

## COMPLEX SPINE SURGERY

### SUMMARY RECOMMENDATIONS

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#### Notes on PROSPECT recommendations

PROSPECT provides clinicians with supporting arguments for and against the use of various interventions in postoperative pain based on published evidence and expert opinion. Clinicians must make judgements based upon the clinical circumstances and local regulations. At all times, local prescribing information for the drugs referred to must be consulted.

#### *Grades of recommendation and levels of evidence*

Grades of recommendation are assigned according to the overall level of evidence on which the recommendations are based, which is determined by the quality and source of evidence: [Relationship between quality and source of evidence, levels of evidence and grades of recommendation](#).

#### Pain after complex spine surgery and aims of the PROSPECT review

Complex spine surgery can be defined as thoracolumbar spine surgery with instrumentation, laminectomy at three or more levels, or scoliosis surgery. Complex spine surgery is associated with intense postoperative pain, while adequate pain control can improve early postoperative rehabilitation and long-term outcomes ([Lamperti 2017](#); [Borgeat 2008](#)).

The aim of this guideline is to provide clinicians with an evidence-based approach to pain management after complex spine surgery to improve postoperative outcomes such as early ambulation and discharge. The recommendations are based on a procedure-specific systematic review of randomised controlled trials and meta-analyses, with primary outcomes being postoperative pain scores and analgesic requirements. The methodology considers clinical practice, efficacy and adverse effects of analgesic techniques.

## Summary recommendations

### Recommended: Pre- and intra-operative interventions

- ‘Pre-operative’ refers to interventions applied before surgical incision and ‘intra-operative’ refers to interventions applied after incision and before wound closure
- Analgesics should be administered at the appropriate time (pre- or intra-operatively) to provide sufficient analgesia in the early recovery period

#### Paracetamol and NSAIDs/COX-2-specific inhibitors

Systemic analgesia should include oral or IV paracetamol (Grade D) and NSAIDs or COX-2 specific inhibitors (Grade A) administered pre-operatively or intra-operatively and continued postoperatively, unless contraindicated.

- The analgesic benefits and opioid-sparing effects of simple analgesics such as paracetamol and NSAIDs are well described ([Joshi 2014](#); [Martinez 2017](#); [Ong 2010](#); [Chidambaran 2018](#)).
- Short-term use of low-dose NSAIDs around the time of spinal fusion is well tolerated and does not interfere with osteogenesis or increase the rate of non-union ([Sivaganesan 2017](#); [Dodwell 2010](#); [Mathieson 2013](#)).
- Patients undergoing spine surgery in association with peri-operative NSAIDs do not have an increased risk of bleeding ([Zhang 2017](#); [Mikhail 2020](#); [Chin 2007](#)).
- Fixed-time interval analgesia has been shown to provide superior pain relief in comparison with on-demand analgesia ([Atkinson 2015](#); [Yefet 2017](#)).

#### Ketamine

Intra-operative IV low-dose ketamine infusion is recommended (Grade A) due to its significant opioid-sparing effect, especially in opiate-dependent chronic pain patients ([Loftus 2010](#); [Pacreu 2012](#); [Urban 2008](#); [Subramaniam 2011](#)).

- Ketamine infusions should not be continued in the postoperative period due to insufficient evidence and potential risk of side effects with increasing ketamine doses ([Avidan 2017](#); [Stoker 2019](#); [Schwenk 2016](#)).

### Recommended: Postoperative interventions

- 'Postoperative' refers to interventions applied at or after wound closure
- Analgesics should be administered at the appropriate time (pre- or intra-operatively) to provide sufficient analgesia in the early recovery period

<b>Paracetamol and NSAIDs/COX-2-specific inhibitors</b>	Systemic analgesia should include oral or IV paracetamol (Grade D) and NSAIDs or COX-2 specific inhibitors (Grade A) administered pre-operatively or intra-operatively and continued postoperatively, unless contraindicated
<b>Epidural analgesia</b>	<p>Epidural analgesia with local anaesthetics alone or combined with opioids is recommended (Grade B) as a component of multimodal analgesia (<a href="#">Park 2016</a>; <a href="#">Gessler 2016</a>; <a href="#">Prasartritha 2010</a>; <a href="#">Pham Dang 2008</a>)</p> <ul style="list-style-type: none"> <li>• The epidural catheter should be placed under direct visualisation by the surgeon at the end of surgery.</li> <li>• Low concentrations of local anaesthetics should be used since concerns about the use of epidural catheters are loss of sensory function and motor weakness and the possibility of delayed diagnosis of neurological complications. No major adverse effects were reported in the literature (<a href="#">Wenk 2018</a>).</li> <li>• Use of epidural analgesia should be individualised.</li> </ul>
<b>Opioids</b>	Opioids should be reserved as rescue analgesics in the postoperative period (Grade D)

COX, cyclooxygenase; IV, intravenous; NSAIDs, non-steroidal anti-inflammatory drugs.

## Interventions that are NOT recommended

Analgesic interventions that are not recommended for pain management in patients undergoing complex spine surgery.

Intervention	Reason for not recommending
Oral gabapentinoids	Significant risk of adverse effects
IV methadone	Significant risk of adverse effects
Erector spinae plane block	Limited procedure-specific evidence
Thoracolumbar interfascial plane block	Limited procedure-specific evidence
IV lidocaine	Limited procedure-specific evidence
IV glucocorticoid	Lack of procedure-specific evidence
IV dexmedetomidine	Limited procedure-specific evidence
Epidural opioids	Limited procedure-specific evidence
Intrathecal opioids	Limited procedure-specific evidence
Local anaesthetic wound infusion	Limited and inconsistent procedure-specific evidence
IV magnesium	Limited procedure-specific evidence
Surgical interventions	Limited procedure-specific evidence

## Overall PROSPECT recommendations

### Overall recommendations for peri-operative pain management in patients undergoing complex spine surgery

<b>Pre-operative and intra-operative interventions</b>	<ul style="list-style-type: none"> <li>• Oral or IV paracetamol (Grade D)</li> <li>• Oral or IV NSAIDs/COX-2 specific inhibitors (Grade A)</li> <li>• IV ketamine infusion (Grade A)</li> </ul>
<b>Postoperative interventions</b>	<ul style="list-style-type: none"> <li>• Epidural analgesia with local anaesthetics with or without opioids (Grade B)</li> <li>• Oral or IV paracetamol (Grade D)</li> <li>• Oral or IV NSAIDs/COX-2 specific inhibitors (Grade A)</li> <li>• Opioids as rescue medication (Grade D)</li> </ul>

COX, cyclooxygenase; IV, intravenous; NSAIDs, non-steroidal anti-inflammatory drugs.

### PROSPECT publication

**Pain management after complex spine surgery. A systematic review and procedure-specific postoperative pain management recommendations.**

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