Beyond opioid patient-controlled analgesia: a systematic review of analgesia after major spine surgery
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CRD summary
The authors concluded that there was a lack of evidence of overall benefit on postoperative pain after spine surgery of most regional analgesic techniques, of gabapentinoids and of most non-steroidal anti-inflammatory drugs. The authors’ cautious conclusions reflect the limitations of the evidence and seem appropriate.

Authors’ objectives
To evaluate postoperative pain management in patients undergoing major spine surgery.

Searching
PubMed and MD Consult databases were searched up to 2011 for articles published in English. Broad search terms were reported. Reference lists of related studies were searched.

Study selection
Randomised controlled trials (RCTs) that reported postoperative pain scores and/or opioid consumption in patients undergoing spine surgery were eligible for inclusion. All types of pharmacological interventions administered by oral, intravenous, intramuscular, rectal, subcutaneous or spinal/epidural routes were considered for inclusion. Studies that used non-pharmacological interventions or wound infiltration of drugs as parts of an analgesic regimen were excluded.

Pain results were reported at two hours or postanaesthesia care unit (PACU) discharge, 24 and 48 hours after surgery. Trials were divided into the groups of non-steroidal anti-inflammatory drugs (NSAIDs), systemic N-methyl-D-aspartate (NMDA) receptor antagonists, gabapentinoids and epidural or intrathecal analgesia. The type of surgery varied between studies and included diskectomy, laminectomy, spinal fusion, microdiskectomy and scoliosis surgery.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
Trial quality was assessed using the Jadad scale. The minimum score of any included trial was 2 and maximum score was 5.

Two reviewers independently assessed study quality. Any discrepancies were resolved by consensus.

Data extraction
Data were extracted on analgesia outcome measures, cumulative opioid consumption and adverse effects of the drugs.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
The studies were combined in a narrative synthesis.

Results of the review
Eighty-two RCTs were included in the review. On the Jadad quality scale 10 trials scored 2, 14 trials scored 3, 22 trials scored 4 and 36 trials scored 5.

NSAIDs (25 trials): Approximately half of the studies showed benefits in either pain scores or rescue analgesic consumption using NSAIDs. Among them, parecoxib and combination of paracetamol and ketoprofen were most effective in decreasing pain as well as decreasing morphine consumption.

NMDA receptor antagonists (eight trials): Trials using ketamine showed analgesic effects and decreased opioid consumption. A single study of dextromethorphan did not show any benefits whereas methadone showed benefits
without causing additional adverse effects.

**Gabapentinoids (six trials):** Pain control was improved with gabapentin at early time point (two hours or postanaesthesia care unit discharge) but not at later time points. It was also effective in decreasing 24 hours cumulative opioid consumption.

**Epidural or intrathecal analgesia (43 trials):** Single-dose epidural analgesia using opioids, local anaesthetics or their combination was found to be ineffective in improving postoperative pain control. However, a combination of these with clonidine or steroid decreased pain as well as morphine consumption. Continuous epidural analgesia with opioids and local anaesthetics did not provide a significant effect but using either opioids or local anaesthetics showed benefit. Use of intrathecal analgesia reduced pain in the immediate postoperative period but no benefit was observed in extended period.

**Authors’ conclusions**
There was a lack of evidence for overall benefit on postoperative pain after spine surgery for most regional analgesic techniques of gabapentinoids and most NSAIDs.

**CRD commentary**
The review question and inclusion criteria were clear. There was a limited search of relevant sources. There was a risk of language bias and publication bias as only studies in English were included in the review. It was unclear whether study selection and data extraction were carried out with sufficient attempts to minimise error and bias. Publication bias was not assessed.

An appropriate quality assessment tool was applied and the results of this were presented. A narrative synthesis was appropriate in view of the diverse studies (for example different types of patients and spine surgery, drugs, dose, route and time of administration) used in this review.

The authors’ cautious conclusions reflect the limitations of the evidence and seem appropriate.

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

**Practice:** The authors suggested that a sample regimen should be considered and might include continuation of preoperative opioid regimen on the day of surgery, administering NSAID (ketoprofen plus paracetamol or parecoxib), methadone (0.2mg/kg) and ketamine (0.5mg/kg intravenous bolus followed by infusion at 2ug/kg per minute) if acceptable to the surgical team.

**Research:** The authors stated that future studies should investigate the effects of intensive and prolonged multimodal analgesic interventions aimed at the prevention of pain hypersensitivity.

**Funding**
None.

**Bibliographic details**

**PubMedID**
22030723

**DOI**
10.1097/AAP.0b013e3182340869

**Original Paper URL**
http://journals.lww.com/rapm/Abstract/2012/01000/Beyond_Opioid_Patient_Controlled_Analgesia__A.15.aspx

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Analgesia, Patient-Controlled /adverse effects; Analgesics, Opioid /administration & dosage /adverse effects; Back Pain /etiology /prevention & control; Evidence-Based Medicine; Humans; Orthopedic Procedures /adverse effects; Pain, Postoperative /etiology /prevention & control; Spine /surgery; Treatment Outcome

**AccessionNumber**
12012002155

**Date bibliographic record published**
27/03/2012

**Date abstract record published**
01/11/2012

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.