

## OPEN LIVER RESECTION

### 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 open liver resection and aims of the PROSPECT review

The most frequent approaches for open liver resection include the use of a right subcostal incision or a reversed L-shaped incision ([Chang 2010](#)). Irrespective of the approach, the procedure can be associated with significant postoperative pain. Effective pain control can facilitate early mobilisation and reduce postoperative complications ([Yip 2016](#)). Adequate pain management is a key to the success of an enhanced recovery after surgery (ERAS) program in liver resection ([Day 2019](#); [Joshi 2019](#)). However, the optimal pain management regimen for open liver resection remains controversial.

The aim of the PROSPECT review was to evaluate the available literature and develop recommendations on the management of pain after open liver resection in adults.

## 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

Paracetamol and an NSAID are recommended, unless contraindicated, administered either pre-operatively or intra-operatively and continued postoperatively

- Analgesic efficacy was shown for NSAIDs as basic analgesics administered pre-operatively or intra-operatively and continued postoperatively on a "round-the-clock" or scheduled basis
- No study investigated the analgesic efficacy of paracetamol in liver resection, although given its relative safe profile and the few side effects, it is considered as basic (i.e. first line) analgesic according to the PROSPECT methodology ([Joshi 2019](#)). Paracetamol was used as basic analgesic in several RCTs included in this review
- Risk factors for hepatotoxicity that should be considered before using paracetamol include liver disease, age, malnutrition and intra-operative liver ischaemia. The altered pharmacokinetics in patients with liver disease or after major liver resections might influence the paracetamol dose ([Galinski 2006](#); [Rudin 2007](#)). Overall, there is a low risk for acetaminophen toxicity after liver resection, and therefore, it is recommended as basic analgesic

#### Regional analgesia technique

In the absence of contraindications, the following interventions are recommended, depending on evaluation of the potential benefits and harms, and the anaesthesiologists' familiarity with the techniques:

- Thoracic epidural analgesia, based on several studies showing analgesic efficacy, particularly during coughing and deep breathing
- OR
- Bilateral oblique subcostal TAP blocks (single shot and/or continuous local anaesthetic infusion), based on analgesic efficacy in several studies

### 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</b>	Paracetamol and an NSAID are recommended, unless contraindicated, administered either pre-operatively or intra-operatively and continued postoperatively
<b>Regional analgesia technique</b>	A catheter-based regional analgesia technique, as chosen in the pre-operative/intra-operative period, is recommended
<b>Opioids</b>	Systemic opioids should be reserved as rescue analgesics in the postoperative period

NSAIDs, non-steroidal anti-inflammatory drugs; TAP, transversus abdominis plane

## Interventions that are NOT recommended

Analgesic interventions that are not recommended for pain management in patients undergoing open liver resection.

Intervention	Reason for not recommending
Ketamine	Lack of procedure-specific evidence
Gabapentinoids	Lack of procedure-specific evidence
IV lidocaine	Lack of procedure-specific evidence
Dexamethasone	Lack of procedure-specific evidence
Intra-operative use of dexmedetomidine	Limited procedure-specific evidence
Intra-operative use of magnesium sulphate	Limited procedure-specific evidence
Intrathecal morphine	Limited procedure-specific evidence
Quadratus lumborum block	Limited procedure-specific evidence
Continuous wound infiltration	Limited procedure-specific evidence
Continuous paravertebral nerve block	Limited procedure-specific evidence
Postoperative intrapleural local anaesthetics	Limited procedure-specific evidence

## Overall PROSPECT recommendations

### Overall recommendations for peri-operative pain management in patients undergoing open liver resection

<b>Pre-operative and intra-operative interventions</b>	<ul style="list-style-type: none"> <li>• Paracetamol</li> <li>• Non-steroidal anti-inflammatory drugs</li> <li>• Thoracic epidural analgesia</li> <li>• Subcostal transversus abdominis plane blocks (single shot and/or continuous local anaesthetic infusion)</li> </ul>
<b>Postoperative interventions</b>	<ul style="list-style-type: none"> <li>• Paracetamol and non-steroidal anti-inflammatory drugs</li> <li>• Catheter-based regional analgesia technique chosen in the pre-operative/intra-operative period</li> </ul>

Further high-quality randomised controlled trials are needed to confirm and clarify the efficacy of the recommended analgesic regimen in the context of an enhanced recovery program.

## PROSPECT publication

### Pain management after open liver resection: Procedure-specific postoperative pain management (PROSPECT) recommendations.

A. Dieu, P. Huynen, P. Lavand'homme, H. Beloeil, S. Freys, E. Pogatzki-Zahn, G. P. Joshi, M. Van de Velde, on behalf of the PROSPECT Working Group of the European Society of Regional Anaesthesia and Pain Therapy (ESRA).

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