
HOW I DO IT

How I Do It: Technical report on surgically-initiated rectus sheath catheter using catheter-over-needle assembly

Vivian H. Y. Ip, MBChB,¹ Jaasmit Khurana, MD,¹ Niels-Erik Jacobsen, MD,² Adrian S. Fairey, MD,² Rakesh V. Sondekoppam, MBBS³

¹Department of Anesthesiology and Pain Medicine, University of Alberta Hospital, Edmonton, Alberta, Canada

²Division of Urology, Department of Surgery, University of Alberta Hospital, Edmonton, Alberta, Canada

³Department of Anesthesia, University of Iowa, Iowa City, Iowa, USA

IP VHY, KHURANA J, JACOBSEN N-E, FAIREY AS, SONDEKOPPAM RV. How I Do It: Technical report on surgically-initiated rectus sheath catheter using catheter-over-needle assembly. *Can J Urol* 2021;28(5):10871-10873.

Development of chronic postsurgical pain following major abdominal or pelvic surgeries is increasingly recognized. Multimodal analgesia including regional anesthesia such as rectus sheath block is growing in popularity. While the literature mainly describes ultrasound-guided rectus sheath blocks, there are many advantages to surgically-initiated rectus sheath catheter performed at the end of surgery. In this technical description, we describe the

rationale and technique of surgical insertion of rectus sheath catheters following major urologic surgery with midline incision which is routinely performed by urologists at our institution. Furthermore, we would like to highlight the type of catheter used during rectus sheath catheter insertion, namely the catheter-over-needle assembly. It is simple to insert while minimizing complications such as local anesthetic leakage at the insertion site causing dressing disruption and premature catheter dislodgement, as the catheter-over-needle assembly fits snugly with the skin after insertion.

Key Words: rectus sheath catheter, nerve block, open urologic surgery, catheter-over-needle assembly

Introduction

There is growing evidence for chronic postsurgical pain with incidence varying between 15% to 30% following minor and major abdominal or pelvic procedures.¹ One of the predictors of chronic postsurgical pain development is acute postoperative pain which is a significant problem,² and evidence demonstrating regional anesthesia reduces chronic pain is emerging.³ The rectus sheath block was first described by Schleich in 1899 and was initially used for abdominal wall muscle relaxation and analgesia during midline laparotomy by blocking the terminal branches of the thoracolumbar nerves. It has shown to reduce pain

scores and opioid consumption following major pelvic urological procedures and laparotomy.^{4,5}

While most literature described ultrasound-guided rectus sheath single shot or catheter insertion preoperatively, there is a paucity of literature on surgically-inserted rectus sheath catheters. The main advantages of such technique are the ability to accurately position the catheters by tactile feel, no requirement of 'soak time' pre-operatively prior to surgical incision, and early recognition of bowel injury should one occurs.

Herein, we would like to provide a stepwise technique of surgically inserted rectus sheath catheter performed at our institution since 2013 for major open pelvic urologic surgeries. We perform approximately 90 such surgeries annually.

Method and technique

Written, informed consent has been obtained prior to the technical description and recording of the surgically inserted rectus sheath catheter. At our institution, major

Accepted for publication June 2021

A video clip is available online at www.canjurol.com

Address correspondence to Dr. Vivian H. Y. Ip, Department of Anesthesiology and Pain Medicine, University of Alberta Hospital, Edmonton, Alberta, Canada

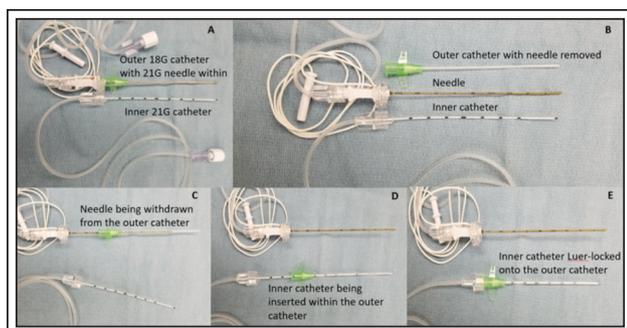


Figure 1. Figure showing the catheter-over-needle (CON) assembly with the 21G needle within the 18G outer catheter, and the inner catheter replacing the needle. **A)** Needle within the outer catheter for insertion. **B)** Needle removed from outer catheter and the needle shares the same diameter and length with the inner catheter. **C)** Needle being removed from the outer catheter **D)** Inner catheter being inserted into the outer catheter. **E)** Inner catheter Luer-locked onto the outer catheter.

open pelvic urologic surgery, such as open radical cystoprostatectomy with ileal conduit urinary diversion is performed using a midline incision. At the end of surgery before abdominal closure, bilateral rectus sheath catheters are inserted. The rectus muscle lies anterior to the transversalis fascia and the posterior rectus sheath. The objective is to position the catheter tip above the posterior rectus sheath but below the rectus muscle at about T8 to T10 dermatomal level. One hand is placed within the abdominal cavity to palpate the rectus muscle. A 21G 75 mm catheter-over-needle (CON) assembly (E-Cath system, Pajunk, Gesingen, Germany) is used. This unit is similar to an intravenous cannula whereby

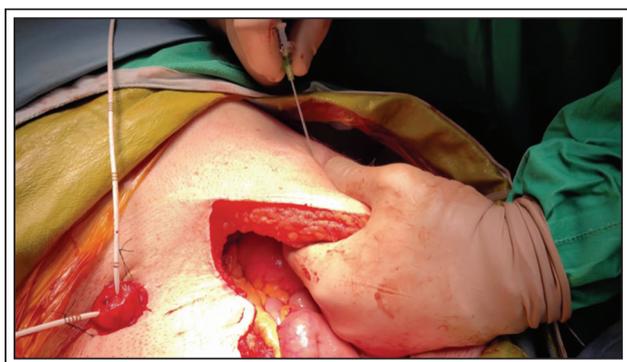


Figure 2. The catheter-over-needle (CON) assembly is inserted in a cephalad-to-caudad direction, advancing through the rectus muscle while the hand is placed intra-abdominally to feel for the needle advancement.

the 18G catheter encompasses the 21G needle, Figure 1. With the abdomen still opened, the CON assembly is inserted at approximately 45-degree angle to the skin in a cephalad-to-caudad direction, advancing towards the rectus muscle while staying above the posterior rectus sheath and transversalis fascia, Figure 2. A tactile feel helps guiding the location of the needle tip. Once in place, the needle is withdrawn while keeping the outer catheter in situ. The inner catheter which is the same diameter and length of the needle replaces the needle and luer-locked onto the outer catheter. For those urologic procedures with ileal conduit and a stoma, the rectus sheath catheter is directed from caudad-to-cephalad to avoid the stoma, while keeping the target position of the catheter tip at T8 to T10 dermatomal level.



Figure 3. Figure showing the rectus sheath catheters with the abdomen closed.

Bilateral rectus sheath catheters insertion usually takes less than 2 minutes. The skin is then closed using staples, Figure 3 and the rectus sheath catheter is secured with suture and sterile dressings.

Local anesthetic infusion via rectus sheath catheter

A bolus of 20 mL 0.25% bupivacaine is injected through both rectus sheath catheters after negative aspiration for blood. In the post-anesthetic care unit (PACU), the rectus sheath catheter is connected to an electric pump (CADD Solis®, Smiths Medical, Minneapolis, MN, USA) programmed to deliver an intermittent bolus of 15 mL of 0.2% ropivacaine every 4 hours, with the first pump bolus no sooner than 2 hours post initial local anesthetic bolus in the operating room. Patient also has regular acetaminophen and a patient-control analgesia (PCA) pump with hydromorphone or morphine as part of the multimodal analgesia. Once the patient tolerates oral fluid, the PCA is transitioned to oral analgesia (usually occurs on postoperative day 1 or 2), typically regular acetaminophen/tramadol with hydromorphone as breakthrough when required, while continuing the local anesthetic boluses via the rectus sheath catheter. The rectus sheath catheter is usually discontinued on post-operative day 3 with the aim to reduce opioid consumption during its use with a length of stay about 6 to 10 days. There has been conflicting evidence of whether intermittent bolus of local anesthetic offers superior analgesia compared to continuous infusion. The studies have been small and mostly observational. However, there is a recent prospective, randomized, controlled trial with 57 participants randomized into 4 arms: single bolus, intermittent bolus, continuous infusion and control which found that intermittent bolus demonstrated better patient satisfaction but did not reduce opioid consumption compared to the continuous infusion group.⁶ Nonetheless, abundance of caution is required when interpreting this study due to a small sample size using 4 comparison groups, as well as the heterogeneous nature of surgeries. The space between the rectus muscle and the posterior rectus sheath has no border, therefore, it seems logical to deduce that a large intermittent bolus may fare better than an insidious continuous infusion, larger robust randomized controlled studies are warranted. It is important to note that the rectus muscle plane necessitates cautious dosing of local anesthetic, especially for patients with low body weight to prevent local anesthetic systemic toxicity.

Advantages of the catheter-over-needle (CON) assembly

We should highlight the catheter used in the described technique is a CON assembly which has been shown to be more stable and less prone to leakage from the catheter insertion site compared to the traditional catheter-through-needle (CTN) techniques.⁷ This potentially offers the advantage of reducing catheter dislodgement since the dressing is not disturbed by the leakage of local anesthetics. Furthermore, its non-kink nature with 2 holes in the inner catheter (one on the distal end and the other proximally encased within the outer catheter once inserted), offers the advantage of 'backup' should the distal hole become occluded.

Conclusion

Rectus sheath catheters for local anesthetic infusion are used as an adjunct for postoperative analgesia following major urologic/pelvic surgeries. At our institution, surgeon-initiated rectus sheath catheter is quick and simple to perform at the end of surgery without impeding surgical access. Furthermore, the CON assembly reduces leakage and premature dislodgement. We hope our technical description will encourage other institutions to adopt this approach to enhance the pain management for patients following major urological surgeries. □

References

1. Gupta A, Gandhi K, Viscusi E. Persistent postsurgical pain after abdominal surgery. *Techniques in Regional Anesthesia and Pain Management* 2011;15(3):140-146.
2. Apfelbaum JL, Mehta SS, Gan TJ. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. *Anesth Analg* 2003;2(97):534-540.
3. Gan T. Poorly controlled postoperative pain: prevalence, consequences, and prevention. *J Pain Res* 2017;10:2287-2298.
4. Dutton TJ, McGrath J, Daugherty M. Use of rectus sheath catheters for pain relief in patients undergoing major pelvic urological surgery. *BJU Int* 2014;113(2):246-253.
5. Cornish P, Deacon A. Rectus sheath catheters for continuous analgesia after upper abdominal surgery. *ANZ J Surg* 2007;77(1-2):84.
6. Purdy M, Kinnunen M, Kokki M et al. A prospective, randomized, open label, controlled study investigating the efficiency and safety of 3 different methods of rectus sheath block analgesia following midline laparotomy. *Medicine (Baltimore)* 2018;97(7):e9968.
7. Ip V, Rockley M, Tsui B. The catheter-over-needle assembly offers greater stability and less leakage compared with the traditional counterpart in continuous interscalene nerve blocks: a randomized patient-blinded study. *Can J Anesth* 2013;60(12):1272-1273.