

Does a thoracic epidural confer any additional benefit following video-assisted thoracoscopic pleurectomy for primary spontaneous pneumothorax?

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Abstract

Objective: Video-assisted thoracoscopic (VATS) bullectomy and apical pleurectomy has become the preferred procedure for recurrent or complicated primary spontaneous pneumothorax (SPN). Although thoracic epidural analgesia is the gold standard after open thoracic surgical procedures, its use in the management of minimally invasive procedures in this young population has not been extensively studied. **Methods:** From 1997 to 2003, a single surgeon performed 118 consecutive VATS pleurectomies for primary SPN. The perioperative course, analgesic requirements, hospital stay and long-term complications were compared for 22 (18%) patients in whom a patient-controlled thoracic epidural was used for analgesia and 96 (82%) patients who did not receive an epidural (parenteral opioids). A four-point verbal pain score (0-3) was recorded hourly in every patient at rest and on coughing following surgery. **Results:** One patient required additional surgery for evacuation of haemothorax. There were no mortalities or other major complications in the series. Overall median hospital stay was 3 (range 1-10) days, the incidence of long-term pain at 3 months was 6%, and the long-term recurrence rate was 3%. Despite parenteral opioids being discontinued significantly earlier than epidurals, pain scores were similar in both groups. There were no significant differences in the duration of air-leaks, length of drainage, hospital stay, long-term pain and long-term paraesthesias between the two groups. **Conclusions:** Thoracic epidural analgesia does not contribute significantly to minimize neither perioperative nor long-term pain after VATS pleurectomy for primary SPN. The additional resource requirement in these patients is not justified.

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1. Introduction

Video-assisted thoracoscopic (VATS) bullectomy and apical pleurectomy has become the treatment of choice for recurrent or complicated primary spontaneous pneumothorax [1]. It has been shown to achieve similar success rates than open surgery, but associated with less postoperative pain, impairment of lung function and use of resources [2-4].

Patient-controlled thoracic epidural analgesia is the most effective mode of postoperative analgesia after major surgery [5], including thoracic procedures [6]. However, its use in certain minimal access operations that are associated to a short recovery period has not been widely explored. We aimed to assess whether thoracic epidural analgesia adds to the postoperative care in this group of patients undergoing VAT surgery for primary spontaneous pneumothorax.

2. Patients and methods

In a 6-year period between 1997 and 2003, a single surgeon performed 118 VATS pleurectomies (66 right- and 52 left-sided) in 112 patients (77 male and 45 females, median age 29 (range 16-57) years) for primary spontaneous pneumothorax. Patients who underwent pleurectomy for secondary pneumothorax, excision of giant bullae or simultaneous bilateral surgery were excluded from this study. Indications for surgery included recurrent pneumothorax on 86% of cases and complicated first episode in 14%.

2.1. Analgesic technique

Patient-controlled thoracic epidural analgesia (Group A) was employed on 22 cases (19%). The epidural infusion consisted in a combination of fentanyl (5 µg/ml) and bupivacaine 0.1%, and was started prior to the skin incision. The remaining 96 cases (81%) received patient-controlled intravenous opioids (Group B) occasionally used in

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combination with intraoperative intercostal (35 cases) or paravertebral block (14 cases). We employ a four-point (0-3) verbal rating pain score (VRS) at rest and at cough to monitor adequacy of the analgesia after surgery being 0 no pain and 3 severe pain. The end-points of the study were postoperative pain scores and analgesic requirements, duration of air-leaks, length of drainage and hospital stay, and long-term complications (pain, paraesthesias and recurrence).

2.2. Operative technique

With the patient under general anaesthesia and double lumen endobronchial intubation, the affected lung is deflated. The thoracoscopy is carried out via standard three 2-cm port incisions. A 10 mm diameter thoracoscope is inserted through one of the ports and the contents of the pleural cavity inspected. The subpleural blebs or bulla are identified and excised with endo-staplers (Fig. 1). If no abnormal area is found in the lung then an apical wedge excision is performed. We routinely perform a subtotal apical parietal pleurectomy to induce adhesions between the lung and the chest wall in order to minimize the possibility of recurrence of pneumothorax (Fig. 1). At the end of the procedure, a single intercostal drain is inserted via the anterior port incision and connected to an underwater seal system overnight. The endotracheal tube is removed at the end of the procedure and the patients are transferred to the ward.

2.3. Postoperative care

Patients are recovered in our dedicated Thoracic Surgical ward. The intercostal drain is connected to a one-way valve portable bag system for a further 24-h and if there is no air-leak the drain is removed on the second postoperative day. Early ambulation and physiotherapy are encouraged during the postoperative period. After thoracic surgery in our unit our four-point pain VRS system is recorded and documented in every patient to monitor adequacy of analgesia, and haemodynamic and neurological monitoring is recorded in patients who received both epidural and intravenous analgesia.

2.4. Statistical analysis

The data is presented as median (range) and number (percentage) unless stated. Univariate analysis was performed using the χ^2 -test for qualitative and Wilcoxon rank

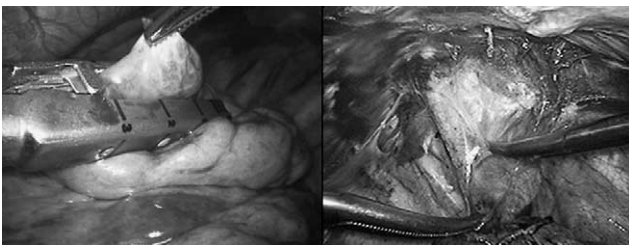


Fig. 1. Apical bullectomy performed with purposely designed endoscopic staplers (left). Apical parietal pleurectomy (right).

Table 1

Postoperative results following VATS pleurectomy for primary spontaneous pneumothorax between patients who received or not a thoracic epidural analgesia

Median (range)	Epidural (n=22)	No epidural (n=96)	P
Duration air-leak	0 (0-3) days	0 (0-9) days	0.6
Length intercostal drainage	2 (1-6) days	2 (1-9) days	0.8
Length hospital stay	3 (1-6) days	2 (1-10) days	0.6

test for quantitative data. Statistical significance was defined by *P* values of less than 0.05.

3. Results

There were no mortalities, no conversions to thoracotomy, and only one complication (0.8%): a patient on long-term anticoagulation required re-operation for evacuation of haemothorax. Subpleural blebs or bullae were identified in 92% of cases and 91% of them were located in the apical segments of the upper lobes. Complications related to insertion or care of epidural catheters were not found. The median length of drainage and hospital stay were 2 (range 1-9) days and 3 (range 1-10) days, respectively. There were no significant differences between the two groups in terms of incidence and length of air-leak, hospital stay and length of drainage (Table 1).

There were no neurological or haemodynamical complications reported due to epidural infusion. Analgesia was adequate in both groups with 71% of patients in each group reporting no pain in the morning of first day after surgery. At that point, the median pain score was 0 (range 0-3) in both groups (*P*=n.s.) (Table 2).

When we compared the peak VRS at any point during the recovery, the median was 1 (range 1-3) in both groups (*P*=n.s.). The time for patients to receive oral analgesia alone was significantly longer in the PCEA group than in the non-epidural group (*P*=0.001) (Table 2).

The incidence of long-term complications: pain, paraesthesias and recurrence was not different between the groups (Table 3).

4. Discussion

Patient-controlled epidural analgesia should be the preferred method following major surgery. A recently performed meta-analysis reveals that any combination employed of epidural analgesia provided better pain

Table 2

Postoperative pain and analgesic requirements following VATS pleurectomy for primary spontaneous pneumothorax

Median (range)	Epidural (n=22)	No epidural (n=96)	P
Maximal pain score	1 (0-3)	1 (0-3)	0.8
Pain score day 1 postop	0 (0-3)	0 (0-3)	0.9
Time until oral analgesia alone	56 (12-144) h	20 (0-96) h	<0.001

Table 3

Long-term complications following VATS pleurectomy for primary spontaneous pneumothorax

Number (%)	Epidural (n=22)	No epidural (n=96)	P
Pain at 3 months	1 (4.5%)	6 (6.3%)	1
Paraesthesias at 3 months	1 (4.5%)	3 (3.1%)	0.6
Recurrence	1 (4.5%)	2 (2.1%)	0.5

relief than parenteral opioids with low associated side effects, with the sole exception of pain at rest following thoracic surgery [5]. However, prospective randomized trials have reported better pain control results with PCEA than intravenous opioids in open thoracic surgery [6-8].

Our method of delivery of thoracic PCEA coincides with the findings in the literature. In studies involving thoracic surgery via thoracotomy, a combination of opioid and local anaesthetic via epidural has been found to provide the best results [9]. Two prospective randomized trials have reported the benefit in commencing the epidural infusion prior to the thoracotomy incision [10,11].

However, the use of PCEA following minimal access procedures has been very rarely reported. A small prospective study involving 30 patients randomised to PCEA or parenteral opioids after laparoscopic segmental colectomy revealed improved pain control in the PCEA group only at 6 and 18 h, but did not alter the hospital stay [12]. Lang-Lazdunsky et al. [13] reported the use of PCEA following VATS for spontaneous pneumothorax at the beginning of their experience, but was later abandoned maybe as a consequence of similar findings to our study although not reported in their manuscript.

Thoracic procedures carried out by VATS are associated with less postoperative pain, use of analgesics, preservation of gas exchange and shoulder function, and shorter hospital stay than when performed via thoracotomy [14,15]. In particular, surgery for primary SPN via VATS has shown similar advantages in prospective randomised trials [2] and even cost savings compared with open surgery [16,17]. These patients are by definition young with few comorbidities and with preserved respiratory function and muscle strength. The procedure when performed by VATS is associated with low incidence of operative complications, virtually no risk of conversion to a thoracotomy, and a short hospital stay.

In our population, the vast majority of patients did not present an air-leak after the procedure, thus permitting rapid ambulation and removal of intercostal drains. The largest series have reported length of drainage of 4-6 days and hospital stay of 7-9 days following VATS procedures for primary SPN [13,18-20]. Our results compare favourably with this reports with a median drainage time of 2 and hospital stay of 3 days, respectively.

We report comparable rates of long-term complications. Most authors share recurrence rates of 1-6%, more commonly within the initial 12 months [1,13,18-21]. In term of long-term pain and paraesthesias, we encountered a very low rate of residual problems and PCEA did not reduce their incidence as compared with parenteral opioids.

We are aware of the limitations of our work. It is the result of a retrospective case-control non-randomised study. Different individual anaesthetists decided the method of analgesia and the group receiving thoracic epidural is limited (20% of the total). However, one of the strong points in our study is that we have eliminated the reported effects of the learning curve in the new technique as the performing surgeon had broad previous experience in the procedure [22].

In summary, the use of a patient-controlled epidural analgesia in patients undergoing VATS pleurectomy for primary spontaneous pneumothorax is as effective as other methods of analgesia and correlates with successful pain control rates in the literature [23], but did not confer any additional benefits to other less invasive methods of analgesia. Our results do not justify the increased use of resources [24,25] or potential complications [25] associated with the care of epidural infusions and therefore PCEA should not be the method of choice in this procedure. We also believe that a prospective randomized study is not warranted in view of our outcomes.

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