation mean HR 88.00±11.259 and 88.93± 7.978 in group E and group C respectively . The 60 minutes mean HR recorded are 78.93± 10.382 and 86.87± 8.669 for group E and group C respectively and shown in **(Fig.3).**

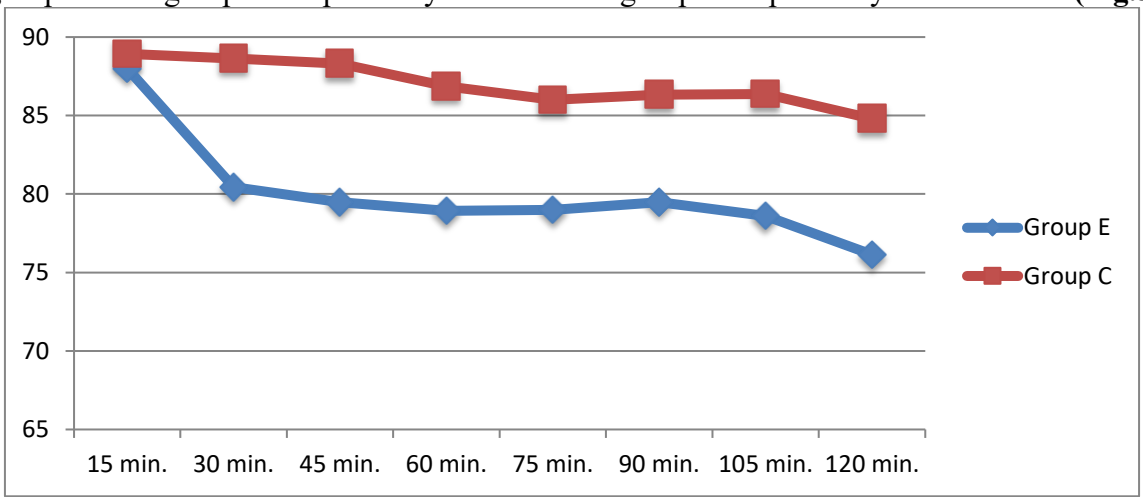

Fig.3. Intra-Operative HR of included subjects in both groups

MAP was recorded intra-operatively in **(Table.4)** and data showed a trend of decrease in MAP throughout the operation time with significant difference between two groups with more decrease in E group than C group except of first 15 minutes recordings and the 120 minutes .

Table 4. Intra-Operative MAP of included subjects in both groups

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
15 min.	81.40±11.717	86.47± 9.479	0.071
30 min.	80.07± 11.326	87.67± 9.925	0.008*
45 min.	78.87± 12.122	86.70± 8.730	0.007*
60 min.	78.83± 10.436	85.20± 9.915	0.019*
75 min.	76.57± 10.549	83.33± 9.382	0.011 *
90 min.	76.40± 9.922	83.30± 10.539	0.014*

105 min.	76.64± 10.367	83.86± 10.026	0.025 *
120 min.	75.00± 10.266	82.27± 10.103	0.065

The MAP show mean values in first 15 minutes 81.40 ±11.717 and 86.47± 9.479 for group E and C respectively. The 60 minutes recordings show mean of 78.83± 10.436 and 85.20± 9.915 for group E and C as shown in **(Fig.4).**

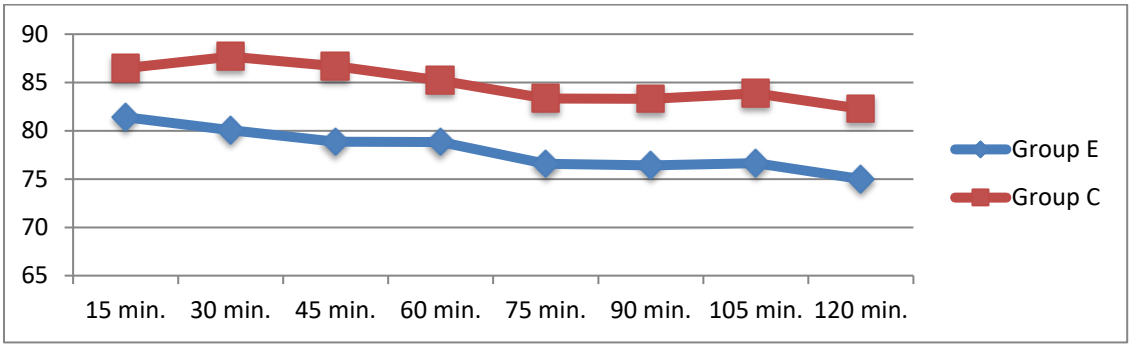

Fig.4. Intra-Operative MAP of included subjects in both groups

In **(Table.5)** we discuss post-operative vital signs follow up regarding the HR and MAP . There are decrease in HR and MAP readings with statistically significant difference between two groups except in readings associated with MAP in first 15 minutes show no statistically significant difference between two groups .

Table 5. Post-Operative HR and MAP of included subjects in both groups

Variables	Group E (N = 30)	Group C (N = 30)	P VALUE
HR			
• **15 MIN**	83.83±10.879	89.37±9.733	0.042*
• **30 MIN**	79.77 ± 9.856	86.23±9.504	0.012*
MAP			
1. 15 MIN	81.43±9.786	85.97± 9.193	0.070
• **30 MIN**	77.87± 9.594	83.57 ±10.04	0.028*

The MAP in first 15 minutes post-operative recorded mean of 81.43±9.786 and 85.97± 9.193 respectively as shown in **(Fig.5).**

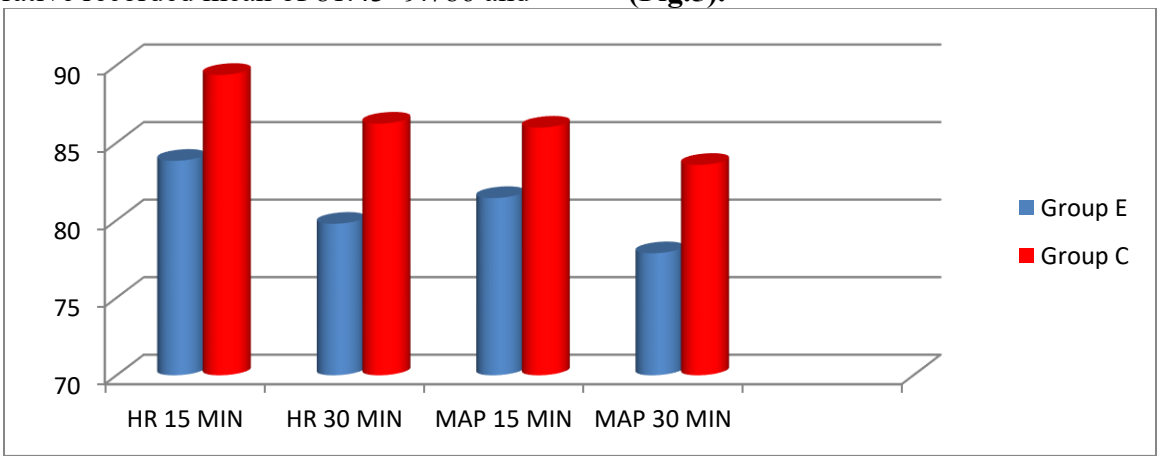

Fig.5. Post-Operative HR and MAP of included subjects in both groups

In this statistical analysis of this paper we recorded the number of patients needed a rescue analgesia in the form of 6 mg Nalbuphine as bolus dose as shown in **(Table.6)** . There was increase of number of patients who received RA in group C than group E with statistically significant difference between two groups in first 30 minutes , 2 hours , 4 hour and 8 hour later. In the first 30 minutes post-operative there was 26 patient of group C needed and received a rescue analgesia .In 8 hour later and in 12 hour later 10 then 3 cases in group C needed RA respectively in comparison to no cases needed a RA in group E from 8 hour postoperative till the end of the day of follow up of the patients . Also data illustrate that 13 of patients in group E needed a RA in the first 30 minutes postoperative then most of them show no need for another RA throughout the rest of the 24 hour follow up. In group C, most of them required RA in the first 30 minutes (26 cases) and the group showed a trend of increasing the RA up to 12 hour postoperative .

Table 6. Follow up number of cases who received Rescue Analgesia (RA) throughout the time of 24 hour postoperative and first time of RA of included subjects in both groups.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
Rescue analgesia through time and first time of RA of included subjects in both groups.			
• **30 MIN**	10 (33.3%)	26 (86.7%)	<0.000*
• **2 HOUR**	1 (3.3%)	17 (56.7%)	<0.000*
• **4 HOUR**	1 (3.3 %)	11 (36.7%)	0.001*
• **8 HOUR**	0	10 (33.3%)	0.001*
• **12 HOUR**	0	3 (10%)	0.076
• **16 HOUR**	0	0	-
• **20 HOUR**	0	0	-
• **24 HOUR**	0	0	-

In **(Table.7)** we calculated the total dose of opioid consumption in the form of 6 mg Nalbuphine as bolus dose as RA throughout the postoperative 24 hour follow up and we found statistically difference between the two groups with more opioid consumption in group C with mean 13.40±5.83 in comparison to a mean 2.40±4.05 for group C (P<0.05).

Table 7. Total dose of opioid consumption in 24 hour postoperative.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
Total dose of opioid consumption	2.40±4.05	13.40±5.83	0.034*

(Table.8) show statistical significant difference between two groups in VAS score recorded for both groups throughout most of the postoperative 24 hour follow up . There was observed decrease in group E score recordings from 4 h postoperative with mean 0.33±0.922 in comparison to 2.90± 1.54 for group C with continue the trend of significant difference between two groups till end of follow up .

Table 8. Follow up VAS score of included subjects in both groups.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
30 MIN	3.37± 1.450	5.93± 1.39	0.512
2 h.	1.57± 1.104	3.93± 1.112	0.928
4 h.	0.33±0.922	2.90± 1.54	0.002*
8 h.	0.10± 0.403	2.27± 1.721	<0.0001*
12 h.	0.07± 0.365	1.17± 1.464	<0.0001*
16 h.	0.03± .183	0.50± 0.78	<0.0001*
20 h.	0	0.1 ± 0.403	0.006*
24 h.	0	0	-

Observed data collected from the associated post-operative side effects and complications show increase in number of patients developed nausea , urinary retention in groups C with statistically significant difference between two groups as shown in **(Table.9).** There was a 26 case developed nausea in group C in comparison to 13 case in group E that may be related to the increase in total amount of opioids which these patients received postoperative .

Table 9. Follow up complications associated with included subjects in both groups.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
Nausea	13(43.3 %)	26 (86.7%)	<0.0001*
Vomiting	1(3.3%)	5(16.7%)	0.085
Pruritus	3(10%)	8(26.7%)	0.095
Urinary Retention	3(10%)	12(40%)	0.007*

Here in **(Table.10)** we recorded data of time of period stay in PACU and Hospital till time of discharge and show less stay time in PACU or in the hospital in group E with mean of 2.43± 0.504 hour and 2.27± 0.450 day respectively in comparison to mean PACU in group C 3.43 ± 0.77 hour and hospital stay mean of 3.20±0.76 day.

Table 10. Duration of long stay period in PACU presented in hours and hospital stay period presented in days of included subjects in both groups.

Variables	Group E (N = 30)	Group C (N = 30)	P. Value
Stay length in PACU (hour)	2.43± 0.504	3.43±0.774	<0.0001*
Stay length in hospital (day)	2.27±.450	3.20±0.761	<0.0001*

Discussion

The effectiveness of certain regional anesthetic procedures in reducing pain while reducing the adverse effects of systemic analgesics has drawn attention in recent years. The ESP block has become one of the more promising adjunctive methods among them. The benefits of using the erector spinae block in this surgical setting are examined in this conversation, with a focus on how it can lessen postoperative discomfort and the need for opioids. Our results are consistent with a growing body of research that indicates ESP block provides better analgesic benefits than traditional analgesia techniques for individuals having laparoscopic cholecystectomy.

The erector spinae block effectively analgesia the somatic structures implicated in the surgery by focusing on the thoracic and abdominal branches of the spinal neurons. In addition to improving patient comfort, this localized pain management promotes early mobilization and general recovery, both of which are essential for the effective care of patients recovering from cholecystectomy.

Furthermore, serious worries about opioid-related side effects such nausea, vomiting, and chronic gastrointestinal dysfunction are addressed by the decrease in opioid use linked to erector spinae block use. By addressing these problems, the erector spinae block not only helps patients have a better postoperative experience, but it also complies with current guidelines meant to reduce the use of opioids during surgery.

In summary, by contrasting the effectiveness and safety profile of the erector spinae block with conventional analgesic techniques, this discussion will go deeper into the implications of our findings and establish the possibility that it could become a standard procedure for the treatment of postoperative pain after laparoscopic cholecystectomy.

Now we can discuss in summary the most important findings in our paper and can start with the management of postoperative pain .

Regarding to postopertive VAS score, our findings showed statistical significant difference between two groups in VAS score recorded for both groups throughout most of the postoperative 24 hour follow up . There was observed decrease in group E score recordings from 4 h postoperative with mean 0.33±0.922 in comparison to 2.90± 1.54 for group C with continue the trend of significant difference between two groups till end of follow up .

A number of studies support the idea that the ESB block is an effective analgesic technique for various abdominal surgeries, including laparoscopic cholecystectomy. **Zewdu et al. (2024)** reported in his meta-analysis which aimed to compare the efficacy of ESB and transversus abdominis plane block (TAP block) for pain control in LC. The effectiveness of TAPB and ESPB for postoperative pain management following LC was compared in all randomized clinical trials. Pain scores at rest and during movement at 1, 2, 6, 12, and 24 hours after surgery were the main outcomes. The rates of postoperative nausea and vomiting, the total amount of opioids consumed, and the time it took to request analgesia were the secondary outcomes. Included in the analysis were 8 RCTs with 542 patients (271 in the ESB group and 271 in the TAPB group). The ESB showed statistically significant lower pain levels during rest and movement than the TAP block. Furthermore, patients who got the ESP block had more time before asking for their first dosage of analgesia and needed less morphine. The incidence of postoperative nausea and vomiting did not differ significantly between the two groups.

But against our findings , **King et al. (2022**) reported in his paper that he performed an electronic search to find research on the application of the erector spinae block in midline sternotomy-assisted adult heart surgery. Cohort studies, case-control studies, and randomized controlled trials were all taken into consideration for inclusion. Postoperative pain, duration to extubation, and length of stay in the intensive care unit were among the noteworthy outcomes.

He reported his results as in total, 498 citations were identified and five were included in the meta-analysis. Self-reported postoperative pain scores at 4 hours (-2.04; 95% CI -8.15 to 4.07; p =.29) or 12 hours (-0.27; 95% CI -2.48 to 1.94; p =.65) after extubation, intraoperative opioid

requirements (-3.07; 95% CI -6.25 to 0.11; p =.05), time-to-extubation (-1.17; 95% CI -2.81 to 0.46; p =.12), and length of stay in the intensive care unit (ICU) (-4.51; 95% CI -14.23 to 5.22; p =.24) were not significantly decreased by the erector spinae plane block.

But these findings against the effective of the block may be due to the use of different types of patients and surgeries with expected increase in pain intensity in cardiac surgeries with sternotomy against laparoscopic cholecystectomy. So we suggest that further studies are required to assess the ESB effectiveness in such types of surgeries associated with increased pain intensity.

Regarding postoperative stay of patients in PACU or hospital, data showed less stay time in PACU or in the hospital to the discharge time in group E with mean of 2.43± 0.504 hour and 2.27±.450 respectively in comparison to mean PACU in group C 3.43 ± 0.774 and hospital stay mean of 3.20±0.761.

Sarhan et al. (2024) reported that Patients between the ages of 18 and 70 who had a midline sternotomy as part of a heart surgical operation were randomized to receive either preoperative single-shot ultrasound-guided bilateral ESPB or fentanyl infusion (control group). The time to extubation was the main result. Incidence of perioperative complications, duration of intensive care unit (ICU) stay, pain score using the numerical rating score (NRS), and total perioperative fentanyl consumption were additional outcomes.

The main result was that the ICU period of stay was significantly reduced in the ESPB group compared to the control group (mean, 47.2 ± 13.3 hours vs. 78.9 ± 25.2 hours; p = 0.0001). There was a more significant reduction in NRS in the ESPB group compared to the control group for up to 24 hours postoperatively (p = 0.001).

Shim et al. (2020) also reported in his study, the efficacy of erector spinae plane block (ESPB) guided by ultrasound as a postoperative pain management technique and compare opioid consumption and post hospital stay for patients following video-assisted thoracoscopic surgery (VATS) . 54 patients participated in the randomized controlled experiment and were split into two groups: one group received the ESPB with ropivacaine, while the other group received a saline solution as a control.

The numeric rating scale (NRS) score for pain measured at different postoperative time points was the main result. The Riker Sedation-Agitation Scale (SAS) was used to quantify emergence agitation, length of stay in the post-anesthesia care unit (PACU), and opiates intake as secondary outcomes.

The main results summarized as immediately following PACU admission, the ESPB group's NRS scores were significantly lower (5.96±1.68 vs. 7.59±1.18 in the control group; P<0.001). This pattern persisted for the first six hours after surgery, but it leveled off after twelve hours (P=0.12). The ESPB group also consumed considerably less rescue pethidine on average (25 mg vs to 50 mg in the control group; P=0.006). About the PACU Stay, The ESPB group spent a median of less time in the PACU (25 vs. 30 min; P=0.034) than the other group.
The ESPB group showed reduced emerging agitation, according to the Riker SAS scores (4 vs. 5 in the control condition; P<0.001).

According to our observed data collected from the associated post-operative side effects and complications show increase in number of patients developed nausea in group C with statistically significant difference between two groups. There was a 26 case developed nausea in group C in comparison to 13 case in group E .

Daghmouri et al. (2021) reported in this systematic review and meta-analysis of randomized controlled trials" provided a comprehensive evaluation of the efficacy of erector spinae plane block (ESPB) in managing postoperative pain in patients undergoing laparoscopic cholecystectomy and The incidence of postoperative nausea and vomiting.

The analysis comprised 15 randomized controlled trials with 947 individuals in total. The main results summarized as the ESPB group also had a decreased 24-hour cumulative opioid consumption (MD -7.88, 95% CI -10.17 to -5.58, $p < 0.00001$). The ESPB group experienced fewer cases of postoperative nausea and vomiting than the control group. But the ESPB group's opioid intake and the frequency of nausea and vomiting were similar to those of other regional block procedures, including oblique subcostal transversus abdominis plane block and quadratus lumborum block.

Liheng et al.(2022) also reported that ESB reduced the incidence of postoperative nausea and vomiting (PONV) and extended the duration of blocking. This was a meta-analysis included 10 randomized controlled trials (RCTs) with 570 subjects underwent comparison between ESB and ransversus abdominis plane (TAP) block. Two independent researchers conducted a systematic search of the PubMed, Web of Science, Cochrane Library, ClinicalTrials.gov registration, and Embase databases between the start of the study and December 2021 and reported similar final findings that regional anesthesia blocks help to decrease PONV.

These findings are consistent with our results and illustrate the efficacy of ESP block to decrease the pain and then decrease the hospital stay even in large and complicated surgeries which require the post-operative ICU admission.

For the purpose of improving patient recovery and lowering narcotic use, postoperative pain management after laparoscopic cholecystectomy is still crucial.

Recommendations: We recommend that further studies on ESP block should be directed to examine its efficacy in more extensive surgeries with possible intensive postoperative pain levels, also to consider other factors like patient satisfaction and cost affection in further research. Finally, teaching hospitals and centers should encourage widespread training for anesthesia teams on the proper ultrasound guided regional technique, ESP included, emphasizing the increasing demand for their application in anesthesia and analgesia, and to ensure high efficacy and safety in practice.

Conclusion

In conclusion , the results of this study, taken together, provide evidence that the ESP block is an effective analgesic alternative compared to the conventional pain management techniques after laparoscopic cholecystectomy. According to our findings, there has been a notable decrease in postoperative pain scores, opioid use, and postoperative nausea incidence, which has resulted in better patient comfort, earlier discharge, and shorter hospital stays. These benefits are consistent with the increasing amount of data indicating that ESP block not only improves recovery but also complies with the most recent recommendations to reduce opiate use and encourage faster recovery.

References

- **Aldrete JA. (1995)**. The Post-Anesthesia Recovery Score revisited. Journal of Clinical Anesthesia, 7(1): 89-91.
- **Benyamin R, Trescot AM, Datta S, Ricardo Buenaventura R, Adlaka R. (2008).** Opioid Complications and Side Effects. Pain Physician , 11 (2 Suppl):

S105-S120.

- **Bisgaard T. (2006)**. Analgesic Treatment after Laparoscopic Cholecystectomy: A Critical Assessment of the Evidence. Anesthesiology , 104 (4): 835–846.
- **Daghmouri MA, Akremi S, Chaouch MA, Mesbahi M, Nouha Amouri N. (2021)**. Bilateral Erector Spinae Plane Block for Postoperative Analgesia in Laparoscopic Cholecystectomy: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Pain Practice . The Official Journal of World Institute of Pain , 21 (3): 357–365.
- **Forero M, Sanjib D, Adhikary SD, Lopez H, Tsui C, Chin KJ. (2016)**. The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. Regional Anesthesia and Pain Medicine , 41 (5): 621–627.
- **Kehlet H, Dahl JB. (1993)**. The Value of 'Multimodal' or 'Balanced Analgesia' in Postoperative Pain Treatment. Anesthesia and Analgesia , 77 (5): 1048–1056.
- **King M, Stambulic T, Servito M, Mizubuti GB, Payne D. (2022).** Erector Spinae Plane Block as Perioperative Analgesia for Midline Sternotomy in Cardiac Surgery: A Systematic Review and Meta-Analysis. Journal of Cardiac Surgery , 37 (12): 5220–5229.
- **Liheng L, Siyuan C, Zhen C, Changxue W. (2022).** Erector Spinae Plane Block versus Transversus Abdominis Plane Block for Postoperative Analgesia in Abdominal Surgery: A Systematic Review and Meta-Analysis. Journal of Investigative Surgery . The Official Journal of the Academy of Surgical Research , 35 (9): 1711–1722.
- **Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Garcia-Ayllon J. (1998).** Laparoscopic Cholecystectomy vs Open Cholecystectomy in the Treatment of Acute Cholecystitis: A Prospective Study. Archives of Surgery , (Chicago, Ill : 1960) 133 (2): 173–175.
- **McCormack HM, David JD , Sheather S. (1988)**. Clinical applications of visual analogue scales. A critical review. Psychological Medicine, 18(4): 1007–1019.
- **Nakeeb AE , Mahdy Y, Salem A, El Sorogy M, Abd El Rafea A. (2017).** Open Cholecystectomy Has a Place in the Laparoscopic Era: A Retrospective Cohort Study. The Indian Journal of Surgery , 79 (5): 437.
- **Oksar M, Menekse K, Koyuncu O, Turhanoglu S, Temiz M, Oran MC. (2016).** Transversus Abdominis Plane Block as a Component of Multimodal Analgesia for Laparoscopic Cholecystectomy. Journal of Clinical Anesthesia , 34 (November):72–78.
- **Sarhan K, Elshemy A, Mamdouh S, Salah M, Abd El Raheem A. (2024)**. Effect of Bilateral Erector Spinae Plane Block versus Fentanyl Infusion on Postoperative Recovery in Cardiac Surgeries via Median Sternotomy: A Randomized Controlled Trial. Journal of Cardiothoracic and Vascular Anesthesia , 38 (11): 2668–2674.
- **Shim JG, Ryu KH, Kim PO, Cho EA, Ahn JH. (2020)**. Evaluation of Ultrasound-Guided Erector Spinae Plane Block for Postoperative Management of Video-Assisted Thoracoscopic Surgery: A Prospective Randomized Controlled Clinical Trial. Journal of Thoracic Disease, 12 (8): 4174–4182.
- **Zewdu D, Tantu T, Eanga S, Tilahun T. (2024).** Analgesic Efficacy of Erector Spinae Plane Block versus Transversus Abdominis Plane Block for Laparoscopic Cholecystectomy: A Systematic Review and Meta-Analysis of Randomized Controlled Trial. Frontiers in Medicine , 11:1399253.