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Safety/QA/QI Projects

# Efficacy of surgically-inserted rectus sheath catheters, epidural and patient-controlled analgesia for major urologic surgeries

Rebecca Entz, Vivian Ip, Rakesh Sondekoppam, Niels-Erik Jacobsen, Adrian Fairey

University of Alberta

## Introduction

Protocols for Enhanced Recovery After Surgery recommend epidural analgesia in open surgical procedures, however, epidurals have associated risks, and their success depends upon a variety of factors including the anesthesiologists' skill set, diligent follow-up care and adequate nursing staff training. Contrastingly, interfascial plane blocks such as rectus sheath (RS) catheters are gaining popularity as a peri-operative pain adjunct with comparable efficacy and considerably less risks than epidurals.1 In fact, the use of RS catheters has been found to be effective and safe in patients undergoing major open urologic procedures2 but the utility of surgically-initiated RS (SI-RS) catheters is currently unknown.3 At our institution, the practice of SI-RS catheters using visualization and tactile sensation while palpating the rectus muscle prior to incision closure has been offered for patients undergoing open urologic surgeries since August 2013, and has become a stable component of multimodal analgesia (MMA) regimen for these surgeries. The analgesic efficacy of these surgically-initiated blocks has not been compared to other analgesic modalities.

In this retrospective audit, we aim to examine the analgesic and non-analgesic benefits of SI-RS catheters in comparison to a patient-controlled-analgesic (PCA)-based or epidural-based MMA following open cystectomies and cystoprostatectomies.

## Materials and Methods

This study was approved by our institutional ethics committee and patient consent was waived. All adult patients undergoing cystectomy/cystoprostatectomy at our institution, the University of Alberta Hospital in Canada, from January 2010 to December 2016 (inclusive) were considered for eligibility. The date was selected to include about 3 years of data before and after the practice of SI-RS catheter insertion became the routine. Our inclusion criteria were >17 years old, elective open cystectomy/cystoprostatectomy, American Society of Anesthesiologist physical status classification (ASA) I-III. Eligible patients were then grouped into PCA-only (no block), RS with PCA (SI-RS), and thoracic epidural analgesia (TEA). In the epidural group, patients received 4 microgram/mL of hydromorphone and 0.1% bupivacaine via the epidural catheter did not have additional PCA, whereas those with plain 0.2% ropivacaine received an additional PCA pump.

Our primary outcome was pain score on movement at 24 post-operative hours. Secondary outcomes included intraoperative and post-anesthesia care unit (PACU) opioid consumption, visual analogue scale (VAS 0-10) on movement at 12, 24, 48 and 72 postoperative hours, length of PACU and hospital stay, need for ICU stay and incidence of nausea/vomiting. We are sharing the preliminary analysis of this data and given the variability in the use of opioid analgesia (oral versus IV-PCA versus epidural opioids), we chose to include the use of IV-PCA as a covariate instead of analyzing the total opioid usage with each modality.

The pain scores were analyzed after dichotomizing them to acceptable (VAS ≤ 5/10) versus not acceptable (VAS > 5/10) while non-pain outcomes were similarly dichotomized (LOS<5 vs > 5 days; Days to resumption of oral diet or to patient mobilization < 2 vs >2 days; Probability of ICU stay (Y/N); probability of using <10 vs >10 MME of opioids intra-op and in PACU; and the probability of staying in the PACU <90 vs >90 minutes. Multivariable logistic regression was performed for these dichotomized outcomes with the analgesic modalities as the grouping variable while age, sex, BMI, ASA classification, smoking status, chronic pain, opioid dependence, psychiatric illness, history of COPD, DM or a history of recreational drug use as the covariates.

## Results/Case Report

There were 133 eligible charts included in our review. Of these, 59 patients were in the no block group, 50 patients in the SI-RS group and a smaller group of 24 patients were in the TEA group. (Table.1) Some data was not reliably recorded in patient charts and thus was not obtained for analysis.

The primary outcome of pain score on movement at 24 postoperative hours as assessed by the multinominal logistic regression model for the probability of having a VAS (0-10) score of less than 5/10 was significantly higher with the use of either SI-RS or TEA compared to having no blocks and there was not much difference between the two groups of SI-RS or TEA. (Figure.1) A similar result was noted for pain scores on movement at other time points as well. The use of SI-RS or TEA or no block did not result in decreased ICU admissions, decreased time to mobilization, time to the resumption of oral diet or the length of hospital stay. The use of TEA resulted in a longer length of PACU stay despite the modality showing an association with lower intraoperative and PACU opioid consumption. There was no difference in the incidence of nausea and vomiting with the use of different analgesic modalities, but this outcome was weakly associated with the use of IV-PCA. No leakage was noted in any of the 50 RS catheter (catheter-over-needle type) placed and only 1 RS catheter dislodgement was identified.

## Discussion

The reported pain score on movement was lower with the use of SI-RS or TEA and were comparable. Use of TEA, while resulting in lower opioid consumption intraoperatively or in the PACU, surprisingly resulted in a longer length of stay in the PACU and were not associated with any significant benefits in terms of analgesia or non-analgesic outcomes. While we report the preliminary results, we advise caution given the nature of the data with its limitations (retrospective audit) and the small sample size.

We noted there were no leakage in the catheter-over-needle assemblies used for RS insertion which aid in preventing premature dislodgement of catheters. With catheter-over-needle assemblies, the needle is housed within the catheter meaning upon withdrawal of the needle during catheter placement, resulting in ‘snug-fit’ of the catheter to the skin, thereby preventing leakage and subsequent dressing disturbance and catheter dislodgement.

The limitations of our study are intrinsic to its retrospective design with missing and inconsistencies of recordkeeping that made some of our initial goals for data analysis a challenge.

Further prospective, randomized-controlled studies are necessary to determine whether surgeon-initiated rectus sheath catheters are an effective analgesic when compared to other analgesic modalities for patients undergoing open abdominal urologic procedures.

## References

[1] Parsons BA, Aning J, Daugherty MO, McGrath JS. The use of rectus sheath catheters as an analgesic technique for patients undergoing radical cystectomy. British Journal of Medical and Surgical Urology. 2011 Jan;4(1):24-30.

[2] Dutton TJ, McGrath JS, Daugherty MO. Use of rectus sheath catheters for pain relief in patients undergoing major pelvic urological surgery. BJU international. 2014 Feb;113(2):246-53.

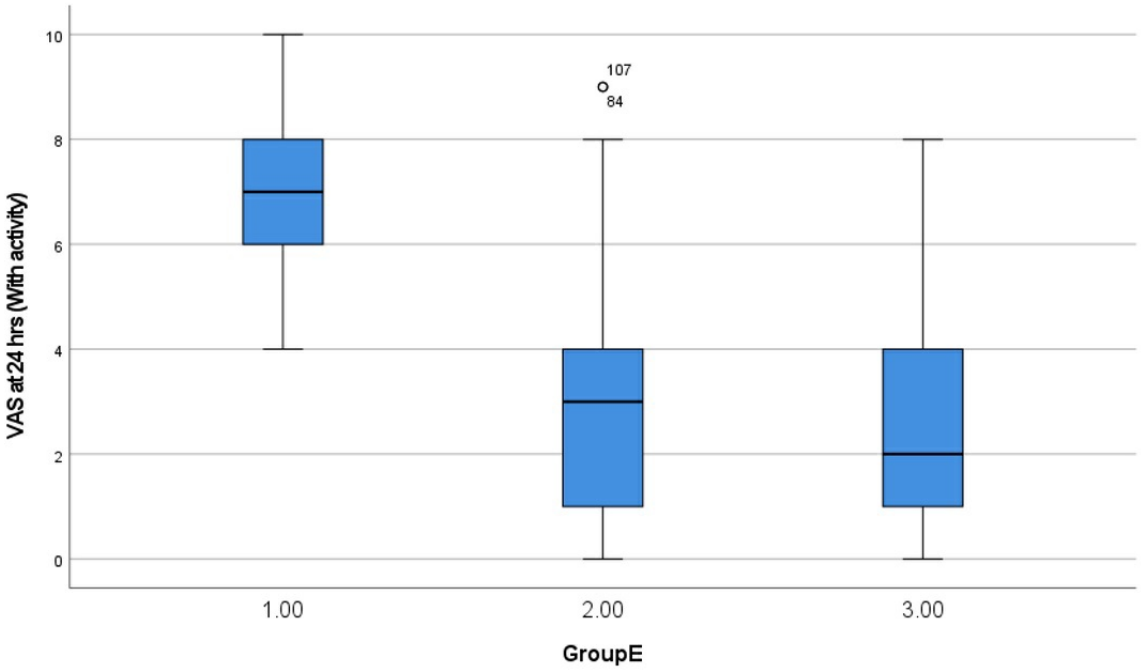
[3] Ip VH, Khurana J, Jacobsen NE, Fairey AS, Sondekoppam RV. How I Do It: Technical report on surgically-initiated rectus sheath catheter using catheter-over-needle assembly. The Canadian Journal of Urology. 2021 Oct 1;28(5):10871-3.

## Disclosures

No

## Tables / Images

Figure 1. Figure showing the pain score on activity at 24 hours following open abdominal urologic surgeries.




Group E = Different groups of analgesic modalities
1.00 = no block group
2.00 = SI-RS (Surgically-initiated rectus sheath catheter) group
3.00 = TEA (Thoracic epidural analgesia) group
VAS = visual analogue scale (0-10)

Table 1. Table showing demographic data and selected secondary outcomes with median and interquartile range

| Characteristics | Different analgesic modalities Median (Interquartile range) | | |
|---|---|---|---|
| | No block | SI-RS | TEA |
| Age (years) | 68 (59-77) | 70 (65.5-74.5) | 70 (64.5-75.5) |
| Height (centimeters) | 173 (168-178) | 170 (164.1-175.9) | 173 (166.25-179.75) |
| Weight (kilograms) | 81 (68.25-93.75) | 86.5 (74.7-98.3) | 84 (71-97) |
| ASA classification | 3 (2.5-3.5) | 3 (2.5-3.5) | 3 (2.5-3.5) |
| Days to oral diet (days) | 4 (3-5) | 3 (1-5) | 4 (2-6) |
| Days to mobilization (days) | 2 (1.5-2.5) | 2 (1.5-2.5) | 2 (1.5-2.5) |
| Total length of stay (days) | 12 (5-19) | 13 (6-20) | 14 (5.5-22.5) |