

Surgically placed rectus sheath catheters

Frank McDermott, Iain Wilson*, Patricia Boorman

*Correspondence Email: iainhwilson@mac.com

INTRODUCTION

The aim of modern surgical and anaesthetic practice is to facilitate the rapid recovery of patients with better anaesthesia, surgical techniques and analgesia, resulting in fewer complications and earlier return to normal activities. There are multiple techniques available for postoperative analgesia following laparotomy. These include patient controlled analgesia (PCA), epidural analgesia and intermittent injection of local anaesthetic agents via a rectus sheath catheter. All these modalities have risks and benefits that must be considered when planning postoperative pain management.

In our institution we use rectus sheath catheters placed by the operating surgeon with increasing frequency and have found this to be an efficient and safe technique. This article accompanies the following article, describing ultrasound guided insertion of rectus sheath catheters and provides an alternative technique that will be easier to adapt to use in settings where resources are limited.

BACKGROUND

The use of rectus sheath catheters for the administration of local anaesthetic is not new. In the 1950s several studies reported on the use of local anaesthetic catheters to reduce postoperative pain after gynaecological and general surgical procedures.¹⁻³ This technique has been further investigated with several papers demonstrating the benefit of either continuous or bolus administration of local anaesthetic,⁴⁻⁹ and others showing no difference.¹⁰⁻¹³ The technique is based on the blockade of the anterior division of the T6-T11 thoraco-abdominal intercostal nerves. These nerves leave the spinal cord dividing into anterior and posterior divisions. The anterior divisions pass posterior to the costal cartilages and then between the transversus abdominis and internal oblique muscles, before passing medially to pierce and supply sensation to the rectus and overlying skin. Therefore a catheter placed anterior to the posterior sheath will block these nerves and achieve reduced pain fibre transmission from a midline laparotomy wound (Figure 1).

Summary

Rectus sheath analgesia is a safe and reliable alternative to other techniques such as epidural catheters. Where the equipment or technical expertise is not available for ultrasound placed catheters, the surgeon can site bilateral catheters at the beginning or end of a laparotomy. The technique and safety aspects of rectus sheath catheters are described in this article.

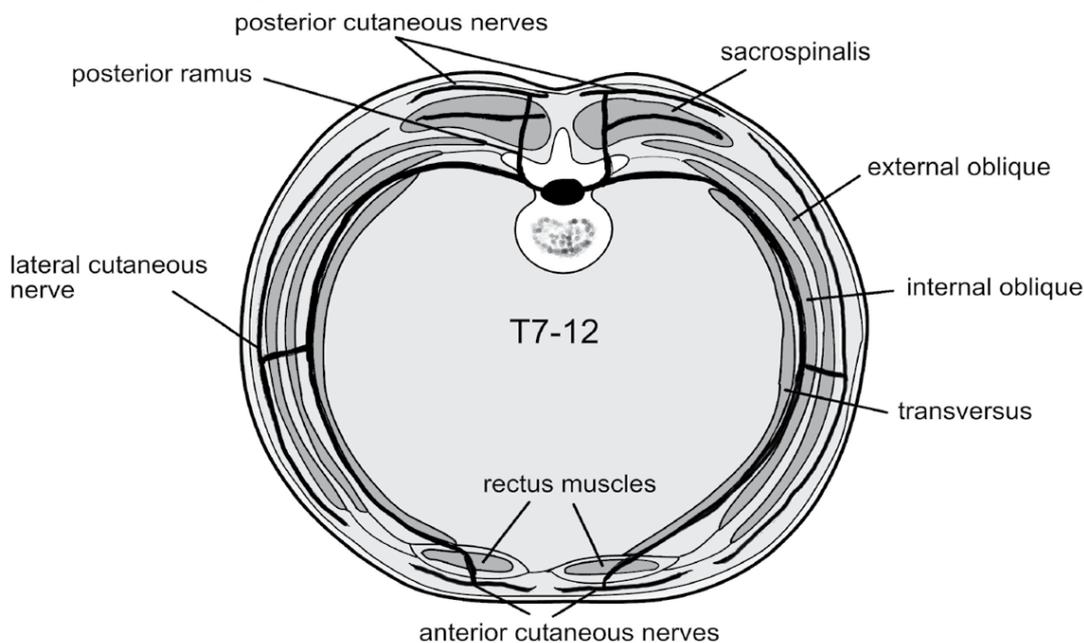


Figure 1. Axial cross-section of the abdomen demonstrating the anatomy of the intercostal nerves (reproduced courtesy of Katrina Webster and Dave Wilkinson)

Frank D McDermott
Registrar in Surgery

Iain H Wilson
Consultant Anaesthetist

Patricia Boorman
Consultant Surgeon
Royal Devon and Exeter NHS
Foundation Trust
Barrack Road
Exeter
EX2 5DE
UK

Our practice is to use epidural catheters which have multiple perforations at the end of the tubing (Smiths-medical 16G epidural mini-pack). A catheter is placed on each side at the superior end of the laparotomy wound; these may be placed at the beginning of surgery, when the peritoneum is first opened or at the end of surgery just prior to closure. The surgeon places one hand inside the abdomen and with the other hand inserts the Tuohy needle through the skin and fascia. The surgeon feels when the needle tip is just superficial to the interface between the peritoneum and muscle layer (Figure 2), and should also palpate and therefore avoid the inferior epigastric artery.



Figure 2. Insertion of a Tuohy needle for a left sided rectus sheath catheter. The surgeon is standing on the patients left, with his left hand within the abdomen and his right hand holding the needle

The stylet is then removed from the needle and the epidural catheter fed through until a 5cm length is in the peritoneum-muscle interface (Figure 3). The surgeon holds onto the catheter tip of the catheter while the needle is removed. The catheter is secured at this point, to avoid accidental removal. We use adhesive epidural catheter dressings (Smiths-medical 'Lock-it plus' - Figure 5); other centres secure them with silk or other suitable suture material. Once secured, a bacterial filter is connected and the catheter is flushed as they can occlude if left during abdominal closure.



Figure 3. Threading the catheter through the needle to leave 5cm within the space (usually 12-15cm at the skin)



Figure 4. Insertion of a right rectus sheath catheter

The procedure is repeated on the contralateral side and 20mls of 0.25% plain levo-bupivacaine is injected into each side. This initial bolus will block the intercostal nerves and augment analgesia as the anaesthetic is ended and through the recovery period until the next bolus.



Figure 5. Rectus sheath catheters in place

On the ward nursing staff administer local anaesthetic every 6 hours in to each catheter, usually with around 20mls of 0.25% levo-bupivacaine (the recommended maximum dose is 2mg.kg⁻¹ every 6 hours). Bupivacaine (non-isomeric) can be also be used. Great care should be taken that the recommended maximum dose of local anaesthetic agent is not exceeded (Table 1).

Table 1. Maximal allowable doses of local anaesthetic agents

	Plain local anaesthetic (mg.kg ⁻¹)	With epinephrine (mg.kg ⁻¹)
Bupivacaine	2	2
Lidocaine	3	7
Ropivacaine	3	3

The catheters must be inspected everyday for signs of infection or occlusion. They are usually weaned by day 4 but may be left in for up to a week. Although this technique is opioid-sparing, for large laparotomy wounds a morphine PCA (patient-controlled analgesia) pump is commonly prescribed for the first 24 hours.

CONCLUSION

We have found that this technique of surgically placed rectus sheath catheters is safe and provides good additional pain relief in most patients. It has the additional benefits of being quick and does not require use of ultrasound, which is not available in many hospitals. It is also not associated with the risks and side effects of epidural anaesthesia including hypotension, epidural abscess or spinal cord injury.

FURTHER READING

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