Extrapleural Catheters: An Effective Alternative for Treating Postoperative Pain for Thoracic Surgical Patients

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Pain control is an important aspect of video-assisted thoracoscopic surgery (VATS) procedures. Offering an effective and low-risk method of postoperative pain control is thus vital to a patient's recovery. Hotta and colleagues report the results of a clinical study comparing efficacy of epidurals vs extrapleural catheters in VATS procedures. They found that extrapleural catheters provided equivalent postoperative pain relief when compared to thoracic epidural catheters.

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Pain control is vital to successful recovery from video-assisted thoracoscopic surgery (VATS). Although less invasive than traditional thoracotomy, patients undergoing VATS experience significant port-site and shoulder pain. Thoracic epidural analgesia is effective in reducing postoperative pain but is associated with side effects including hypotension, bradycardia, urinary retention, and itching. Alternatively, Hotta et al[1] describe an effective alternative that uses continuous-infusion paravertebral catheters.

Paravertebral and extrapleural catheters, in conjunction with intravenous opioids, produce similar pain control to thoracic epidural catheters with less theoretical risk.[1-5] Hugo Sellheim performed the first paravertebral block in 1905; however, paravertebral blocks have recently re-emerged as a method for postoperative analgesia. Currently, paravertebral blocks are commonly used in breast, thoracic, and abdominal surgeries as well as for chronic pain management.[6]

ANATOMY OF THE PARAVERTEBRAL SPACE

The wedge-shaped paravertebral space is immediately adjacent to the vertebral bodies and contains the intercostal nerve, dorsal ramus, and rami communicantes. The sympathetic chain is located anterior to this space. The anatomical boundaries of the paravertebral space are the parietal pleura anterolaterally, the costotransverse ligament posteriorly, and the vertebral body and disk medially. Because a fascial sheath does not cover the nerves in this space, they are easily penetrated by local anesthetics (Figs. 1 and 2).

TECHNIQUE

Paravertebral catheters offer the ability to have localized pain control in both an inpatient and outpatient basis. They might be placed by using ultrasound guidance, reducing the risk of postoperative pneumothorax, and can be placed preoperatively or postoperatively. Postoperative placement offers the advantage of placement in the lateral position under prior sterile preparation and anesthesia. Alternatively, sedation with midazolam and fentanyl facilitates placement preoperatively. After placement, the catheters are secured to the patient's back with skin glue and tape. Management of catheters involves a continuous infusion of a local anesthetic of choice, which is usually run between 10 and 14 mL/h during a period of up to 7 days. Removal of the catheter can be performed either before hospital discharge or at home by the patient or primary care physician. Because they are not placed in the epidural space, they offer less risk with anticoagulation (Fig. 2).

REVIEW OF CLINICAL STUDIES

In a prospective, randomized, unblinded study of 40 American Society of Anesthesiologists I and II patients, Hotta et al[1] compared postoperative analgesic efficacy of extrapleural catheters versus thoracic epidural catheters. Extrapleural catheters were placed before chest closure under video guidance by the surgeon. A multi-

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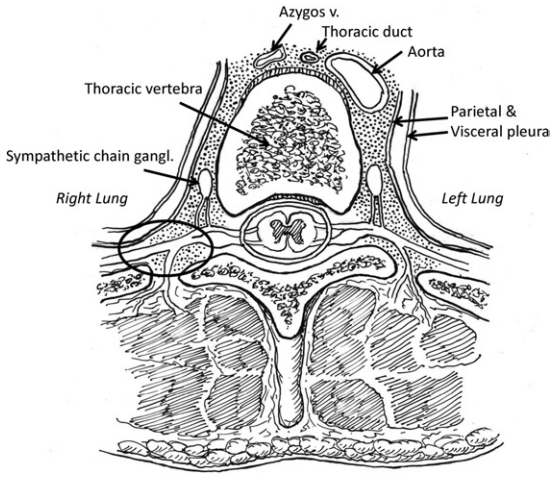

Figure 1. Anatomical diagram showing the paraveretebral space and the desired location of the catheter (encircled area).

orifice 5-holed catheter was threaded in the extrapleural space and bolused immediately with 5 mL of 0.75% ropivacaine and then redosed after chest closure. A continuous infusion of 0.2% ropivacaine at 4 mL/h was started and continued for 60 hours. Epidural catheters were placed before induction of anesthesia and were bolused with same timing, volume, concentration, and infusion of local anesthetic as the extrapleural catheter. Maintenance of anesthesia was via a standardized regimen. All patients were provided a morphine patient-controlled analgesia (PCA) for analgesic rescue. The primary end point was a decrease in pain score of 20 points. The secondary end point was the amount of PCA rescue morphine required. The 2 groups were equal in baseline characteristics. There were no signif-

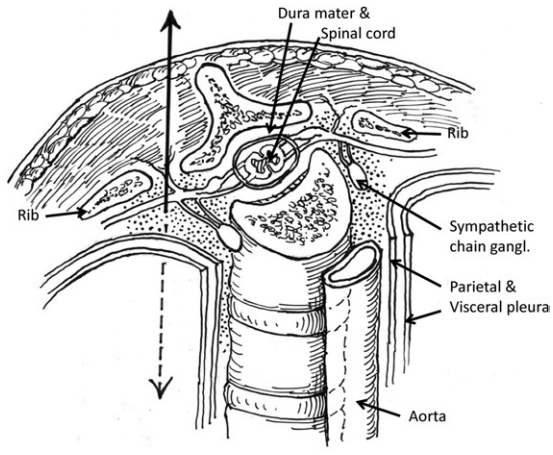

Figure 2. Anatomical diagram showing extent of spread of local anesthetic in the paravertebral space, which typically is 2 levels above and 1 level below the level of the catheter.

Table 1. Summary of the Results of the Secondary Endpoints Between Epidurals and Extrapleural Catheters

Intervention	Bleeding or Nerve Injury	Urinary Retention	Length of Stay	Nausea	Rescue Morphine	No. of Patients Ambulating on Postoperative Day 1
Extrapleural group	0	0	12.7 days	12	12.9 mg	18
Epidural group	0	1	12.6 days	11	10.2 mg	19
P value			.66	.73	.82	1.00