CASE REPORT

Bubble Trouble: Extended Pneumoperitoneum and Delayed Small Bowel Obstruction Following Laparoscopic Appendectomy in a Child—A Rare Postoperative Challenge: A Case Report

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Abstract

Aim and background: Pneumoperitoneum is a common radiological finding after laparoscopic surgery, typically resolving within 3–7 days due to rapid CO_2 absorption. Persistence beyond this period—particularly in symptomatic patients—raises concern for serious complications like bowel perforation or small bowel obstruction (SBO). However, not all cases indicate surgical emergencies. This case highlights a rare instance of extended pneumoperitoneum in a child following laparoscopic appendectomy, managed conservatively without the need for reoperation.

Case description: A 12-year-old girl with a history of subacute appendicitis was initially managed conservatively and underwent elective laparoscopic appendectomy 1.5 months later. The procedure was uneventful, and she was discharged on postoperative day (POD) 9. On POD 13, she presented with abdominal distension, constipation, and mild tenderness. Radiographs revealed significant pneumoperitoneum and dilated bowel loops, raising suspicion for SBO or perforation. Despite alarming imaging, the patient remained afebrile, hemodynamically stable, and had normal leukocyte counts. Conservative management was initiated, including nasogastric decompression, bowel rest, and supportive care. She showed symptomatic improvement within 48 hours. Serial abdominal radiographs demonstrated gradual reabsorption of free air. The patient was discharged on POD 23, and a follow-up X-ray on POD 30 confirmed complete resolution.

Conclusion: Extended postoperative pneumoperitoneum, though uncommon, may not always indicate a surgical emergency. In clinically stable patients without signs of peritonitis or systemic infection, conservative management is effective. Radiological findings should be interpreted in conjunction with clinical evaluation.

Clinical significance: Persistent pneumoperitoneum may be benign and self-limiting. Imaging alone should not dictate surgical intervention. Clinical judgment is critical to avoid unnecessary surgery and highlights the importance of multidisciplinary evaluation in postoperative care.

Keywords: Acute appendicitis, Appendicectomy, Case report, Laparoscopic, Laparoscopy complications, Pediatric lap. surgery, Pneumoperitoneum.

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Introduction

Laparoscopic appendicectomy is the gold standard treatment for uncomplicated appendicitis in children due to its minimal invasiveness and faster recovery. Pneumoperitoneum following such procedures is expected and usually benign, resulting from carbon dioxide insufflation used during surgery. It typically resolves within a week as CO_2 is absorbed rapidly due to its high solubility.[1,2] However, persistent pneumoperitoneum beyond this period, especially in symptomatic patients, may indicate serious complications like visceral perforation or small bowel obstruction (SBO).[3] Determining whether the intraperitoneal gas is benign or pathological becomes crucial. We report a rare case of extended pneumoperitoneum following laparoscopic appendicectomy in a 12-year-old girl, which resolved with conservative management.

Case Description

A 12-year-old girl presented with a 12-hour history of insidious-onset, progressive right-sided abdominal pain. She had no associated vomiting, fever, urinary complaints, or altered bowel habits. She passed flatus and stools normally. Her general condition was stable (Pulse: 88/min, RR: 15/min, BP: 110/70 mm Hg, afebrile). Abdominal examination was unremarkable—soft and

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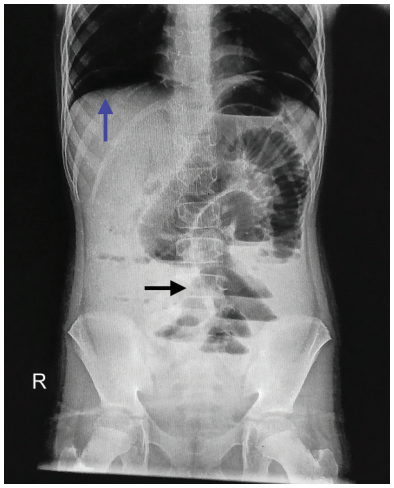

Fig. 1: Abdomen X-ray showing free air under the diaphragm (blue arrow) with multiple air-fluid levels (black arrow) on POD 13

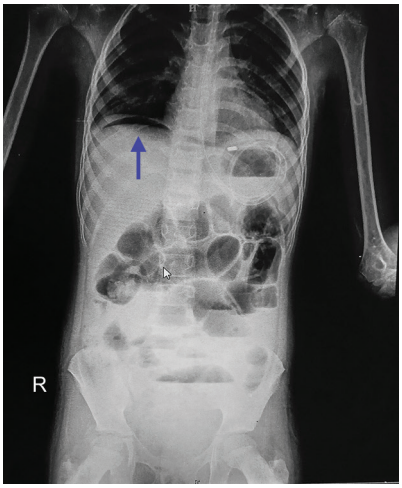

Fig. 3: Abdomen X-ray on POD 18 showing reduction in air-fluid levels and decreased free air under the diaphragm with conservative management

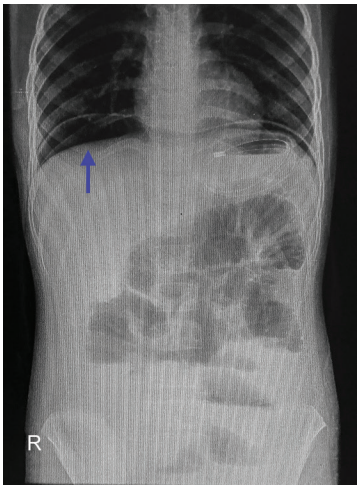

Fig. 2: Abdomen X-ray after NG tube insertion with reduced free air under the diaphragm

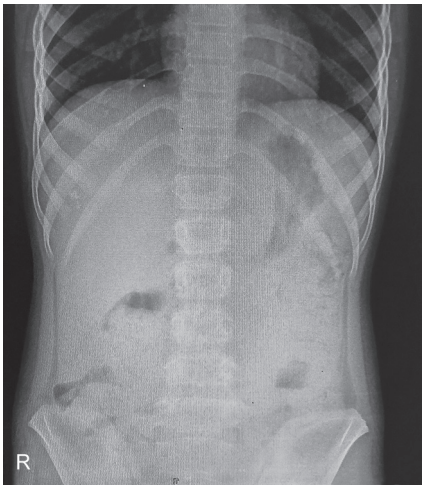

Fig. 4: Abdomen X-ray on POD 30, suggesting complete resolution of pneumoperitoneum

non-tender. Laboratory tests revealed a normal total leukocyte count (10,000/mm^3). Ultrasonography showed an inflamed 8 mm appendix.

In view of the subacute presentation and stable condition, she was managed conservatively and scheduled for an interval laparoscopic appendicectomy, performed 1.5 months later. Pneumoperitoneum was created using a Veress needle. Three ports (10 mm at the umbilicus, 5 mm suprapubic midline, and 5 mm at the left iliac fossa) were placed. The appendix was found inflamed, dissected, ligated, and removed. Suction and irrigation were done. The ports were closed, and the patient recovered well. She was discharged on postoperative day (POD) 9.

She was readmitted with abdominal distension, multiple episodes of non-bilious vomiting, and no passage of stools on POD 13. Examination revealed a distended abdomen with generalized tenderness. She remained afebrile and hemodynamically stable. Abdominal X-ray showed multiple air-fluid levels and free air under the diaphragm (Fig. 1). Ultrasonography was suggestive of cholelithiasis (7.1 × 3.8 mm in the lumen of the gallbladder) without signs of cholecystitis. Despite alarming X-ray findings, the absence of peritoneal signs, stable vitals, and normal leukocyte counts supported a decision for conservative management.

A nasogastric tube was inserted, and the patient was kept nil per oral (NPO). She was managed with intravenous fluids and supportive care. Over the next 10 days, her symptoms gradually subsided. Bowel movements resumed, and abdominal distension reduced. Serial X-rays showed slowly resolving pneumoperitoneum (Figs 2 and 3). She was discharged on POD 23, symptom-free. A follow-up abdominal X-ray on POD 30 (Fig. 4) confirmed complete resolution of pneumoperitoneum.

Discussion

Pneumoperitoneum refers to air within the peritoneal cavity, frequently resulting from visceral perforation. However, pneumoperitoneum does not always indicate perforation, as various nonsurgical conditions may give rise to it. Conversely, small perforations may seal quickly, releasing minimal gas.

Postoperative pneumoperitoneum is common and ordinarily resolves within 3–6 days, but cases with a longer duration of pneumoperitoneum have been reported.

KS Smith et al. observed a 48-year-old female post-laparoscopic hysterectomy done for uterine leiomyoma on post op day 48 with abdominal pain and free air under the diaphragm who underwent exploratory laparotomy, but no defect was found, and applying the concept of lex parsimoniae, the diagnosis was retained pneumoperitoneum.[4]

Stanley et al. observed 25 patients after gynecological laparoscopy and concluded that by 48 hours post-operation, its impact on postoperative pain and the amount of air present should be minimal.[5]

Feingold et al. conducted a study on pigs undergoing laparoscopic and open cholecystectomies, concluding that evidence of free air beyond POD 2 after laparoscopy and day 6 after laparotomy is abnormal and should prompt further investigation.[6]

Probst et al. studied the duration of pneumoperitoneum in dogs, finding that it correlated with the amount of air introduced and the size (maturity) of the patient. Their results suggest that patients undergoing longer surgeries or with higher BMI may take longer to resolve pneumoperitoneum.[7]

Currently, the longest reported cases in the literature are 8 weeks of retained pneumoperitoneum postlaparotomy and 4 weeks of retained pneumoperitoneum postlaparoscopy.[8]

Persistent pneumoperitoneum on postoperative imaging often raises concern for serious surgical complications such as SBO, visceral perforation, or anastomotic dehiscence. These diagnoses frequently warrant urgent re-intervention. However, distinguishing a benign postoperative finding from a pathological condition remains crucial, particularly when clinical features are not alarming.

In our case, the patient presented on POD 13 following a laparoscopic appendectomy with abdominal distension, non-passage of stools, and imaging revealing both pneumoperitoneum and multiple air-fluid levels. These findings suggested possible SBO or perforation. However, the absence of systemic signs such as fever, leukocytosis, peritonitis, or hemodynamic instability supported a conservative approach. Nasogastric decompression and bowel rest led to a gradual resolution of both symptoms and radiological findings, with complete recovery by POD 30.

Multiple mechanisms may contribute to prolonged retention of intraperitoneal air, including peritoneal adhesions, gas trapping in dependent spaces, decreased mobility, or lower absorption capacity.

In the case presented by us, the patient's ultrasonographic evaluation revealed cholelithiasis, which could potentially precipitate an inflammatory response, subsequently leading to adhesion formation. Such adhesions might impede the absorption of intraperitoneal gas. Additionally, the presence of an infectious process or purulent collection could further exacerbate delays in gas absorption. It is also possible that the thin build of the patient could have resulted in persistent as it has been found that lean adults have a more prolonged postoperative pneumoperitoneum than overweight patients because the bulky panniculus in obese adults restricts the distension of the peritoneal space and thus limits the volume of air collected initially. Moreover, intraoperative complications, such as inadvertent bowel injury or anastomotic leakage, must be considered as potential contributory factors.

The management of the patient is contingent upon their history and clinical examination. In the absence of signs indicative of peritonitis, the patient can be monitored, taking into consideration radiographic evaluations and hemodynamic stability. However, should there be indications of peritonitis, hemodynamic instability, or sepsis, an exploratory laparotomy should be performed without hesitation.

Conclusion

Extended postoperative pneumoperitoneum is a rare but benign complication in pediatric patients after laparoscopic appendicectomy. It is of utmost importance to raise awareness of the management of postoperative pneumoperitoneum, along with its clinical and medicolegal implications. Further research should focus on prospective studies for the management of free air and should include a multidisciplinary team composed of surgeons and radiologists. Without a doubt, if a clinical exam suggests peritoneal irritation with laboratory and imaging supporting pneumoperitoneum, surgical exploration is a must. It is important to recognize nonsurgical pneumoperitoneum, and if the clinical history suggests postoperative retained air or nonsurgical causes, then conservative management with frequent clinical evaluations should be considered to avoid the risks and financial burden of a negative exploratory laparotomy.

Clinical Significance

The case contributes significantly to the surgical literature, advocating for judicious, clinically guided decision-making in the face of prolonged postoperative pneumoperitoneum, not relying on radiological imaging alone, and thus avoiding unnecessary interventions and medicolegal complications and emphasizing further research on the topic that could help a surgeon when and when not to use the knife.

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