Spinal analgesia in cardiac surgery: a meta-analysis of randomized controlled trials

CRD summary
This well-conducted review concluded that spinal analgesia did not significantly improve clinically relevant outcomes in patients undergoing cardiac surgery. The reliability of the conclusion will be limited by the paucity and poor quality of the available evidence.

Authors' objectives
To investigate whether the use of spinal analgesia influences patient outcomes after cardiac surgery.

Searching
PubMed, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and BioMed Central were searched without language restrictions to January 2009; the PubMed search strategy was reported. Proceedings from conferences of three relevant societies (for 2005 to 2008) and bibliographies of included studies and reviews were also searched. International experts were also contacted.

Study selection
Randomised controlled trials (RCTs) conducted in adults undergoing cardiac surgery, that compared spinal analgesia with general anaesthesia, regardless of dose or time of administration, were eligible for inclusion.

The primary outcome was the incidence of in-hospital myocardial infarction. Secondary outcomes included intensive care and hospital stay, incidence of arrhythmias and adverse events.

Most included patients underwent coronary artery bypass grafting; some also underwent valve surgery. Most trials used morphine as the spinal anaesthesia; the doses varied considerably, and administration was most commonly between lumbar vertebrae 2 and 3, or 3 and 4.

Studies were selected by at least two independent reviewers; differences were resolved by consensus.

Assessment of study quality
Studies were assessed for selection, performance, attrition and adjudication biases by two independent reviewers, and categorised as low, moderate or high risk of bias, or unable to ascertain risk of bias. Allocation concealment was categorised as adequate, inadequate, unclear or not used. Differences were resolved by consensus.

Data extraction
Risk difference (RD) was extracted for binary outcomes, and mean difference for continuous outcomes, along with 95% confidence intervals (CI).

Data was extracted by four independent reviewers; differences were resolved by consensus. Authors were contacted to obtain missing data.

Methods of synthesis
Summary risk differences and weighted mean differences, with 95% confidence intervals, were calculated. Heterogeneity was assessed using the Cochrane Q and I^2 tests. A fixed-effect model was used when I^2 was 50% or less, and a random-effects model when I^2 was over 50%.

Publication bias was assessed using funnel plots.

Results of the review
Twenty five RCTs met the inclusion criteria (n=1,106 patients; range 20 to 100). Of the 25 studies, 11 reported adequate sequence generation, one adequate allocation concealment, 13 blinding of patients, 12 blinding of physicians, one blinding of outcome assessors and five addressed incomplete outcome data. None used uniform or explicit outcome definitions or were free of selective outcome reporting. None of the studies were considered high quality. The funnel plot showed no evidence of publication bias.

Only four deaths and 20 myocardial infarctions occurred across the trials; there was no significant difference between spinal and general anaesthesia. There was also no significant difference in arrhythmias, bleeding, length of hospital or intensive care stay, hypotension, headache, urinary retention, nausea or vomiting. Spinal analgesia significantly increased the incidence of postoperative pruritis (RD 0.06, 95% CI 0.03 to 0.09). No serious adverse events or complications were reported for spinal analgesia across the trials.

**Authors’ conclusions**
Spinal analgesia did not significantly improve clinically relevant outcomes in patients undergoing cardiac surgery.

**CRD commentary**
The authors addressed a clear review question supported by appropriate inclusion criteria. Several relevant sources were searched without language restrictions, and attempts were made to identify unpublished studies. Each stage of the review process was conducted in duplicate, reducing the risk of error and bias.

Appropriate criteria were used to assess study quality and the results given for each trial. The included trials were small and generally poor quality, and the primary outcomes rare; only six trials reported any deaths or myocardial infarctions. Appropriate methods of synthesis were employed.

This was a well-conducted review, although the reliability of the conclusion will be limited by the paucity and poor quality of the available evidence.

**Implications of the review for practice and research**

**Practice:** The authors stated that, despite the benefits of aggressive pain control in terms of effective coughing, deep breathing and weaning from mechanical ventilation, the review does not support its use in patients undergoing cardiac surgery in order to improve perioperative clinically relevant outcomes.

**Research:** The authors stated that there is no current role for further RCTs powered to clinically relevant outcomes in patients undergoing cardiac surgery; however, changes in techniques, devices and drugs could modify the outlook of the comparison between spinal and general anaesthesia in this setting.

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