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ULTRASOUND GUIDED BILATERAL RECTUS SHEATH BLOCK IN MANAGEMENT OF POSTOPERATIVE PAIN IN LAPAROSCOPIC GYNECOLOGIC SURGERY: A RANDOMIZED DOUBLE BLIND CONTROLLED STUDY

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ABSTRACT

Background: Rectus sheath block (RSB) is an anterior abdominal wall block that reduces postoperative pain associated with midline incisions. objectives were to compare the post- operative pain scores, intravenous opioid analgesic requirements and length of postoperative stay of the two groups of women.
Material and Methods: Present Prospective Randomized Controlled Trial was conducted at Department of Anaesthesiology, G.M.E.R.S Medical College and Hospital Sola, Ahmedabad. Sixty patients were scheduled for elective laparoscopic gynecologic surgery. At the end of the surgery, the patients were divided into two groups. RSB group (GROUP A): Patients received USG guided Bilateral Rectus Sheath Block with 20 ml of 0.25% Ropivacaine on each side (n=30). Control Group (GROUP B): Patients who did not receive the RSB block and were given Injection Tramadol on demand for post-operative analgesia as per institutional protocol(n=30). Analgesic efficacy of RSB block in laparoscopic gynecologic surgery was assessed by time to first requirement of rescue analgesic drug (Tramadol), VAS scores, and total dose requirement of Tramadol in 24 hrs.
Results: RSB block increases the duration of time to first rescue analgesic drug with significant difference between RSB group and the CONTROL group. There is a significant decrease in the VAS score in the postoperative period in the RSB group as compared to the control group. It also reduces the total Analgesic requirement in the first 24 hours with significant difference between both groups.
Conclusion: USG guided Bilateral Rectus Sheath block when compared with a standard general anaesthetic is associated with a significant decrease of systemic analgesics demand and is a good choice for postoperative pain management in surgery involving the anterior abdominal wall like laparoscopic gyneclogical surgery as a part of multimodal analgesia.
Key Words: Laparoscopic Gynecologic Surgery**,** Rectus sheath block, Ropivacaine, Tramadol.

INTRODUCTION

There is an increasing demand for safe and effective regional anaesthetic techniques to deliver post-operative analgesia to patients undergoing laparoscopic gynaecological surgery. Intra-operative infiltration of local anaesthetic into the subcutaneous tissues around the wound is rarely sufficient to control post-operative pain, with patients requiring repeated boluses of opioid analgesia in the immediate and medium-term post-operative period and prolonged use of morphine based patient-controlled analgesia (PCA).[1,2]
Reliance on opioids to achieve adequate postoperative analgesia increases the risk of sedation, nausea, vomiting, constipation and

paralytic ileus in comparison to that epidurals provide extremely effective pain relief except visceral pain, reduces perioperative morbidity but sepsis and coagulopathy are contraindication which can hamper epidural based post-operative analgesia making it not suitable for all patients. The rectus sheath block was first described by Schleich in 1899 when it was used to achieve peri-operative relaxation of the anterior abdominal wall. More recently, the rectus sheath block has been used to achieve post-operative analgesia in a variety of clinical settings, including following laparoscopy, umbilical hernia repair, abdominoplasty, upper abdominal and major gynaecological surgery.[3-6]

The anterior abdominal wall has a multiple segmental nerve supply derived from the anterior divisions of the lower thoracic (T7–12) and first lumbar (L1) nerves. These nerves pass between the internal oblique and transversus abdominis muscles in the transversus abdominis plane, where they branch extensively and communicate widely with each other.[7]

They pierce the posterior aspect of the rectus sheath where they branch and communicate in the ‘‘rectus sheath plexus’’ that runs alongside the deep inferior epigastric artery. Muscular and cutaneous branches are given off as the nerves enter the muscle and finally terminate in the skin. Above the umbilicus, the skin of the anterior abdominal wall is supplied by cutaneous nerves derived from T7 to T9. T10 innervates the skin at the level of the umbilicus and T11, T12 and L1 supply the skin below it. The rectus sheath block aims to bathe the nerves of the rectus sheath plexus in local anaesthetic as they pass through the rectus sheath space between the rectus abdominis muscle and the posterior layer of the sheath.[8,9]

The rectus sheath block has been administered percutaneously by the anaesthetist after completion of laparoscopic operative procedure and before extubation using an ultrasound-guided technique which allows non-invasive real-time imaging of the important anatomical structures while the needle is placed under direct vision. Ultrasound-guided rectus sheath blocks may be safer and more accurately placed Furthermore, they require specialised equipment and technical expertise.[10]

Care is taken to avoid the inferior epigastric vessels as they ascend between the posterior layer of the rectus sheath and the rectus abdominis muscles. A needle is passed under direct vision into the space between the rectus abdominis muscle and the posterior layer of the rectus sheath.

After aspirating to exclude vascular injury, a total volume of 20 ml 0.25% ropivacaine is infiltrated slowly. The rectus sheath space expands with little resistance as the local anaesthetic is introduced. The procedure is then repeated on the contralateral side of the abdomen. In 2019, we started performing surgical rectus sheath blocks routinely for women undergoing major gynaecological laparoscopic surgery. This study describes a retrospective case note study of consecutive women receiving and not receiving the surgical rectus sheath block. Our objectives were to compare the post- operative pain scores, intravenous opioid analgesic requirements and length of postoperative stay of the two groups of women.

MATERIALS AND METHODS

Present Prospective Randomized Controlled Trial was conducted at Department of Anaesthesiology, G.M.E.R.S Medical College and Hospital Sola, Ahmedabad from July 2019 to July 2021. All patients undergoing laparoscopic gynecological surgeries were included in the study.

Inclusion Criteria

1. Age group of 18-50 years
2. ASA grade 1 or 2

Exclusion Criteria

1. ASA grade 3 and 4
2. Patient refusal
3. Coagulopathy or Anti-coagulation treatment
4. History of allergy to the study drug
5. Infection at the site of injection

Total 60 patients were included in the study. After approval from Ethics Committee and oral as well as written consent will be taken from all participant and they will be informed that they can leave the study at any time during the study. Patients were randomly allocated into two groups,

Group A: To undergo general anaesthesia and ultrasound guided bilateral Rectus sheath block with 0.25% Ropivacaine (plain) (Group R, n = 30)

Group B: To undergo general anaesthesia without BRS block. (Group C, n=30).

Both the groups were given injection Tramadol on demand as per VAS score for postoperative analgesia as per institute protocol for routine surgery.

Patients were randomly assigned to receive a USG guided bilateral rectus sheath block with 40 ml of 0.25% ropivacaine (study group) or conventional rescue analgesic protocol (control group). All the patients given premedication with Injection Glycopyrolate 0.04mg/kg, Injection Ondansetron 0.15mg/kg, Injection Midazolam 0.2mg/kg, Injection Fentanyl 0.25µg/kg. Induction agents consist of Injection Propofol 2.5mg/kg and Injection Scholine 1.5 mg/kg. Patients were intubated with endotracheal tubes of appropriate sizes. Injection Atracurium 0.5mg/kg loading dose followed by incremental doses of 0.1 mg/kg as per requirement. Anaesthesia was maintained on 50% Nitrous oxide & 50% oxygen and Sevoflurane. All the patients received Paracetamol 1g IV as analgesic intraoperatively. After the surgery, A USG guided BRSB performed on the study group under general anaesthesia before extubation.

The ultrasound probe (Mindray) was placed in the midline of the abdomen, beneath the xiphoid process and moved caudally till rectus abdominis

muscle is seen on USG machine. The RSB was induced by 2 injections, 1 on each side of abdomen. A 22-gauge spinal needle was inserted medial to the probe by the in-plane technique and advanced in a lateral direction on just lateral to umbilicus in 3 to 5 cm on both sides and below the umbilicus. After a negative aspiration 20 ml of 0.25% of ropivacaine was injected on the posterior border of rectus muscle. This procedure was performed bilaterally and total 40 ml of 0.25% ropivacaine was injected. The patients in the control group received rescue analgesic agent Tramadol 100mg Iv postoperatively while the patients in the study group received this rescue analgesic on request for pain breakthrough.

Analgesic efficacy of RSB block in laparoscopic gynecologic surgery was assessed by time to first requirement of rescue analgesic drug (Tramadol), VAS scores, and total dose requirement of Tramadol in 24 hrs. Any adverse effects or complications were also observed.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2019) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

RESULTS

Patients were in the age group of 18 to 50 years in both the groups. Both groups were comparable in terms of age, weight, height and BMI. No significant difference was observed between two groups in terms of demographic data. (P>0.05)

Heart rate, Systolic Blood Pressure, Mean Arterial Pressure in both the groups were significantly decreased in the RSB group (P<0.05) at all-time intervals except at 0-hour post-operative. (P≤0.05). [Table 1]

VAS score was significantly higher in control group as compared to the RSB group at all the time EXCEPT at 24 hours post –operative. Total dose of TRAMADOL consumption in RSB group was 89.99±97.81 mg and in control group it was 331.64±120 mg, which showed that TRAMADOL consumption was significantly decreased in RSB group. [Table 2]

First dose of rescue analgesia required in RSB group was at 840.70±39.09min and in control group was 227.90min which was statistically significant. (p<0.05). [Table 3]

Rectus Sheath block with 0.25% Ropivacaine reduces requirement of TRAMADOL in RSB group compared to control group at all times. Tramadol requirement in RSB group was one time in 19 patients and two times in 4 patients and zero patients needed a third dose which was significantly less as compare to control group in which Tramadol requirement was one time in 17 patients and two times in 10 patients and three times in 3 patients in 24 hours. [Table 4]

Table 1: Demographic Data

	RSB	CONTROL	P VALUE
AGE(YEARS)	36.63±8.80	34.47±7.74	0.1587
HEIGHT(CM)	160.43±3.28	160.87±2.60	0.2843
WEIGHT(KG)	60.43±5.20	59.73±6.02	0.2061
BMI(KG/M²)	23.66±1.73	23.07±2.15	0.1210

(*Using unpaired student's t test)

Table 2: Comparison of VAS Score

	POST-OP				
	0 HOUR	1 HOUR	6 HOUR	12 HOUR	24 HOUR
RSB	1.90±0.61	2.10±0.61	2.37±0.72	2.27±0.98	4.37±1.03
CONTROL	3.00±0.53	4.13±0.68	3.27±0.64	4.70±0.75	5.00±0.69
P VALUE	0.0001	0.0001	0.0001	0.0001	0.0001

*using unpaired student's t test

*P <0.05, Significant difference in both group

Table 3: Time Taken for First Dose of Rescue Analgesia

GROUP	Time for first dose of analgesia in minute
Study	840.70±39.09
Control	227.90±28.15
P Value	<0.0001

Table 4: Cumulative Consumption of Tramadol

Group	0 Hour	1 Hour	6 Hour	12 Hour	24 Hour
RSB	0	0	3.33±18.26	13.33±34.57	73.33±44.98
Control	3.33±34.57	83.33±37.90	34.48±48.37	100±0	100±0
P Value	0.017	0.0001	0.0001	0.0001	0.0001

(*using unpaired student's t test)

P value <0.05 shows statistically significant difference in both groups

DISCUSSION

Analgesia is an important aspect of perioperative care. Appropriate postoperative analgesia is always associated with less post-operative stress, better patient satisfaction and reduction of side effects. Safety and morbidity issues are therefore of utmost importance and should be constantly re-evaluated and optimized. Thus, the development of safe and well tolerated analgesic techniques that provide optimal postoperative pain relief is of utmost importance. In Our study, we studied 60 patients undergoing elective Laparoscopic gynecological surgery. Both the groups showed no statistically significant difference in Weight, Age, Height and BMI.[11,12]

Pain management during the immediate postoperative period is critical, because inadequate pain control is associated with pulmonary or cardiac complications and increased morbidity and mortality.[13] Furthermore, the severity of postoperative pain affects postoperative quality-of-life and enhanced recovery.[14,15] Emotional state in the perioperative period is related to the degree of persistent pain after surgery; this demonstrates the importance of careful management of postoperative pain.[16] It appears clear from the previous studies that RSB reduces pain during the early postoperative period. Willschke et al,[17] and Gurnaney et al,[18] both reported a reduction in opioid use during the early postoperative period in RSB patients who underwent pediatric umbilical hernia repair surgery. In a study by Dingeman et al,[19] the pain scores of pediatric umbilical hernia repair patients were decreased in the PACU, but were similar to those obtained 4 h postoperatively. However, unlike umbilical hernia repair surgery, the laparoscopic surgery has manipulations on viscera and is accompanied by postoperative visceral pain. Nevertheless, the RSB plays a certain role in reduction of pain also in laparoscopic surgeries.

In our study the total duration of analgesia i.e. the time taken for first dose of rescue analgesic the RSB group was 840.70 ±39.09 Minutes while that in the control group was 227.90 ± 28.15 minutes (P value < 0.0001 – extremely significant). Duration of analgesia in our study with Tramadol as a rescue analgesic was also significantly longer in the study group compared to the control group which is comparable to Debas Yaregal Melesse et al in 2018.[20]

In our study, in the RSB group VAS score is 1.90, 2.10, 2.37, 2.27 and 4.37 respectively. In control group VAS score is 3.00, 4.13, 4.77, 4.70 and 5.00 respectively. Throughout 24 hrs VAS scores were less in the RSB group as compared with the control group. Santhanam Sampath et al in 2016 conducted a study on 50 patients undergoing midline laparotomy for gynecological onco surgery. In this study Vas score in Epidural block was 6.24, 3.64, 3.64, 5.28, 5.68, 4.6, 2.2 and 3.48 respectively. In RSB group the VAS score was 4.36, 3.44, 3.6, 4.64, 5.48, 4.4, 2.4 and 3.48 respectively. (p value of <0.05 which is statistically significant). Throughout post-operative periond VAS scores were less in the RSB group as compared with the epidural block group. Andrijan Kartalov et al in 2017 conducted a study on 60 patients scheduled for umbilical hernia repair with control group and rectus sheath block group. In this study Vas score in control group was 4,4,4,4 and 3 resprectively and in RSB group the VAS score was 1,1,2,2 and 1 respectively. Throughout post-operative periond VAS scores were less in the RSB group as compared with the control group. Results in these studies have showed that ractus sheath block has more analgesic effect post operatively.

In our study, the patients receiving rectus sheath block had a reduced requirement of total rescue analgesic i.e. Tramadol in the first 24 hours. The total Tramadol consumption in the RSB group was 89.99± 97.81mg. In comparison, in the control group which did not receive the block Tramadol consumption in first 24 hours was 331.64±120 mg. Emma J Crosbie et al in 2011 conducted a study on 98 patients undergoing major gynecological surgery. The total 48-hour morphine consumption in the surgical rectus sheath block group was 161.1mg and the 48-hour morphine consumption in standard subcutaneous LA infiltration group was 250.9 mg. Results in our study were comparable to their study. These results are consistent with those of the previous studies.[2,22,23]

In our study the hemodynamic parameters like HR and MAP remained stable in both the groups. The Heart rate, Systolic blood pressure and Mean Arterial pressure were significantly lower in the RSB group as compared to the control group. Arti Kuldeep et al in 2019 conducted a study for comparison of analgesic efficacy of ropivacaine and bupivacaine in rectus sheath block for midline abdominal surgeries and observed heart rate, systolic blood pressure and diastolic blood pressure in control group and rectus sheath block with ropivacaine one group and bupivacaine in another group which showed better hemodynamic stability with rectus sheath block using ropivacaine and bupivacaine than patients without rectus sheath block. Results in our study were comparable to their study.

In our study incidence of nausea and vomiting was comparatively very low in patients receiving rectus sheath block.

Limitation of the study is sample size is too small for generalization of the study findings. Since the study was conducted in a single institute, care should be taken while inferring the result to the general population.

CONCLUSION

USG guided Bilateral Rectus Sheath block is Easy to perform, quick, safe and precise. It reduces pain (VAS score) and increases duration of time to first requirement of rescue analgesic drug(Tramadol). It reduces total opioid requirement (Tramadol) in 24 hours and their related side effects. Hence, USG guided Bilateral Rectus Sheath block when compared with a standard general anaesthetic is associated with a significant decrease of systemic analgesics demand and is a good choice for postoperative pain management in surgery involving the anterior abdominal wall like laparoscopic gyneclogical surgery as a part of multimodal analgesia.

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