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No pressure, no pain? A randomized trial comparing postoperative pain after low-pressure versus standard-pressure laparoscopic surgery in children

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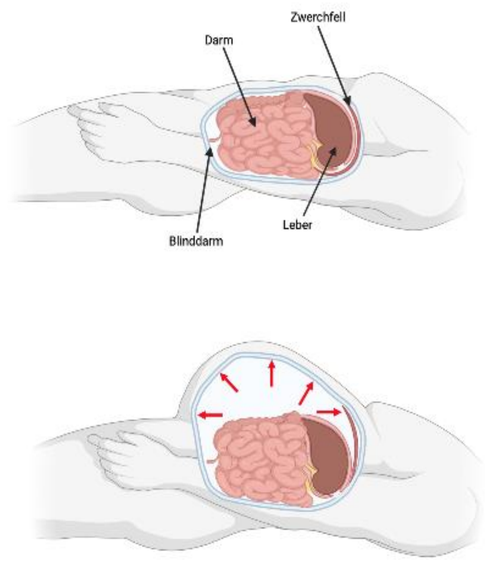
Introduction

Children still suffer from substantial pain after laparoscopic surgery. It has been hypothesized that low-pressure pneumoperitoneum reduces postoperative pain after laparoscopic surgery. However, this has not yet been studied in school-aged children.
Our objective was determine whether low-pressure pneumoperitoneum (8 mmHg) reduces postoperative abdominal pain compared to standard-pressure pneumoperitoneum (12 mmHg) in children undergoing laparoscopic appendectomy for acute appendicitis.



Conclusion

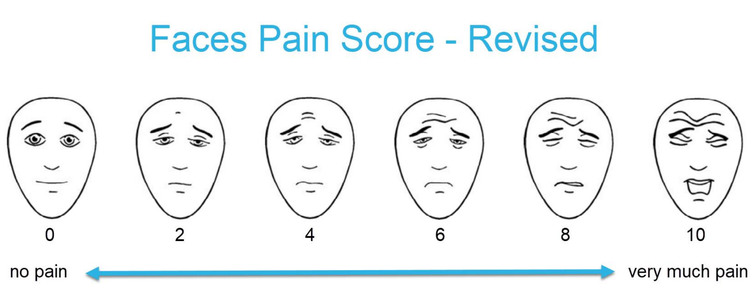
Children do not experience less postoperative pain when low-pressure pneumoperitoneum is used during laparoscopic appendectomy.

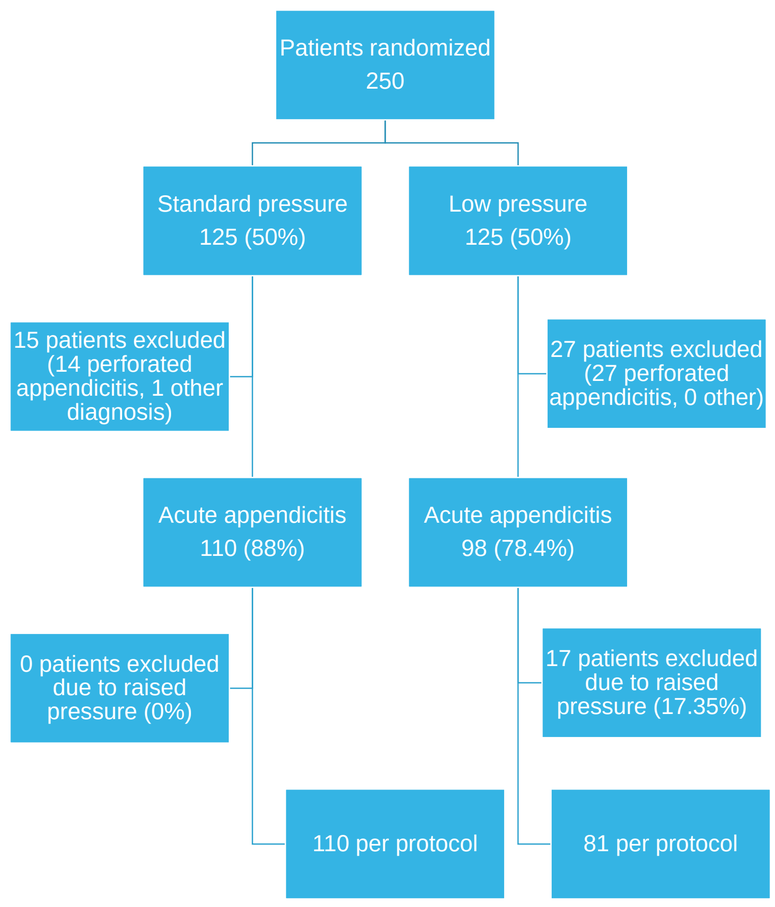
However, due to the other advantages of low-pressure pneumoperitoneum and the absence of safety concerns, as demonstrated by this study, we recommend its use wherever feasible.

Patients & Methods

Single-center, parallel-group, superiority randomized controlled trial conducted between September 2021 to January 2025. Children aged 5 to 17 years scheduled for laparoscopic appendectomy were randomly assigned (1:1) to low- or standard-pressure pneumoperitoneum. We excluded patients with showing signs of four-quadrant peritonitis, if an ultrasound report showed an intraabdominal abscess and if the patient or parents were not fluent enough in German, the local language, to answer the questions about postoperative pain. The patients and their parents were blinded regarding group allocation.

The primary outcome was postoperative abdominal pain intensity, measured using the revised Faces Pain Score (FPS-R) on the first post-operative day. Secondary outcomes included shoulder pain intensity, the side of shoulder pain, and intra- and postoperative complications.





Results

- Low-pressure pneumoperitoneum was associated with higher postoperative abdominal pain scores (OR 1.74).
- Low-pressure pneumoperitoneum was associated with higher postoperative shoulder pain scores (OR 2.11).
- Shoulder pain was more intense on the right side in both groups (OR 7.81).
- Subjective surgical view was relevantly better in standard-pressure group (P< 0.0001).
- No difference in intra- or postoperative complications.

	Standard pressure	Low Pressure	Missing (%)
n	110	81	
Age (years) (median [IQR])	11.35 [9.06, 13.75]	11.95 [9.83, 13.79]	
Sex = Male (%)	63 (57.3)	45 (55.6)	
Body weight (median [IQR])	39.75 [30.05, 50.80]	40.00 [29.20, 53.00]	
Previous abdominal surgery = yes (%)	1 (1)	0 (0)	
Underlying disease = yes (%)	11 (10)	7 (7.1)	
Postoperative abdominal pain (FPS-R) (median [IQR])	4.00 [2.00, 4.00]	4.00 [2.00, 4.00]	3.1
Postoperative right shoulder pain (FPS-R) (median [IQR])	0.00 [0.00, 2.00]	0.00 [0.00, 3.00]	3.1
Postoperative left shoulder pain (FPS-R) (median [IQR])	0.00 [0.00, 0.00]	0.00 [0.00, 0.00]	3.1
Intraoperative complication = Yes (%)	2 (1.8)	2 (2.5)	0
Postoperative complication = Yes (%)	0 (0)	0 (0)	0
Operative time (minutes) (median [IQR])	73.50 [54.00, 92.00]	74.00 [62.00, 90.00]	0
Postoperative LOS (hours) (median [IQR])	39.71 [35.00, 44.26]	39.90 [36.22, 46.13]	0
Subjective assessment of surgical view by surgeon = good (%)	106 (96.4)	43 (53.1)	0
Postop. non-opioid analgesics (No. doses) (median [IQR])	11.00 [8.00, 14.00]	11.00 [9.00, 13.00]	0