

## APPENDICECTOMY

### 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.

#### Pain after appendicectomy and aims of the PROSPECT review

Appendicectomies are frequently performed laparoscopic and open procedures. Despite this, peri-operative pain is inadequately treated due to limited evidence on the most effective treatment options. Furthermore, appendicectomies are often viewed as minor or less invasive procedures, leading to pain being underestimated and undertreated. Effective postoperative pain management shortens hospital stays, reduces risk of chronic pain, and reduces morbidity and mortality ([Kehlet 2006](#); [Pöpping 2008](#); [Beattie 2003](#); [Rodgers 2000](#); [van Boekel 2019](#)).

This PROSPECT review ([Freys 2024](#)) aimed to develop evidence-based, procedure-specific recommendations for pain management following appendicectomies. Recommendations were made by systematically evaluating available literature on the impact of analgesics, anaesthetics, and surgical interventions on pain. All recommendations apply to both children and adults.

The unique PROSPECT methodology is available at <https://esraeurope.org/prospect-methodology/>. The methodology reflects on clinical practice, efficacy, and adverse effects of analgesic techniques. This has been updated now for future reviews ([Joshi 2023](#)).

Literature databases were searched from January 1999 to October 2022.

## Summary of recommendations and key evidence

### Summary of recommendations and key evidence for procedure-specific pain management in patients undergoing appendicectomy (children and adults)

#### ***Surgical intervention***

Three-port laparoscopic appendicectomy is recommended over open appendicectomy due to lower pain scores and reduced complications

- Three-port laparoscopic procedures reduce pain scores in the early postoperative phase compared with open procedures, shorten hospital stays, and lessen the risk of postoperative complications such as wound infections and chronic pain ([Baird 2017](#); [Wei 2011](#); [Li 2010](#); [Jaschinski 2015](#); [Garbutt 1999](#); [Tiwari 2011](#); [Guller 2004](#))
- Several studies demonstrated a significant reduction in analgesic consumption with laparoscopic vs. open appendicectomy ([Milewczyk 2003](#); [Sozutek 2013](#); [Shirazi 2010](#); [Cipe 2014](#); [Talha 2020](#))
- An open appendicectomy resulted in a significantly higher rate of complications than laparoscopic appendicectomy across four studies ([Jan 2011](#); [Pramanik 2015](#); [Shirazi 2010](#); [Kargar 2011](#))

#### ***Pharmacological treatment***

Systemic analgesia should include paracetamol and NSAIDs (or selective COX-2 inhibitors in adults), administered pre-operatively or intra-operatively and continued postoperatively for basic analgesia

- Despite limited evidence for systemic non-opioid analgesics in appendicectomy, these are fundamental in all peri-operative pain control protocols, with their analgesic effects being well established ([Joshi 2014](#); [Martinez 2017](#); [Ong 2010](#))
- There is debate regarding the use of NSAIDs during gastrointestinal operations, particularly with digestive anastomoses. However, appendicectomy typically involves a closing suture, and recent studies showed a well-documented safety profile, even in the context of colonic anastomoses ([Gustafsson 2019](#); [Arron 2020](#); [Morris 2020](#))

Opioids should be reserved for rescue analgesia

#### ***Laparoscopic appendicectomy – Regional analgesic strategies***

Instillation of intraperitoneal local anaesthetic is recommended pre-/intra-operatively

- Several studies demonstrated mostly positive results, leading to it being recommended despite limitations present in adult studies. Limitations included heterogeneity in study designs with variability in placement of local anaesthetic, and not reporting

complications and basic analgesia ([Thanapal 2014](#); [Sevensma 2019](#); [Kang 2010](#); [Kim 2011](#); [Čustovic 2019](#); [Hamill 2017](#); [Elnabtity 2018](#))

- This technique does not have relevant side effects and has a rapid and straightforward application
- Regional analgesia spares opioid use during and after surgery

### ***Open appendicectomy – Regional analgesic strategies***

Pre-operative unilateral TAP block is recommended

- Several studies showed a significant and clinically-relevant analgesic benefit of a TAP block as a component of multimodal analgesia with no increase in complications ([Patel 2018](#); [Niraj 2009](#); [Abdul 2014](#); [Carney 2010](#); [Ramzy 2014](#))
- Regional analgesia spares opioid use during and after surgery

Pre-incisional infiltration with local anaesthetics into the skin and external oblique is recommended if TAP block is not possible

- Studies showed a relevant reduction in pain severity with little to no side effects compared with no infiltration or subcutaneous infiltration alone ([Refaat 2015](#); [Lohsiriwat 2004](#); [Randall 2010](#))

COX, cyclooxygenase; NSAID, non-steroidal anti-inflammatory drug; TAP, transverse abdominis plane.

## Interventions that are NOT recommended

Analgesic interventions that are not recommended for pain management in patients undergoing appendicectomy

Intervention	Reason for not recommending
<b>Laparoscopic appendicectomy</b>	
<b>Pre-operative</b>	
Dexamethasone/corticosteroids	Limited procedure-specific evidence
Local wound infiltration with local anaesthetics in single incision technique	Lack of procedure-specific evidence
Intravenous lidocaine	Lack of procedure-specific evidence
Combined spinal + epidural block	Limited procedure-specific evidence
Pentoxifylline	Limited procedure-specific evidence
Interfascial plane blocks	Limited procedure-specific evidence
Bilateral TAP-block	Lack of procedure-specific evidence
Bilateral quadratus lumborum block	Lack of procedure-specific evidence
<b>Intra-operative</b>	
Single-port incision	Inconsistent evidence and risk of postoperative complications
Needlescopic technique	Lack of procedure-specific evidence
Double-incision, three-port technique	Lack of procedure-specific evidence
Hem-o-Lok clips to close stump	Lack of procedure-specific evidence
Intraperitoneal nebulised ropivacaine	Lack of procedure-specific evidence
Warm humidified carbon dioxide insufflation	Lack of procedure-specific evidence
<b>Post-operative</b>	
Topical lidocaine patch on trocar site	Lack of procedure-specific evidence
<b>Open appendicectomy</b>	
<b>Pre-operative</b>	
Ketamine	Limited procedure-specific evidence (and no basic analgesia in the positive study)
<b>Intra-operative</b>	
New right groin incision vs McBurney's incision	Lack of procedure-specific evidence
Cutting diathermy vs scalpel skin incisions	Lack of procedure-specific evidence
Peritoneal closure vs non-closure	Lack of procedure-specific evidence
Subcuticular vs transdermal or interrupted	Lack of procedure-specific evidence

suturing	
<b>Post-operative</b>	
Morphine added to bupivacaine for TAP block	Lack of procedure-specific evidence
Continuous wound infiltration with local anaesthetics	Conflicting procedure-specific evidence
Aromatherapy	Limited procedure-specific evidence

TAP, transverse abdominis plane.

## Overall PROSPECT recommendations table

### Overall recommendations for procedure-specific pain management in patients undergoing appendicectomy (children and adults)

**Surgical procedure:** Three-port laparoscopy is recommended over open appendicectomy

#### Pre- and intra-operative

##### Three-port laparoscopic appendicectomy

- Paracetamol and NSAIDs (or selective COX-2 inhibitor in adults)
- Intraperitoneal local anaesthetic

##### Open appendicectomy

- Paracetamol and NSAIDs (or selective COX-2 inhibitor in adults)
- Pre-operative unilateral TAP block
- Pre-incisional infiltration with local anaesthetics into the skin and external oblique (if TAP block is not possible)

#### Postoperative

- Paracetamol and NSAIDs (or selective COX-2 inhibitor in adults)
- Opioids for rescue analgesia

COX, cyclooxygenase; NSAIDs, non-steroidal anti-inflammatory drugs; TAP, transverse abdominis plane.

### PROSPECT publication

Jacob C. Freys, Stephan M. Bigalke, Moritz Mertes, Dileep N. Lobo, Esther M. Pogatzki-Zahn, Stephan M. Freys; The PROSPECT Working Group of the European Society of Regional Anaesthesia and Pain Therapy (ESRA).

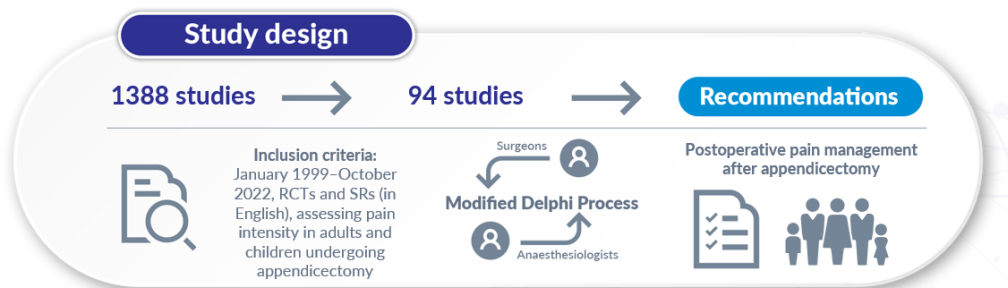
**Perioperative pain management for appendicectomy. A systematic review and Procedure-specific Postoperative Pain Management recommendations.**


[Eur J Anaesthesiol 2024;41:174–187. doi: 10.1097/EJA.0000000000001953.](https://doi.org/10.1097/EJA.0000000000001953)


[PROSPECT recommendations for appendicectomy – infographic](#)


# Recommendations for appendicectomy


A systematic review with recommendations for postoperative pain management



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**Surgical technique**  
Three-port laparoscopic appendicectomy is recommended over open appendicectomy.
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**Systemic (basic) analgesia**  
Systemic analgesia should include paracetamol and NSAIDs (or selective COX-2 inhibitors in adults), administered pre-operatively or intra-operatively and continued postoperatively.
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**Regional analgesic strategies**  
**Laparoscopic appendicectomy:** Instillation of intraperitoneal local anaesthetic is recommended pre-/intra-operatively.  
**Open appendicectomy:** Pre-operative unilateral TAP block is recommended. If TAP block is not possible, pre-incisional infiltration with local anaesthetics into the skin and external oblique is recommended
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**Opioids**  
Opioids should be reserved as rescue analgesia.

Freys JC, et al. Perioperative pain management for appendicectomy. A systematic review and procedure-specific postoperative pain management recommendations. *Eur J Anaesthesiol* 2024;41:174–187.

COX, cyclo-oxygenase; NSAIDs: non-steroidal anti-inflammatory drugs; RCT, randomised controlled trial; SR, systematic review; TAP, transverse abdominis plane.

