Insertion of paravertebral block catheters intraoperatively to reduce incidence of block failure

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Abstract

Paravertebral block catheters are a recognized method of regional pain control after a thoracotomy. We describe a technique of insertion with the belief that it provides a superior positioning of the paravertebral (extra-pleural) catheter resulting in a better distribution of the local anaesthetic and better pain control.

Keyword: Paravertebral catheter insertion

INTRODUCTION

Paravertebral block (PVB), which was first performed in 1905 to produce abdominal analgesia [1], is an alternative technique to thoracic epidural analgesia both being used as regional methods to control postoperative thoracotomy pain. The classic approach for performing PVBs uses loss of resistance to air or saline as the superior costa-transverse ligament is traversed. Injection of local anaesthetic into the paravertebral space by blocking the intercostal nerve, its dorsal ramus, the rami communicantes and the sympathetic chain, produces a dense sensory and sympathetic block [2].

In our centre, PVBs are inserted intraoperatively by thoracic surgeons. We describe a technique of insertion with the belief that provides a superior positioning of the paravertebral (extra-pleural) catheter resulting in better distribution of the local anaesthetic and better pain control.

TECHNIQUE DESCRIPTION

The classic surgical method for insertion of extra-pleural catheters is forming a tunnel lateral to the parietal pleura and placing the catheter as deep as possible in that tunnel. We have found that this method is associated with a significant leak of the local anaesthetic into the pleural space resulting in a less effective postoperative pain control.

We describe a Seldinger technique of the catheter insertion under vision. Intraoperatively, we use a trocar which is passed one space below the thoracotomy wound posteriorly. When its tip is visible in the extra-pleural space through the thoracotomy wound, the catheter is passed through the trocar and positioned to lie vertically covering two intercostal spaces (Supplementary Video 1). Ten milliliters of 2.5% Bupivacaine is injected into the catheter to ensure proper positioning (Supplementary Video 2). Ballooning of the extra-pleural space with no leak of the local anaesthetic into the pleural space is an indication for correct placement. We then use 2/0 silk sutures to secure the catheter. We believe that this method of insertion offers better pain control as the extra-pleural space is closed above the catheter tip allowing no leakage into the pleural space and there is coverage of more than one intercostal space.

DISCUSSION

PVBs are becoming more popular in the use of postoperative regional control of pain after a thoracotomy wound as there is a growing bulk of evidence [3, 4] for the efficacy of paravertebral catheters and patient-controlled analgesia as a safe alternative to epidural analgesia for post-thoracotomy pain after lung resections.

The timing of insertion of PVB is also important. We aim to insert PVB preemptively immediately after a thoracotomy rather than at the end of the procedure; as some studies have demonstrated better pain control [5].

It must be said that paravertebral catheters are not without drawbacks. PVBs have been associated with neurologic complications. Although uncommon, there is a risk of inadvertent neuraxial placement of the needle or of potentially puncturing a dural sleeve with a subsequent intrathecal injection [6]. Additionally, nearly 10% of patients have a clinically significant parasympathetic discharge at needle placement, resulting in hypotension, bradycardia and near syncope. This would be less common in our practice as PVBs are placed intraoperatively while patients are anaesthetized. Furthermore, continuous paravertebral nerve block may also be problematic in patients with spinal anomalies, trauma or a history of spine surgery [7]. As local anaesthetics are usually used in higher concentrations than in thoracic epidural analgesia, it would be logic to assume that patients are at higher risks of local anaesthetic toxicity.
Perhaps the ultimate side effect of PVB is a block failure with both the percutaneous approach and the open technique having a relatively high failure rate of approximately 10% [1]. This failure rate might be due to the interference of the endothoracic fascia. Once the tip of the needle or of the catheter is ventral to this fascia, the diffusion of the local anaesthetic solution back to the nerve(s) is severely hindered [8]. We also believe that the tunneling technique with inevitable leak and escape of some of the local anaesthetic into the pleural space has contributed to the higher failure rates reported.

We believe that the described technique ensures better distribution of the block and can improve success rates for PVB catheters after thoracotomies.

CONCLUSION

PVBs are an alternative and effective method of regional pain control after thoracotomies. Nevertheless, they carry a fairly high risk of failure. We believe our described technique of insertion of PVB catheter can reduce the incidence of failure.

SUPPLEMENTARY MATERIAL

Supplementary material is available at ICVTS online.

Conflict of interest: none declared.

REFERENCES