ORIGINAL ARTICLE

ASSESSMENT OF POSTOPERATIVE ANALGESIC EFFECT OF RECTUS SHEATH BLOCK IN GYNECOLOGICAL LAPAROSCOPIC SURGERY

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Background: Gynaecological laparoscopic surgery is a minimally invasive surgical technique that can cause pain and discomfort in the postoperative period. To manage this pain, various analgesic techniques have been employed, including rectus sheath block (RSB). Bupivacaine is a long-acting local anaesthetic that has been used in bilateral rectus sheath block (BRSB) for postoperative pain relief after laparoscopic surgery. The objective of this study was to assess the impact of bupivacaine's bilateral rectus sheath block (BRSB) on post-laparoscopic pain relief with its intraperitoneal (IP) administration. **Methods:** This prospective randomized, double-blind, clinical trial was done at the department of obstetrics and gynaecology Patel hospital Karachi, from September 2022 to February 2023. All the adult female patients aged 18 years or older undergoing elective gynecological laparoscopic surgery and willing to receive RSB as a postoperative analgesic technique were included. After taking informed consent, the patients were randomly allocated into two groups. In group I, BRSB was performed with 25 mg of bupivacaine and in group II was given 25 mg of bupivacaine intraperitoneal. Visual analogue pain score (VAS) was used to evaluate the postoperative pain at 1st, 6th, 10^{the} and 24^{the} hours postoperatively. Data was collected via study proformas. **Results:** The study comprises 60 patients who underwent gynaecological laparoscopic surgeries, with group I having an average age of 38.10±11.19 years and an average was BMI of 27.07±5.15 kg/m^2, and group II having a mean age of 41.36±11.18 years and an average BMI of 27.51±4.22 kg/m2. Average (VAS) was significantly lower in group I compared to group II at 1st, 6th, 10th, and 24th hour, with a statistically significant *p*-value of 0.001. The average duration of surgery was statistically insignificant in both groups, as an average duration in group I was 32.14±12.20 minutes and in group II was 31.0±19.21 minutes. **Conclusion:** The use of bupivacaine in a bilateral rectus sheath block (BRSB) with was observed to be more effective for post-laparoscopic pain relief compared to 25 mg of bupivacaine intraperitoneal administration.

Keywords: Laparoscopy; Pain; Bupivacaine; BRSB

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INTRODUCTION

In the field of gynaecology surgery has been significantly influenced by minimally invasive surgery, which has now become the standard of care for many gynaecological diseases.[1] Due to the evident benefits of this surgical approach, new technological advancements are being rapidly adopted, allowing even complex procedures to be performed with minimal invasiveness.[1] It is a fast-evolving field, providing numerous advantages such as less hospital stay, less complications, smaller scars, quicker recovery time, and lower cost.[2] It is now widely used for a range of procedures that were traditionally conducted via laparotomy.[2] Even though, this minimally invasive surgery (MIS) has several benefits, there are still a considerable number of patients, ranging from 35% to 80%,[3] who may encounter intense pain and need pain management to relieve their discomfort or distress.[3–5] If moderate to severe acute pain remains untreated, regardless of the location, can lead to increased healthcare costs due to prolonged hospital stays, decreased satisfaction of the patients, delayed movements of patients postoperatively, and the exacerbation of chronic postoperative pain.[6,7] To reduce pain resulting from injury during clinical anaesthesia procedures, it's necessary to administer analgesics beforehand.[8] Pre-emptive analgesia has become increasingly popular in clinical anaesthesia as it can avoid hyperalgesia of nerve and reduce the body's production of pro-inflammatory factors, resulting in enhanced postoperative inflammatory reaction and reduced postoperative discomfort.[8] However, the effective form of preventive analgesics is very importance, in the prognosis and recovery of patients who undergo gynaecological laparoscopy. Several opioids and non-steroidal medicines are frequently utilized in the practice of gynaecological surgery[9] as preventive analgesics. One of these localized procedures that is beneficial for postoperative analgesia following laparoscopy is known as rectus sheath block (RSB).[10] In 1899, initially developed RSB with the goal of depositing local anaesthetic (LA) in the virtual area in between posterior wall of rectus abdominis muscles and its sheath,[11] and it

is anticipated that the local anaesthetic, once injected into this region, will flow freely in both directions and will obstruct the terminal branching of intercostal nerves prior to their exit from the rectus sheath.[11] In modern practice, the rectus sheath block (RSB) has been proven to be effective in reducing opioid usage following both diagnostic and interventional laparoscopy and laparotomy.[12] However, the effectiveness of rectus sheath blocks (RSB) with bupivacaine in managing immediate postoperative pain following gynaecological laparoscopic surgery has not been thoroughly studied at the local level. Therefore, this study has been conducted to evaluate the impact of bupivacaine's bilateral rectus sheath block (BRSB) on post-laparoscopic pain relief with its intra-peritoneal (IP) administration.

MATERIAL AND METHODS

This prospective randomized, double-blind, clinical trial was done at the department of obstetrics and gynaecology Patel hospital Karachi after taking ethical approval (PH/IRB/2022/020. Study duration was six months from September 2022 to February 2023. Non-probability, consecutive sampling technique was used. All the adult female patients aged 18 years or older undergoing elective gynaecological laparoscopic surgery and willing to receive RSB as a postoperative analgesic technique were included. All the patients with a history of chronic pain or neuropathic pain or allergy to local anaesthetics, patients with history of coagulation disorders or on anticoagulant therapy, patients uncontrolled hypertension or diabetes mellitus or any other medical condition that could compromise the safety of the patient or the success of the procedure were excluded. After taking informed consent and relevant history, duration of operation, height, weight, and age were noted of each patient. Patients were randomly allocated into two groups using sealed envelope method. In Group I, 25 mg of bupivacaine was administered via a bilateral rectus sheath block (BRSB). The procedure was performed by identifying the rectus sheath bilaterally, and under ultrasound guidance, 25 mg of bupivacaine was injected into the space between the rectus muscle and the posterior sheath on each side, while Group II, 25 mg of bupivacaine was administered intraperitoneally. Following the completion of the surgical procedure (e.g., laparoscopic cholecystectomy), bupivacaine was delivered directly into the peritoneal cavity at the surgical site. The administration was carried out under direct visualization to ensure even distribution of the local anaesthetic across the peritoneal surfaces, particularly around the surgical site and near the diaphragmatic area. Postoperative pain was assessed by visual analogue pain score (VAS) at 1st, 6th, 10^{the} and 24^{the} hours post operatively. All the information was collected via study proforma and analysis of data was done by using SPSS version 26.

RESULTS

The study included 60 patients who had gynaecological laparoscopic surgeries. The mean age of patients in group I was 38.10±11.19 years and in group II was 41.36±11.18 years, with an average BMI of 27.07±5.15 kg/m2 in group I and 27.51±4.22 kg/m2 in group II. The findings were not statistically significant for age, BMI, and types of surgeries in both groups (p=>0.05) as shown in Table 1.

Post-operative pain was significantly less in group I as compared to group II at 1st hour, 6th hour, 10th hour and 24th hour p-values were quite significant statistically (p=0.001). Although the average duration of surgery was not statistically significant in both groups, as it was 32.14±12.20 minutes in group I and 31.0±19.21 minutes in group II (p=0.852), as shown in Table 2.

Table-1: Descriptive statistics of demographic and clinical characteristics n=60

Variables		STUDY GROUPS		*p*-value
		Group I	Group II	
Age (mean±SD)		38.10±11.19 years	11.36±11.18 years	0.263
BMI mean±SD)		27.07±5.15 kg/m^2	27.51±4.22 kg/m^2	0.721
Types of surgery	Myomectomy	2 (6.7%)	--	0.641
	TLH	16 (53.3%)	18(60.0%)	
	Cystectomy	08 (26.7%)	07(23.3%)	
	Salpingectomy	01 (3.3%)	02(6.7%)	
	Diagnostic	03 (10.0%)	03(10.0%)	
Total		30 (100.0%)	30(100.0%)	

Table-2: Comparison of procedure duration and post operative pain (VAS) in both groups n=60

Variables		STUDY GROUPS		*p*-value
		Group I	Group II	
Duration of surgery (mean±SD)		32.14±12.20 minutes	31.0±19.21 minutes	0.852
Postoperative pian (VAS) (mean±SD)	At 1 hour	3.46±1.40	5.16±1.76	0.001
	At 6 hours	2.63±1.24	4.73±1.33	0.001
	At 10 hours	2.26±0.69	4.26±1.38	0.001
	At 24 hours	1.73±0.73	3.03±1.27	0.001

DISCUSSSION

Gynaecological laparoscopic surgeries can be associated with significant postoperative pain, and several approaches have been used to manage this pain. One promising approach is the use of a bilateral rectus sheath block (BRSB) administration of bupivacaine. It has been assumed that, it can provide more effective pain relief. To observe these findings, the present study has been done to observe the impact of 25 mg bupivacaine's bilateral rectus sheath block (BRSB) on post-laparoscopic pain relief with its intraperitoneal (IP) administration. A total of 60 patients were comparatively enrolled and their mean age in group I was 38.10±11.19, while in group II was 41.36±11.18 years, with an average BMI of 27.07±5.15 kg/m2 in group I and 27.51±4.22 kg/m2 in group II (p = >0.05). In the comparison of this study Azemati S *et al*[13] also conducted the study in same manner and they found no significant differences in their study groups based on weight, age, or the duration of the surgery. In the comparison of this study Allene MD *et al*[6] reported higher average age of the patients as 47±6.12 years in exposed group and 46±8.8 years in non-exposed group, furthermore they found lower average of BMI as 21.94±2.11 kg/m^2 in exposed group and in non-exposed group 21.93±2.12 kg/m^2. Age and BMI are important factors that can affect the response to pain management interventions, including the use of a bilateral rectus sheath block (BRSB) with intraperitoneal (IP) administration of bupivacaine for postoperative pain relief in gynaecological laparoscopic surgeries. While the current study did not find a significant difference in age and BMI in both groups.

In this study, the results indicated that participants in group I reported significantly lower levels of postoperative pain compared to those in group II at multiple time points: 1 hour, 6 hours, 10 hours, and 24 hours post-surgery. The statistical analysis revealed p-values of 0.001, highlighting a strong significance in the differences observed between the two groups. This finding aligns with the research conducted by Allene MD *et al*,[6] who also documented a significant variation in pain scores between group I and group II specifically at the 6-hour and 10-hour marks following surgery. Their findings were supported by highly significant p-values of 0.001 and 0.004, respectively. Findings of this study align with those of Sooyoung C *et al*,[14] who reported that pain scores in the RSB group were significantly lower than those in the control group at 0 hours post-surgery, both at rest (p=0.02) and while coughing (p=0.004). Additionally, the Visual Numerical Rating Scale (VNRS) at 6 hours post-surgery also showed lower scores in the RSB group, with a p-value of 0.01. Conversely, Mowafi MM *et al*[15] conducted a similar study and found no significant differences in pain scores at rest or during coughing between the two groups, except at the 6-hour mark, where the RB group reported significantly lower pain scores (p<0.001). Furthermore, the RB group demonstrated improved respiratory function at 1, 6, and 12 hours after surgery, although there were no significant differences in the incidence of postoperative complications between the two groups.[15] In the study by Choi BJ *et al*[16] observed that the visual Analog Scale scores were notably lower in the RSB group both upon arrival at the post-anaesthesia care unit and 30 minutes after arrival, when compared to the PCA group. Hamid HK *et al*[17] also concluded that the administering the RSB preoperatively resulted in superior pain management compared to administering the block after surgery.

Some potential limitations of the impact of high dose bupivacaine's bilateral rectus sheath block (BRSB) on post-laparoscopic pain relief, small sample size, and the single-center design of the study. Additionally, the study may not be generalizable to other populations or surgical procedures, and there may be other factors that influence postoperative pain and analgesic effectiveness that were not controlled for in the study. However, further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and to identify potential adverse effects associated with this approach. Additionally, it is important to consider individual patient characteristics and preferences, as well as potential risks and benefits, when deciding on the most appropriate pain management strategy for each patient.

CONCLUSION

As per the study conclusion, bilateral rectus sheath block BRSB observed to be more effective due to its targeted approach, in terms of decreased pain, longer duration of analgesia, and improved patient satisfaction. BRSB is a regional anaesthetic technique that specifically targets the sensory nerves that supply the anterior abdominal wall, which is where postoperative pain is commonly experienced following laparoscopic surgery. In contrast, intraperitoneal bupivacaine provides a more diffuse analgesic effect, which may not be as effective in targeting the specific nerves responsible for pain in the abdominal wall. The findings, are based on a limited sample size and a number of other restrictions, cannot be suggested as definitively conclusive; however, additional large-scale studies should be done to prove the findings.

AUTHORS' CONTRIBUTION

SI: Conceptualization and design of the study, data collection, first drafting and revising the manuscript. SS: Contribution in data collection and analysis, writing and revision of the manuscript. AB: Literature review and background research, assisted in data interpretation and contributed to manuscript preparation. SI: Data entry and statistical analysis, Reviewed and edited the manuscript for important intellectual content. KF: Provided critical feedback and guidance throughout the research process, Final approval of the version to be published

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