Is intercostal block for pain management in thoracic surgery more successful than epidural anaesthesia?


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of epidural catheter analgesia (EPC) and intercostal block (ICB) for the postoperative management of patients who had undergone thoracic surgery. The patients in the ICB group received an ICB with 20 mL 0.5% levobupivacain from the third to the ninth intercostal space at the end of the operation. The patients in the EPC group had a catheter placed in the epidural space at the thoracic level before the induction of general anaesthesia. All of the patients received a baseline analgesic medication with non-steroidal anti-inflammatory drugs. They also received extra subcutaneous opiate injections if required.

Type of intervention
Anaesthesia.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing elective anterolateral thoracotomy (fourth intercostal space) for lobectomy, bilobectomy, open decortication or wedge resection without pleural or rib resection. Patients were excluded from the study if they were undergoing resection or decortication in combination with resection of the pleura and/or rib, or if they had a history of severe heart disease, hepatic or renal insufficiency (as determined by preoperative blood tests). Also excluded were patients with haemorrhagic diathesis or medication of anticoagulants or acetylsalicylic acid in the 10 days before admission to hospital, and patients with a known allergy to local anaesthesia or with another contraindication to epidural techniques.

Setting
The setting was a hospital. The economic study was conducted at the Department of Thoracic Surgery of the Otto-Wagner Hospital in Vienna, Austria.

Dates to which data relate
Neither the dates nor the price year were reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was performed prospectively on the same patient sample as that used in the effectiveness analysis.
Study sample
Power calculations to determine the sample size were not performed. In addition, the method used to select the sample was not reported. A sample of 30 patients was enrolled in the study. There were 15 patients in each of the two groups. The mean age of patients was 60.7 years in the EPC group and 58.2 years in the ICB group. No patient was excluded from the initial sample.

Study design
This was a randomised controlled trial that was carried out in a single centre. The patients were followed for six days. No loss to follow-up was reported. It was not reported whether the people who collected the data were blinded to the patients’ group.

Analysis of effectiveness
All of the patients included in the study were accounted for in the clinical analysis. The primary health outcome estimated in the analysis was pain, which was assessed using a visual pain analogue scale (El-Baz et al., 1984) with a pain score ranging from 1 (no pain) to 10 (worst pain). The assessment was conducted twice daily in the relaxed position and during physical activity, such as coughing, on the day of surgery and over 5 postoperative days.

The occurrence of complications and the use of additional analgesics were also evaluated. On the fifth postoperative day, the patients were asked specific questions concerning the subjective pain experience. The study groups were shown to be comparable at baseline in terms of their age and surgical procedures.

Effectiveness results
On the operation day, the mean pain scores in the relaxed position were 3.95 in the EPC group and 4.1 in the ICB group. The corresponding scores during activity were 6.33 (EPC group) and 5.1 (ICB group). There was no statistically significant difference between the groups on this day. However, on the first, second and third postoperative day, the patients in the ICB group showed a higher pain score in the relaxed position than those in the EPC group, (p<0.05). There was no difference in pain scores between the activity and relaxed positions in either group.

Three patients in the EPC group required additional subcutaneous opiate injection, while 12 patients in the ICB group received subcutaneous opiates. EPC was accompanied by mild nausea and pruritus occurred in two EPC patients. However, there was no statistically significant difference between the groups. No severe complications were observed in the study groups.

For the specific questions concerning the subjective pain experience, there was no statistically significant difference between the groups. Eight patients in the EPC group and 10 in the ICB group reported that the pain suffered was as expected. The pain suffered was more than expected for 2 patients in the EPC group and one patient in the ICB group, and less than expected for 5 patients (EPC group) and 4 patients (ICB group), respectively. Only one patient in the EPC group was against further surgery, if required, due to the pain suffered.

Clinical conclusions
The effectiveness analysis showed that pain management was better with ICB during the day of surgery, but after the day of surgery EPC led to better pain control. Mild side effects were more frequent with EPC.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. A cost-consequences analysis was therefore conducted.

Direct costs
Discounting was not conducted since the time horizon of the study was short. The unit costs and the quantities of
resources were not reported separately. The health services included in the economic analysis were medication, catheter and equipment in the EPC group and equipment, medication and additional opiates in the ICB group. The cost/resource boundary adopted in the study was not stated, but appears to have been that of the hospital. The quantities of resources were estimated alongside the effectiveness study. The cost data were likely to have been estimated from the study hospital. No price year was reported.

Statistical analysis of costs
Standard statistical analyses were conducted to test the statistical significance of the total costs.

Indirect Costs
The indirect costs were not included in the analysis.

Currency
Euros.

Sensitivity analysis
No sensitivity analyses were carried out.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The total costs were 105 euros in the EPC group and 33 euros in the ICB group. Although EPC was more costly than ICB, due to the higher costs of equipment, the authors commented that neither treatment could be considered expensive.

Synthesis of costs and benefits
Not relevant as a cost-consequences analysis was conducted.

Authors' conclusions
Epidural anaesthesia should be considered as the 'gold' standard for pain management in thoracic surgery, but intercostal nerve blockade may represent a feasible alternative therapy when an epidural catheter is not possible. The cost considerations were of secondary importance, as the expenses related to the two interventions were negligible.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators was clear. Epidural anaesthesia was selected since it represents the 'gold' standard for postoperative pain management in thoracic surgery, while intercostal block is a potential alternative anaesthesia procedure. You should decide whether they represent valid strategies in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness used a randomised controlled trial, which was appropriate for the study question. The study groups were comparable at baseline. The study sample was representative of the study population. The main threat to the internal validity of the analysis was the small sample size and the lack of power calculations. In addition, there was no evidence that the initial sample was adequate for the study question. There was also no indication that the people who assessed the pain levels were blinded. These issues may limit the internal validity of the analysis. The fact
that more patients in the ICB group needed more additional opiate injections might have caused the pain measure to underestimate the pain for that group.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

**Validity of estimate of costs**
The perspective adopted in the study is likely to have been that of the hospital, but only the costs strictly related to the anaesthetics were included in the analysis. The quantities of resources were estimated during the trial, but the dates during which they were collected was not reported. There was no indication that the other cost areas excluded (e.g. labour) were equal across the groups. Standard statistical analyses were conducted to test the statistical significance of the total costs. The small sample size may have limited the internal validity. The source of the cost data was not reported.

**Other issues**
The authors compared the results of the effectiveness analysis with those from other studies. However, they did not address the issue of the generalisability of the study findings to other settings, as sensitivity analyses were not conducted. Consequently, the external validity of the analysis was fairly low. The study enrolled a sample of patients undergoing thoracic surgery and this was reflected in the conclusions of the analysis.

**Implications of the study**
The main implication of the study is that epidural anaesthesia remains the treatment of choice for pain management in patients undergoing thoracic surgery. The use of intercostal nerve blockade may represent a complementary technique, as the authors stated that a combination of both anaesthetics could be an ideal form of pain control.

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