



## Efficacy of Rectus Sheath Block for Postoperative Pain Management: A Comparison with Epidural Analgesia

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### Abstract

**Background:** Rectus sheath block is an effective modality in postoperative management of pain after midline laparotomy. It compares favourably with gold standard of epidural analgesia in terms of pain scores and need for rescue doses of opioids and NSAIDs. We report our experience with rectus sheath block administered via catheters placed surgically by operating surgeon during midline laparotomies.

**Material and Methods:** 50 patients undergoing midline laparotomy for gynaecological oncosurgery were randomized to epidural block (EA) and rectus sheath block arms. Pain scores, need of and time to rescue analgesia, time to ambulation and functional GI recovery were compared in the two groups.

**Results:** Rectus sheath block was associated with an earlier onset of analgesia and a trend towards lower pain scores, earlier ambulation and GI recovery compared to epidural block.

**Conclusion:** Rectus sheath block is an effective modality for postoperative pain relief in gynaecological oncosurgery and is comparable to epidural analgesia in efficacy with minimal adverse effects.

**Keywords:** Rectus sheath block, gynaecological oncosurgery, midline laparotomy, epidural analgesia, pain scores.

### Introduction

Effective postoperative analgesia is an essential component of enhanced recovery after major gynaecological oncosurgery, by contributing to early ambulation, early alimentation and reduced pulmonary and thromboembolic complications. Epidural analgesia (EA) remains the gold standard for postoperative analgesia following midline laparotomies however may not always be possible due to patient specific contraindications, non-availability of anaesthesiology staff, perioperative change in surgical plan and OT time constraints. In 30 – 35% of cases epidural catheter insertion

may be technically difficult or may not produce adequate analgesia postoperatively. Concerns with use of EA include hypotension, motor block and increased requirement of anaesthetic and nursing personnel. The awake insertion of epidural catheter may not be acceptable to all patients. Use of pharmacological thromboprophylaxis in patients has to be moderated depending on time of epidural catheter placement.

Patient controlled analgesia using parenteral opioid agents is an effective alternative but may not be readily available in resource poor settings and side effects of opioids such as nausea,

vomiting and prolonged ileus may hamper early recovery.

Bilateral Rectus sheath catheters placed intraoperatively by operating surgeon between the rectus abdominis muscle and posterior rectus sheath can provide effective postoperative analgesia after midline laparotomies without adversely impacting operative time, manpower requirement and postoperative recovery. Since catheters are inserted under GA during surgery, patient acceptability is better. Insertion under direct vision ensures precise placement of catheter and obviates need of sonographic equipment and specialised training. Periodic or continuous administration of local anaesthetic agents through rectus sheath catheters provide analgesia equivalent to EA. The method achieves pain relief by blockade of anterior division of T6-T11 intercostal nerves to produce midline parietal analgesia. Visceral pain is controlled by rescue doses of parenteral opioids and NSAIDs.

### **Materials and Methods**

Institutional ethical clearance was obtained for carrying out the study from hospital Institutional Review Board.

50 patients undergoing midline laparotomy for radical hysterectomy or surgical staging were randomized to Epidural analgesia (EA, n=25) and Rectus sheath block (RSB, n=25) arms. Postoperatively both groups received periodic top up doses of 0.125% (10ml bolus) and 0.25% (20ml bolus) Bupivacaine administered 6 hourly, starting from time of conclusion of surgery, in epidural and rectus sheath catheters respectively. Both groups received Inj Paracetamol 1g IV and Inj Tramadol 50mg IV 6 hourly and Diclofenac 100mg rectal suppository once daily. Rescue doses of Inj Mepiridine 75mg were administered on demand.

### **Study parameters:**

Pain score was recorded by 10cm vertical Visual Analogue Score (VAS) and Prince Henry Hospital Pain Score (PHHPS). Score was recorded at 30 and 60 min, 2,4,6,12 and 24h in resting position and at 24 and 36h after ambulation in

postoperative ward. Time to first rescue dose and number of rescue doses of Meperidine were noted. Time to first ambulation and alimentation were recorded. Return of alimentation was defined as tolerance of full planned daily diet, passage of flatus and bowel movement.

### **Anaesthesia Technique:**

Both groups received general anaesthesia with thiopentone induction, intubation after succinylcholine and maintenance with isoflurane and atracurium.

### **Technique of Epidural Block:**

Epidural catheter was placed in awake state prior to induction of anaesthesia by loss of resistance technique using air between T9 -T11 spaces. Bolus dose of 10ml 0.125% Bupivacaine was administered at end of surgery and repeated 6 hourly after negative aspiration test till catheter removal 72 hours postoperatively.

### **Technique of Rectus Sheath Block:**

Rectus sheath catheters were placed bilaterally prior to abdominal closure under direct vision, introduced by 16G Tuohy needle 4cm lateral to cranial end of incision, between rectus abdominis muscle and posterior rectus sheath and passed through till 10cm mark. Placement of catheters was confirmed by direct inspection and palpation. Catheters were fixed to skin by Steristrips<sup>TM</sup>. Bolus dose of 20ml 0.25% Bupivacaine was administered bilaterally at completion of surgery and repeated 6 hourly after negative aspiration test till catheter removal 72 hours postoperatively.

### **Recording of Data:**

Demographic data like age, weight, BMI were noted. Type of surgery and operative time were noted. Painscores were noted by VAS and PHHPS at 30min, 60 min, 2, 4,6,12,24 and 48h at rest and on deep breathing, coughing and after ambulation. Time to first dose of rescue analgesia and total number of doses was recorded. Time to first ambulation was noted. Time to functional GI recovery as defined was noted.

### **Statistical Analysis:**

Data was analysed using MS Excel, Epi Info -6 and SPSS 15.0 statistical software. To detect

statistically significant differences between two groups by keeping  $\alpha = 0.05$  and power of study 95%, a minimum sample size of 25 is required for each subgroup. The observations were tested for statistical significance using Student-t and chi square tests.

**Results**

The two groups were comparable in terms of demographic and surgical variables including nature of diagnosis, surgery and operative time. (Table-1).

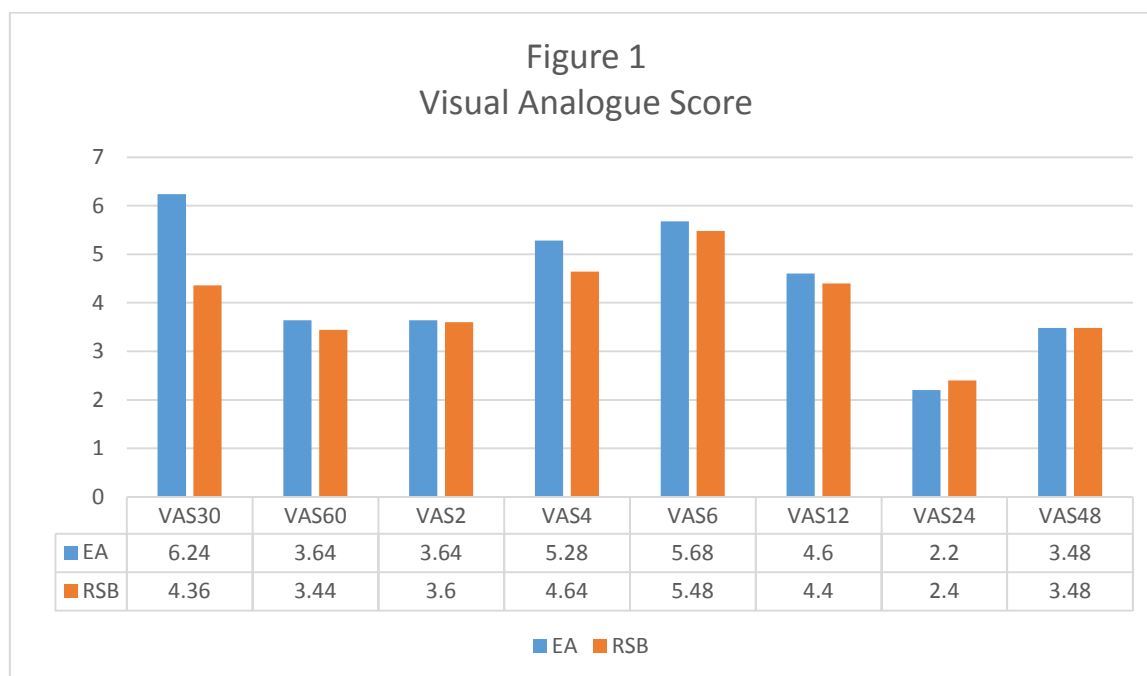
Variable	Epidural Group n=25	Rectus sheath group n=25
Age 30-40	3	4
Age 40-50	6	7
Age 50-60	8	6
Age 60-70	6	6
Age 70-80	2	2
CA Cervix RAH	7	7
CA Ovary Primary CRS	3	3
CA Ovary Interval CRS	8	8
CA Endometrium Staging	7	7
ASA I	11	11
ASA II	7	7
ASA III	7	7
Mean operative time (min)	160	160

Pain score by VAS was less in RSB group at 30 min probably indicating earlier onset of analgesia with rectus sheath block compared to epidural analgesia. VAS at 30min for EA group was 6.24 and RSB group was 4.36. The t value is 9.33. The p value is  $< 0.00001$ . The result is statistically significant.

Pain score at 60 min was 3.64 and 3.44 and at 2h was 3.64 and 3.6. The difference did not reach statistical significance.

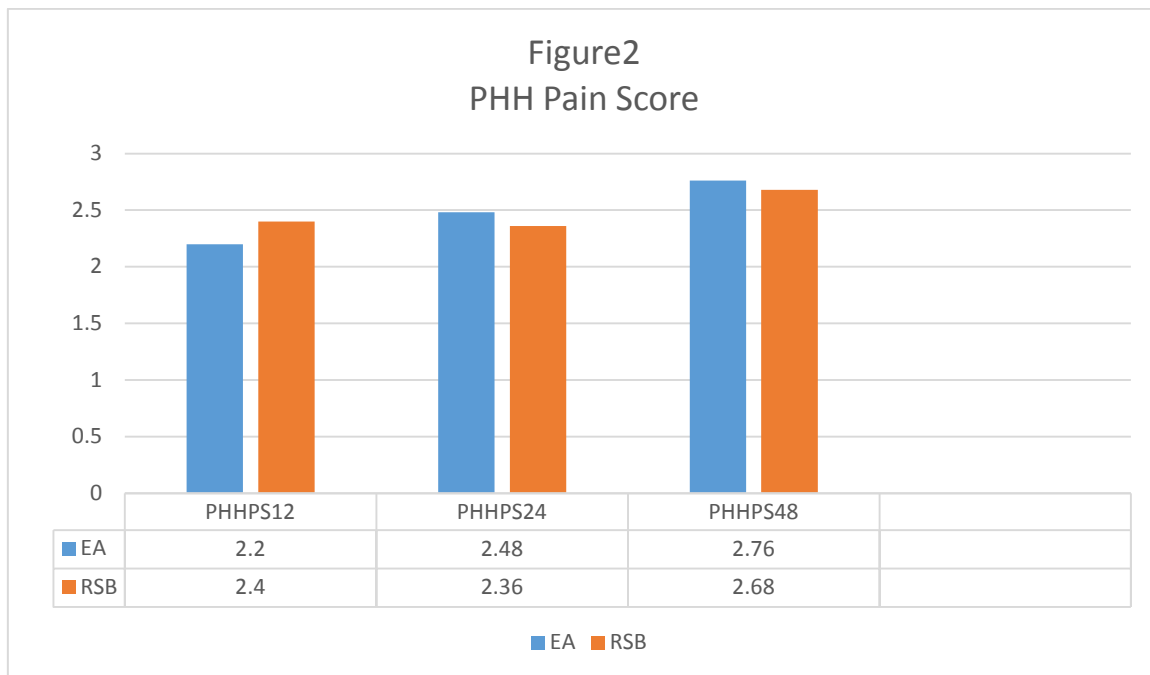
VAS at 4h was 5.28 and 4.64. For VAS at 4h, t-value is 3.28313. The p-value is .00096. The result is significant at  $p < .05$ .

VAS at 6h was 5.68 and 5.48, 12h was 4.6 and 4.4, 24h was 3.64 and 3.48, in the EA and RSB groups respectively and at 48h was 3.48 in both groups. The difference in scores in the EA and RSB groups however did not reach statistical significance. (Figure 1)



PHHPS at 12h was 2.2 and 2.4, at 24h was 2.48 and 2.36 and at 48h was 2.76 and 2.68. The

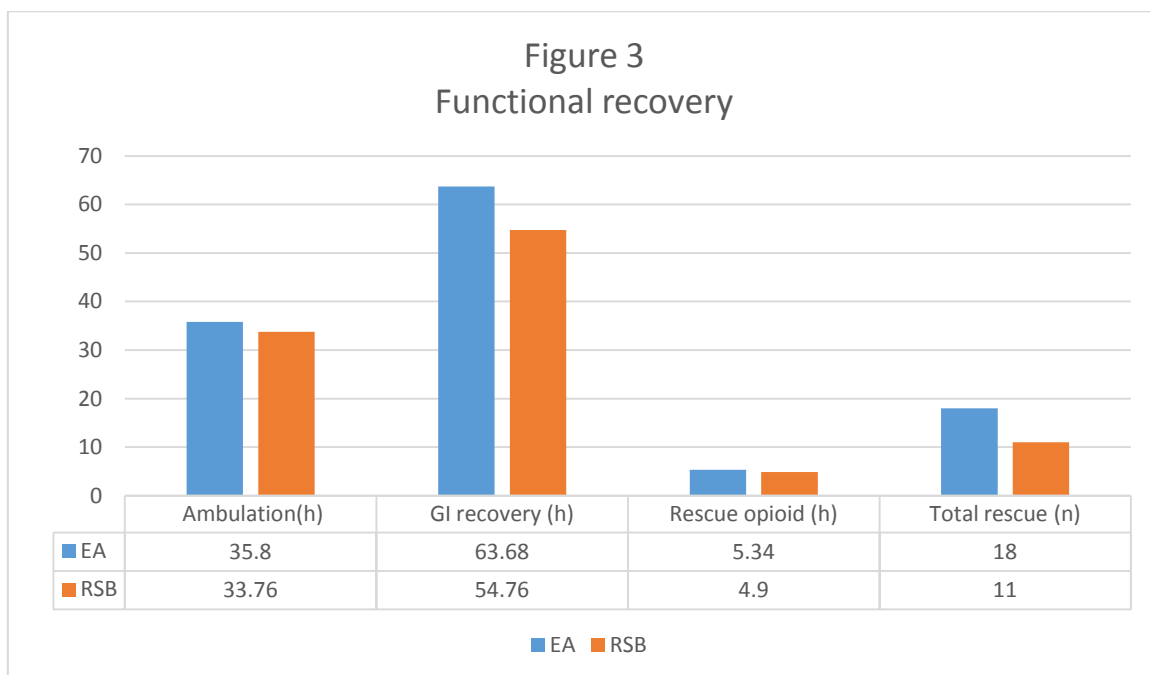
difference was not statistically significant. (Figure 2)



The time to ambulation was 35.8h in EA group versus 33.76h in RSB group. The difference was not statistically significant.

Time to complete GI functional recovery was 63.68h in EA group versus 54.76h in RSB group. The t-value is 4.68609. The p-value is .000012. The result is significant at  $p < .05$ .

18 patients in the EA group required rescue analgesia with an average time to rescue of 5.34h. 11 patients in the RSB group required rescue doses of opioids with average time to rescue of 4.9h. The difference is not statistically significant. (Figure 3)



The mean cumulative opioid dose was 223.68mg in EA group versus 248.48 in RSB group. The difference did not reach statistical significance.

## Discussion

This study compared efficacy of Epidural analgesia with Rectus sheath block in post operative pain management following midline laparotomy in gynaecological oncosurgery. The two groups were comparable in terms of demographic and surgical variables. Our results showed earlier onset of pain relief, lesser pain scores, reduced need for rescue analgesia and earlier functional GI recovery in the rectus sheath block group.

Anwar et al reported their experience with a mixture of bupivacaine 2ml/kg and clonidine 1µg/kg with normal saline, injected 30ml to each sheath before closure under direct vision. They reported a reduced requirement for postoperative analgesia in abdominoplasty patients with this technique.<sup>(1)</sup>

Dutton et al reported rectus sheath block was an effective alternative to thoracic epidural analgesia however described an incidence of ileus equivalent in both methods. We observed faster recovery of bowel function with RSB as compared to EA in our study.<sup>(2)</sup>

Willschke HB et al described the use of sonographically placed rectus sheath catheters for perioperative analgesia in paediatric patients undergoing umbilical hernia repair and reported adequate perioperative pain relief.<sup>(3)</sup>

Isaac et al compared the rectus sheath block(RSB) with local anesthetic infiltration(LAI) into the surgical incision in paediatric undergoing repair of umbilical hernia. They reported that postoperative pain control as the primary outcome, indicated by postoperative morphine requirement, did not differ significantly between the two groups.<sup>(4)</sup>

In contrast, Gurnaney et al compared rectus sheath catheters placed under USG guidance with local anaesthetic infiltration for postoperative pain relief and found lower pain scores with RSB. They attributed the variation with previous studies to the accurate placement of rectus sheath catheters under USG guidance.<sup>(5)</sup>

Monika Gupta et al compared intraperitoneal instillation of local anaesthetic agent with rectus sheath block following laparoscopic cholecyste-

ctomy. They observed significantly lower PHHPS pain scores on movement and coughing in RSB group compared to intraperitoneal instillation.<sup>(6)</sup>

RSB use has been described in a wide variety of surgeries including umbilical hernia repair in paediatric patients, abdominoplasty, laparoscopic and urologic surgeries. Husain et al reported use of combined bilateral ilio-inguinal and rectus sheath blocks for elective gynaecological operations with a Pfannenstiel incision. They found that the block produced effective analgesia without need for supplementary analgesia.<sup>(7)</sup>

In another study, Cornish et al reported the results using rectus sheath catheters for upper abdominal surgery and obtained effective analgesia using this system.<sup>(8)</sup>

In a case series by Bakshi et al, they found RSB to be an effective alternative to epidural analgesia in cases where epidural analgesia was not a viable option.<sup>(9)</sup>

Sune Cuneyitoglu et al found superior analgesic efficacy with rectus sheath catheters placed under USG guidance compared to surgically placed catheters.<sup>(10)</sup>

## Conclusion

Rectus sheath block is an effective modality for postoperative pain relief in major gynaecological surgery. In our study, we found it to be as effective as epidural analgesia in terms of postoperative pain scores, with a faster onset of action and faster functional recovery in terms of ambulation and return of bowel function.

**Conflicts of interest:** None

**Source of funding:** Institutional resources. No external funding has been used in conduct of this study.

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