

# Rectus Sheath Block and Subcutaneous Bupivacaine Infiltration for Post-operative Pain Relief in Midline Laparotomy

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## Abstract

**Background:** The aim of the study was assessment of post-operative outcomes of rectus sheath block and comparison of outcomes between rectus sheath block and sub cutaneous bupivacaine.

**Materials and Methods:** This study enrolled 58 patients who were scheduled to undergo laparotomy. Group I – 30 patients received rectus sheath block using bupivacaine by placing catheters in between the muscle and posterior rectus sheath. Group II – 28 patients received bupivacaine infiltration by placing catheters in the subcutaneous plane. Visual analog scale (VAS) score, peak expiratory flow rate (PEFR), rescue analgesia, and complications were noted and follow-up of these patients was done.

**Results:** Both the groups were comparable, hemoglobin concentration and anesthesiologists grades (statistically insignificant). The majority of the patients from rectus sheath block group had VAS scores <5 comparing to subcutaneous infiltration group which was statistically very significant ( $P \leq 0.001$ ). There was a statistically significant improvement of post-operative PEFR values in Group I as compared to Group II ( $P < 0.001$ ). In Group I, 20 patients showed VAS score of 1 (no pain) at rest as compared only four patients in Group II. Rate of infection was more common in group receiving subcutaneous infiltration.

**Conclusion:** The patients from rectus sheath block group showed a statistically significant decrease in post-operative pain in terms of VAS scores compared to that of subcutaneous bupivacaine infiltration group. There was statistically significant decreased use of opioids as rescue analgesic in the rectus sheath group compared to that of the subcutaneous bupivacaine infiltration group.

**Key words:** Peak expiratory flow rate, Rectus sheath, Subcutaneous bupivacaine infiltration, Visual analog scale score

## INTRODUCTION

Surgery is a major stress that induces secretion of various substances such as prostaglandins, serotonin, and histamines as a reaction to localized tissue damage. In laparotomies with larger incisions, in abdominal surgeries, incision site is the most significant cause of acute post-operative pain. Extended midline laparotomies have

relatively long incisions and post-operative pain control of the incision site is important.<sup>[1,2]</sup>

Pain at the incision site if not effectively controlled interferes with breathing and causes atelectasis of lungs and also affects the cardiovascular, digestive, urinary, and musculoskeletal system and thus making the post-operative recovery difficult with poor surgical outcome.<sup>[1]</sup> The use of rectus sheath catheters for the administration of local anesthetic is based on the blockade of the anterior division of T6-T11 thoracoabdominal intercostal nerves. These nerves leave the spinal cord dividing into anterior and posterior divisions. The anterior division passes posterior to costal cartilages and then between transversus abdominis and internal oblique muscles,

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before passing medially to pierce and supply sensation to the rectus and the overlying skin. Therefore, a catheter placed anterior to the posterior sheath will block these nerves and reduce pain transmission from a midline laparotomy wound. Since 2007, the technique has further developed to include ultrasound-guided placement of rectus sheath catheter.<sup>[2,3]</sup>

The anterior rami of the thoracic nerve follow a curvilinear course forward in the intercostal spaces toward the midline of the body. The upper six thoracic nerve ends near the sternum as anterior cutaneous sensory branches. Thoracic nerves 7<sup>th</sup>–12<sup>th</sup> pass behind the costal cartilages and lower ribs to enter a plane between the internal oblique muscle and the transverses abdominis. The 7<sup>th</sup> and 8<sup>th</sup> nerves course slightly upward or horizontally to reach the epigastrium, whereas the lower nerves have an increasingly caudal trajectory.<sup>[3]</sup> As these nerves course medially, they provide motor branch to the abdominal wall musculature. Medially, they perforate the rectus sheath to provide sensory innervations to the anterior abdominal wall. The anterior ramus of the 10<sup>th</sup> thoracic nerve innervates the skin of the hypogastrium.<sup>[3,4]</sup>

Rectus sheath block will provide somatic pain relief from abdominal wall structures superficial to the peritoneum. For surgery deep to the peritoneum (such as bowel resection), there is usually a component of deeper visceral pain, for which systemic analgesia is routinely given immediately after surgery.<sup>[4]</sup> Major abdominal surgeries with upper abdominal incisions lead to severe abdominal pain, which if treated inadequately, causes shallow breathing, atelectasis, retention of secretion, and poor wound healing. This increases the incidence of post-operative morbidity and leads to delayed recovery with increased hospital stay.<sup>[5]</sup>

In this study, we will compare rectus sheath block and subcutaneous bupivacaine infiltration for post-operative pain relief in patients undergoing midline laparotomy. These pain reliefs will how much help in the post-operative recovery of patient will be assessed in terms of return of bowel sounds, passage of first flatus, nausea, vomiting, and improvement in peak expiratory flow rate (PEFR) and wound complications.

## MATERIALS AND METHODS

- Study design: Prospective, observational
- Study period: From October 2013 to October 2014
- Study place: Department of Surgery, Netaji Subhash Chandra Bose Medical College, Jabalpur, M.P.

There will be two study groups:

- Group I – 30 patients will receive rectus sheath block using bupivacaine by placing catheters in between the muscle and posterior rectus sheath
- Group II – 28 patients will receive bupivacaine infiltration by placing catheters in the subcutaneous plane.

## METHODS

### Inclusion Criteria

- All patients undergoing midline laparotomy were included in the study.

### Exclusion Criteria

The following criteria were excluded from the study:

- Previous midline surgery
- Simultaneous incision more than 1 cm (colostomy/ileostomy)
- Chronic liver and renal disease.

### Ethical Approval: Taken

Informed consent was taken from the patient and study protocol as decided by institutional ethical committee was followed.

### Evaluation of the Response to Intervention

In our study we have taken PEFR values of all patients undergoing midline laparotomy 3 readings in one hour preoperatively and compared with post op values in patients given either rectus sheath block or subcutaneous infiltration postoperatively, PEFR is used as an indirect measure to assess pain post operatively in patients after rectus sheath block or subcutaneous infiltration .post operatively we have measured PEFR after 2 hour and then other two readings 6 hourly.

### Observations

This prospective, observational study was carried out in the department of anesthesiology. Fifty-eight selected cases were included under the study to determine the comparative study of outcome of midline laparotomy after rectus sheath block and subcutaneous bupivacaine following parameters:-

1. Demographic features: Age and sex.
2. Depending pre-operative factors such as hemoglobin, anesthesiologists (ASA) score, PEFR
3. Depending intraoperative factors such as incision length and duration of surgery
4. Depending post-operative factors such as visual analog scale (VAS) score, PEFR, assessment of patient, rescue analgesia, and wound complication.

Duration of surgery – in both groups, duration of surgery is divided in subgroups, comparatively statistically insignificant.  $P = 0.45$ , in both groups, in majority of the cases, the duration of surgery was  $<2$  h; there was no statistically significant difference.

Follow-up of patients was satisfactory. Most of the patients came at the 4<sup>th</sup> week postoperatively. All of the patients done well at their follow-up with no post-operative wound complications.

## RESULTS

The mean  $\pm$ SD of age (in years) of patients receiving rectus sheath block was  $38 \pm 16.7$  and that of patients receiving subcutaneous infiltration was  $40.4 \pm 13.7$  which was statistically insignificant ( $P = 0.54$ ). Both the groups were comparable in respect to the parameters such as age, sex, hemoglobin concentration, and ASA grades (statistically insignificant) [Table 1].

The incision length in majority of cases of both Groups I and II was between 15 cm and 18 cm. There was no statistically significant difference ( $P = 0.43$ ) in length of incision in both the groups. The majority of the patients from rectus sheath block group had VAS scores  $<5$  comparing to subcutaneous infiltration group which was statistically very significant ( $P \leq 0.001$ ) [Tables 2 and 3].

Only 10 patients in Group I required tramadol as rescue analgesic as compared to 20 patients in Group II. The rescue analgesic requirement was very less in Group I as compared to Group II which was statistically very significant ( $P = 0.09$ ) [Table 4].

In Group I, number of patients showing PEFR values  $>50\%$  was 7 in the first reading, 21 in the second reading, and 16 in the third reading. While in Group II, no patients showed PEFR value  $>50\%$  in the first reading. Only two patients in the second reading and four patients in the third reading showed PEFR  $>50\%$  in Group II. There was a statistically significant improvement of post-operative PEFR values in Group I as compared to Group II ( $P < 0.001$ ). In Group I, 20 patients showed VAS score of 1 (no pain) at rest as compared only four patients in Group II. Twenty patients in Group I showed VAS score of 1 with coughing as compared to five patients in Group II [Tables 5 and 6].

There were no statistically significant difference between the appearance of bowel sound postoperatively, time for passage of first flatus, and incidence of nausea and vomiting ( $P > 0.05$ ). Rate of infection was more common in group receiving subcutaneous infiltration as compared

to rectus sheath block group ( $P < 0.05$ ). Incidence of hematoma and seroma formation was similar in both the groups [Table 7].

## Statistical Analysis

After getting the required information, the collected data were coded, tabulated, and analyzed. The various statistical techniques, that is, the mean, standard deviation, and test of significance (t-test and Chi-square test) were used for drawing valid conclusions. Statistical analysis done using Student's *t*-test. SPSS 13.0 software was used to calculate *P* value.  $P < 0.05$  was taken as statistically a descriptive analysis was done on all variables to obtain a frequency distribution. The mean + SD and ranges were calculated for quantitative variables. Continuous variables were compared by the Student's *t*-test. Proportions were analyzed with the Chi-square test.

## DISCUSSION

In abdominal surgeries, incision site is the most significant cause of acute post-operative pain. Extended midline laparotomies have relatively long incisions and post-operative pain control of the incision site is particularly important. Pain at the incision site puts a lot of physical and mental burden on the patient, increases the duration of stay at the hospital leading to increased chances of hospital acquired infections. It interferes with the breathing process (decreased PEFR) and causes atelectasis of lungs. Uncontrolled pain also affects the cardiovascular, digestive, urinary, and musculoskeletal system and thereby making the post-operative recovery difficult with poor surgical outcome.<sup>[2-4,6]</sup>

Good post-operative pain control after laparotomy is a primary requisite to make patient comfortable, for early mobilization and for decreasing the complication rates. Post-operative pain is due to stretching of intra-abdominal cavity, peritoneal inflammation, and phrenic nerve irritation pains arising from the visceral and deeper peritoneal layer may be a greater contributor to overall pain than from subcutaneous and muscular layers of a wound incision.<sup>[5,7]</sup>

Rectus sheath block is a very good modality for relieving pain in patients of midline laparotomies. Local anesthetics administered through the catheter placed in rectus sheath binds with the intercostal nerves blocking the sodium channel responsible for pain transmission. It leads to interruption of pain transmission pathway. We chose bupivacaine as the local anesthetic for our study because of its prolonged duration of action and proposed antimicrobial, antifungal activity, and prevent ileus which is not present in other local anesthetics such as lidocaine and mepivacaine.

Bilateral intrafascial administration of bupivacaine for regional scalp block can decrease post-operative pain of diagnostic laparoscopy. Effective post-operative pain relief results in improve comfort, respiratory pattern, and rapidly recovery bupivacaine toxicity as excessive shivering, nausea, dizziness, confusion, seizure, and cardiac arrhythmias.<sup>[8,9]</sup>

The incision length in majority of cases of both Groups I and II was between 15 and 18 cm. There was no statistically significant difference ( $P = 0.43$ ) in length of incision in both the groups. The majority of the patients from rectus sheath block group had VAS scores <5 comparing to subcutaneous infiltration group which was statistically very significant ( $P \leq 0.001$ ). In a study by Gupta *et al.*, the time of first analgesic request was significantly delayed in patients who had fascial infiltration with bupivacaine after elective laparotomy than who do not. They also draw inference that bupivacaine wound infiltration improves pain score at rest within the first 6 h and pain score on coughing within the first 24 h postoperatively.<sup>[8,9]</sup>

Only 10 patients in Group I required tramadol as rescue analgesic as compared to 20 patients in Group II. The rescue analgesic requirement was very less in Group I as compared to Group II which was statistically very significant ( $P = 0.09$ ). Rectus sheath block efficiently decreased the post-operative opioid requirement compared to subcutaneous infiltration of bupivacaine and it indirectly decreased the incidence of ileus. In Group I, number of patients showing PEFR values >50% was 7 in the first reading, 21 in the second reading, and 16 in the third reading. While in Group II, no patients showed PEFR value >50% in the first reading. Only two patients in the second reading and four patients in the third reading showed PEFR >50% in Group II. There was a statistically significant improvement of post-operative PEFR values in Group I as compared to Group II ( $P < 0.001$ ) [Table 8]. Shah *et al.* found reduction in PEFR in first 48 hrs after surgery but no significant difference in reduction between control and study groups and therefore concluded that there was no significant benefit in either pain score or PEFR.<sup>[8-10]</sup>

In Group I, 20 patients showed VAS score of 1 (no pain) at rest as compared only four patients in Group II. Twenty patients in Group I showed VAS score of 1 with coughing as compared to five patients in Group II. Only nine patients of Group I had VAS score >5 (moderate to severe pain) at rest while 20 patients in Group II had the same score at rest. Six patients had VAS score >5 with coughing in Group I as compared to 20 patients in Group II. There was a statistically significant improvement of VAS score in Group I as compared to Group II ( $P < 0.0001$ ).<sup>[10,11]</sup>

Among the pathways responsible for relaying pain after exploratory laparotomy, a significant contribution comes

from visceral pain fibers arising from viscera and deep peritoneal layers which are not blocked by both of the above techniques, that is, the reason none of the study population was able achieve complete pain relief (VAS=0). There was no statistically significant difference between the appearance of bowel sound postoperatively, time for passage of first flatus, and incidence of nausea and vomiting ( $P > 0.05$ ).

Rate of infection was more common in group receiving subcutaneous infiltration as compared to rectus sheath block group ( $P < 0.05$ ). Incidence of hematoma and seroma formation was similar in both the groups. Choragi *et al.* (2013) enrolled 60 patients scheduled to undergo midline laparotomies into two groups of 30 patients each. Group I patients received suprafascial bupivacaine through a catheter while Group II patients received interfascial bupivacaine through a catheter placed between rectus sheath muscle and posterior rectus sheath. They found a significant reduction in median VAS scores ( $P < 0.05$ ) in group of patients receiving interfascial bupivacaine as compared to suprafascial bupivacaine group. Opiate requirement was also significantly less in interfascial bupivacaine group as compared to suprafascial bupivacaine group (0.001). Our study was in unison with the study of Khorgami *et al.* in showing

**Table 1: Anesthesiologists grading**

Group	As a	Male (%)	Female (%)
Rectus sheath block	I	9 (15.5)	2 (3.4)
	II	12 (20.6)	1 (1.7)
	III	4 (6.8)	2 (3.4)
Subcutaneous infiltration	I	9 (15.5)	1 (1.7)
	II	12 (20.5)	2 (3.4)
	III	3 (5.1)	1 (1.7)

**Table 2: Incision length**

Group	Incision length	Cases (%)		Total
		Male	Female	
Rectus sheath block	12-14	8 (13.7)	3 (5.1)	11
	15-18	17 (29.3)	2 (3.4)	19
Subcutaneous infiltration	12-14	7 (12.1)	2 (3.4)	9
	15-18	17 (29.3)	2 (3.4)	19

**Table 3: Duration of surgery**

Group	Duration of surgery	Male (%)	Female (%)	Total (%)
Rectus sheath block	1:00-1:59 h	21 (36.2)	2 (3.4)	23 (39.6)
	2:00-2:59 h	4 (6.8)	2 (3.4)	6 (10.2)
	3:00-3:59 h	0	1 (1.7)	1 (1.7)
Subcutaneous infiltration	1:00-1:59 h	16 (27.0)	3 (5.1)	19 (32.1)
	2:00-2:59 h	7 (12.0)	1 (1.7)	8 (12.7)
	3:00-3:59 h	1 (1.7)	0	1 (1.7)

**Table 4: Visual analog scale score**

Group	Visual analog scale	Male (%)		Female (%)	
		At rest	On cough	At rest	On cough
Rectus sheath block	1 (no pain)	19 (32.7)	17 ((29.3)	1 (1.7)	3 (5.1)
	3 (mild pain)	1 (1.7)	4 (6.8)	0	0
	5 (moderate pain)	4 (6.8)	0	4 (6.8)	1 (1.7)
	>7 (severe pain)	1 (1.7)	4 (6.8)	0	1 (1.7)
Subcutaneous infiltration	1 (no pain)	3 (5.1)	4 (6.8)	(1.7)	1 (1.7)
	3 (mild pain)	4 (6.8)	3 (5.1)	0	0
	5 (moderate pain)	18 (11.9)	0	2 (3.4)	1 (1.7)
	>7 (severe pain)	6 (10.3)	17 (29.3)	1 (1.7)	2 (3.4)

**Table 5: Rescue analgesia after visual analog scale scoring**

Group			Rescue analgesia (%)					
			Tramadol 50 mg	Paracetamol				
				100 MI	200 MI	300 MI	400 MI	500 MI
Rectus sheath block	Male	No. of patient	6 (10.3)	2 (3.4)	2 (3.4)	0	0	0
	Female	No. of patient	4 (6.8)	1 (1.7)	1 (1.7)	0	0	0
Subcutaneous infiltration	Male	No. of patient	17 (29.3)	5 (8.6)	5 (8.6)	3 (5.1)	2 (3.4)	0
	Female	No. of patient	3 (5.1)	1 (1.7)	2 (3.4)	0	0	0

**Table 6: Pre-operative peak expiratory flow rate values**

Group	Sex	Peak expiratory flow rate value	30–40	41–50	51–60	61–70	P
Rectus sheath block	Male	First reading	7 (12)	10 (17.2)	6 (10.3)	2 (3.4)	<0.001
		Second reading	6 (10.3)	8 (13.7)	9 (15.5)	2 (3.4)	
		Third reading	5 (8.6)	12 (20.6)	7 (12)	1 (1.7)	
	Female	First reading	3 (5.1)	2 (3.4)	0	0	
		Second reading	1 (1.7)	2 (3.4)	2 (3.4)	0	
		Third reading	0	5 (8.6)	0	0	
Subcutaneous infiltration	Male	First reading	3 (5.1)	9 (15.5)	10 (17.2)	2 (3.4)	<0.001
		Second reading	1 (1.7)	8 (13.7)	12 (20.6)	3 (5.1)	
		Third reading	3 (5.1)	9 (15.5)	9 (15.5)	3 (5.1)	
	Female	First reading	1 (1.7)	1 (1.7)	2 (3.4)	0	
		Second reading	-0	2 (3.4)	2 (3.4)	0	
		Third reading	1 (1.7)	2 (3.4)	1 (1.7)	0	

**Table 7: Clinical signs**

Group	Range (hours)	Appearance of bowel sound (%)		Passage of first flatus		Nausea/vomiting (%)	
		Male	Female	Male	Female	Male	Female
Rectus sheath block	12–24	9 (15.5)	2 (3.4)	3 (5.1)	0	8 (13.7)	0
	25–36	15 (25.8)	2 (3.4)	17 (29.3)	4 (6.8)	0	0
	37–48	2 (3.4)	0	4 (6.8)	1 (1.7)	1 (1.7)	0
	49–60	0	0	0	1 (1.7)	0	0
	61–72	0	0	2 (3.4)	1 (1.7)	2 (3.4)	0
Sub cutaneous infiltration	12–24	13 (22.4)	2 (3.4)	4 (6.8)	0	13 (22.4)	1 (1.7)
	25–36	10 (17.2)	2 (3.4)	18	2 (3.4)	1 (1.7)	0
	37–48	1 (1.7)	0	1 (1.7)	1 (1.7)	0	0
	49–60	0	0	(1.7)	1 (1.7)	0	0
	61–72	0	0	0	1 (1.7)	0	0

the superiority of rectus sheath block in comparison to subcutaneous infiltration. Rescue analgesic requirement was decreased postoperatively in our present study which was also in agreement with the study of Khorgami *et al.*<sup>[12]</sup>

Crosbie *et al.* conducted a retrospective study comparing subcutaneous infiltration and rectus sheath block in alleviating post-operative pain 98 patients undergoing gynecological surgeries. With their observations, they

**Table 8: Post-operative peak expiratory flow rate values**

Group	Sex	Peak expiratory flow rate value	30–40 (%)	41–50 (%)	51–60 (%)	61–70 (%)	P
Rectus sheath block	Male	First reading	5 (8.6)	14 (24.1)	4 (6.8)	2 (3.4)	<0.001
		Second reading	2 (3.4)	6 (10.3)	14	3 (5.1)	
		Third reading	1 (1.7)	10 (17.2)	10 (17.2)	4 (6.8)	
	Female	First reading	0	4 (6.8)	1 (1.7)	-	
		Second reading	0	1 (1.7)	4 (6.8)	0	
		Third reading	0	3 (5.1)	1 (1.7)	1 (1.7)	
Subcutaneous infiltration	Male	First reading	4 (6.8)	20 (34.4)	0	0	<0.001
		Second reading	2 (3.4)	20 (34.4)	2 (3.4)	0	
		Third reading	1 (1.7)	18 (31.0)	4 (6.8)	0	
	Female	First reading	3 (5.1)	1 (1.7)	0	0	
		Second reading	-	4 (6.8)	0	0	
		Third reading	1 (1.7)	3 (5.1)	0	0	

concluded that rectus sheath block technique was efficient in relieving post-operative pain and decreasing post-operative opioid requirement ( $P < 0.001$ ). Our study was in agreement to the study done by Crosbie *et al.*<sup>[13]</sup>

The present study was in agreement with studies done by Khorgami *et al.* and Crosbie *et al.* in terms of reduction in post-operative pain, rescue analgesic requirement, post-operative morbidity, and in improving lung function.<sup>[10-13]</sup>

## CONCLUSION

The patients from rectus sheath block group showed a statistically significant decrease in post-operative pain in terms of VAS scores compared to that of subcutaneous bupivacaine infiltration group. There was statistically significant decreased use of opioids as rescue analgesic in the rectus sheath group compared to that of the subcutaneous bupivacaine infiltration group.

### What this Study add to Existing Knowledge

Effective pain relief provided by that of the rectus sheath block group lead to significant improvement in PEFR values in the post-operative period compared to that of subcutaneous infiltration group. Implying that rectus sheath block was efficient in restoring post-operative pulmonary function compared to that of the subcutaneous infiltration group.

### Limitation of our Study

1. Small sample size
2. Chances of bias
3. Single-center trial.

### Contribution by Different Authors

First author: Dr. Sangeeta Chauhan, Assistant Professor, Dept. of Anaesthesiology, LNMC, Bhopal: Concept and data collection.

Second author and Corresponding Author: Dr. Chandra Shekhar, Assistant Professor, Department of

Anaesthesiology, LNMC, Bhopal: Concept and data collection.

Third author: Dr. Kiran Bhatia, Associate Professor, Department of Anaesthesiology, SHKM GMC, Nalhar, Haryana: Discussion and guidance.

Fourth author: Dr. Sumit Bhargava, Professor, and In-charge SICU, Department of Anaesthesiology,

LNMC, Bhopal: Discussion and guidance.

## REFERENCES

1. Dolin SJ, Cashman JN, Bland JM. Effectiveness of acute postoperative pain management: I. Evidence from published data. *Br J Anaesth* 2002;89:409-23.
2. Caristi D. Postoperative pain management: Organisation and audits. In: *Perioperative and Critical Care Medicine*. Milano: Springer; 2006. p. 171-88.
3. Sanfilippo F. *Pain Out International: Treatment of Postoperative Pain in Catania's Area*. Italy: University of Catania; 2012.
4. Saxena R, Joshi S, Srivastava K, Tiwari S, Sharma N, Valecha UK. Comparative study of ultrasound-guided abdominal field blocks versus port infiltration in laparoscopic cholecystectomies for post-operative pain relief. *Indian J Anaesth* 2016;60:578-83.
5. Quek KH, Phua DS. Bilateral rectus sheath block as the single anaesthetic technique for an open infraumbilical hernia repair. *Singapore Med J* 2014;55:e39-41.
6. Abo-Zeid MA, Al-Refaei AR, Zeina AM. Surgically-assisted abdominal wall blocks for analgesia after abdominoplasty: A prospective randomized trial. *Saudi J Anaesth* 2018;12:593.
7. Ibrahim M, El Shamaa H, Ads E. Efficacy of combined ultrasound guided anterior and posterior rectus sheath block for postoperative analgesia following umbilical hernia repair: Randomized, controlled trial. *Egypt J Anaesth* 2016;32:519-26.
8. Shah MK, Kulkarni SS, Fun W. The analgesic efficacy of ultrasound-guided modified rectus sheath block compared with wound infiltration in reduction of postoperative morphine consumption in women undergoing open hysterectomy or myomectomy: A randomized controlled trial 14/09/2012 trial. *J Obstet Anaesth Crit Care* 2012;2:74.
9. Gupta M, Naithani U, Singariya G, Gupta S. Comparison of 0.25% ropivacaine for intraperitoneal instillation v/s rectus sheath block for postoperative pain relief following laparoscopic cholecystectomy: A prospective study. *J Clin Diagn Res* 2016;10:UC10-5.
10. Aman Z, Qayum A, Khan K. A study of effectiveness of local bupivacaine infiltration of the wound reducing the post-operative parenteral narcotic

- analgesic requirement. *J Postgrad Med Inst* 2004;18:7-11.
11. Jensen MP, Chen C, Brugger AM. Interpretation of visual analog scale ratings and change scores: A reanalysis of two clinical trials of postoperative pain. *J Pain* 2003;4:407-14.
  12. Khorgami Z, Shoar S, Araghi NH, Mollahosseini F, Nasiri S, Ghaffari MH, *et al.* Randomized clinical trial of subcutaneous versus interfascial bupivacaine for pain control after midline laparotomy. *Br J Surg* 2013;100:743-8.
  13. Crosbie EJ, Massiah NS, Achiampong JY, Dolling S, Slade RJ. The surgical rectus sheath block for post-operative analgesia: A modern approach to an established technique. *Eur J Obstet Gynecol Reprod Biol* 2012;160:196-200.

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