

# A Case of Idiopathic Diffuse Pneumoperitoneum Presented with Neonatal Abdominal Color Change

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## ABSTRACT

**Background:** Necrotizing enterocolitis is the leading cause of intestinal perforation and pneumoperitoneum in neonates. In addition, neonatal pneumoperitoneum includes several conditions requiring surgery, such as gastric and duodenal perforation, intestinal atresia, volvulus, meconium ileus, and Hirschsprung's disease. A type of pneumoperitoneum in which intra-abdominal free air is detected through direct X-ray; however, no cause is found clinically and radiologically during the surgery is named "benign pneumoperitoneum".

**Case report:** This case report presents a 5-day-old male newborn who is presented with complaints of abdominal color change and vomiting and is diagnosed with Idiopathic Benign Pneumoperitoneum (IBP) during the operation. Neonatal pneumoperitoneum usually occurs as a result of perforation and requires emergency surgery. Rare cases of IBP should also be kept in mind. Unnecessary surgery can be prevented by establishing a differential diagnosis with clinical, laboratory, and imaging methods.

**Conclusion:** This case demonstrated that laparotomy is not a true routine in neonates with IBP if a timely diagnosis is established.

**Keywords:** Benign pneumoperitoneum, Newborn, X-ray

## Introduction

Necrotizing enterocolitis is the leading cause of intestinal perforation and pneumoperitoneum cases in the neonatal period. In addition, several conditions requiring surgery, such as gastric and duodenal perforation, intestinal atresia, volvulus, meconium ileus, and Hirschsprung's disease can be considered neonatal pneumoperitoneum (1). Pneumoperitoneum in which intra-abdominal free air is detected through direct X-ray; however, no cause is found clinically and radiologically during the surgery is named "benign pneumoperitoneum". Benign pneumoperitoneum is also termed spontaneous idiopathic pneumoperitoneum, surgery-free pneumoperitoneum, or unexplained pneumoperitoneum (2). This case report presented a case of a newborn who was presented with complaints of abdominal color change and vomiting and diagnosed with "Idiopathic Benign Pneumoperitoneum (IBP)" during the operation.

## Case report

A 5-day-old male infant presented to the county public hospital with complaints of abdominal color change and vomiting was referred to our tertiary neonatal intensive care unit for further investigations and treatment. The patient was taken to the previously heated incubator. The physical examination at the time of admission showed that the infant had a moderate general health status and a mild hypotonic appearance. Moreover, the patient had no fever, and cardiovascular system examination revealed that S1 and S2 were normal and there were no murmur and tachycardia. The infant's respiration was comfortable and lung sounds were considered normal by auscultation. However, the abdomen was markedly distended and there was erythema in the periumbilical region. It should be mentioned that the infant was born from the third pregnancy of a 20-year-old mother as the third live birth at 39th week of gestation with a birth

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weight of 3300 g. The 1st and 5th minute APGAR scores were determined at 8 and 9, respectively. The breastfed baby infant had meconium in the first 24 h after the birth. The case was discharged from the hospital 24 h after the birth since there was no complaint. In the complete blood count, WBC was found as 10340/ $\mu$ L (LYM: 32.2 %, NEU: 50.4 %), Hb 15.0 g/dL, HCT:45.5 %, and PLT 478.000/ $\mu$ L. It is worth mentioning that, there were no pathologic findings in biochemical and coagulation tests. The CRP, among the markers of infection, was determined at 6.19 mg/dL (N:0-0.5). The standing direct abdominal X-ray revealed free air below the diaphragm surrounding the liver (Figure 1). Moreover, there were no signs of pneumothorax or pneumomediastinum. Enteral feeding was discontinued and the infant was fed through orogastric free drainage and intravenous fluid. Subsequently, antibiotic treatment was initiated for the infant. The infant was then operated on by the pediatric surgery department with the presumed diagnosis of intestinal perforation due to the erythema in the abdomen, the presence of free air on the abdominal X-ray, and the elevated CRP value.

No perforation was detected in the gastrointestinal tract of the patient who had abundant air outflow during the operation and his diaphragm was evaluated as normal. The patient was diagnosed with "Benign Idiopathic Neonatal Pneumoperitoneum".

The patient was extubated after the operation and followed up again in the neonatal intensive

care unit. The patient whose general health status was stable was provided with limited enteral feeding on the second day after the operation and received full enteral feeding on the 5th postoperative day. The patient was discharged on the 12th postnatal day with the recommendation to visit for control after his general condition was checked during the follow-up.

## Discussion

Neonatal pneumoperitoneum is usually a result of perforation anywhere in the gastrointestinal tract (3). Pneumoperitoneum can develop from air leak syndromes in the lung, including pneumothorax and pneumomediastinum observed during mechanical ventilation (4). The development of pneumoperitoneum is an extremely rare condition in a newborn without perforation; therefore, clinicians must be mindful in such cases. In this case, which develops as a result of subclinical micro-perforation, the gas in the intestine comes out, while the other intestinal contents do not. Since peritonitis symptoms were not developed, the patient's vital signs were stable in general (5).

The number of IBP cases is increasing in the literature year by year. Moreover, some of the reported cases have been diagnosed after the surgery (6-9), while others (10, 11) were diagnosed following conservative approaches. There may be some clues that show when a case of IBP in clinical practice should be expected. It should be mentioned that the general status of the patients with IBP is usually stable except for abdominal tenderness and signs of pneumoperitoneum on direct X-ray. Moreover, soft abdominal distention, as well as the lack of stiffness and tension, are important signs for differential diagnosis. In addition, a direct X-ray usually reveals diffuse intra-abdominal surrounding the liver. Moreover, abdominal distention resulted from organic causes requiring surgery is usually stiff and tense. Furthermore, heat irregularities, leukopenia or leukocytosis, thrombocytopenia, and elevated markers of infection should be assessed in favor of organic pathologies.

The results of a study conducted by Ibrahim A et al. indicated that pneumoperitoneum is not an absolute indication for surgery in newborns, and the practice of tapping (abdominal paracentesis) can be revealing. Moreover, the authors emphasized that all cases with pneumoperitoneum should be evaluated for abdominal paracentesis before the operation (12). In a retrospective study conducted by Duan SX, a conservative approach



**Figure 1.** Free peritoneal air under the diaphragm surrounding the liver on the 5th postnatal day

was applied in six neonatal cases with pneumoperitoneum identified within 15 years. The authors stated that they performed abdominal paracentesis on two of the cases, while the cases that did not require surgical operation did not experience any problem during long-term follow-up (13).

Unlike the cases that were studied in the literature, our patient had an abdominal color change. The complaint of vomiting and a high level of CRP suggested organic pathology; however, the patient was diagnosed with benign spontaneous idiopathic neonatal pneumoperitoneum during the operation. It is worth mentioning that, in case pneumoperitoneum is believed to be developed due to an organic cause, a decision for surgery should be made as soon as possible since the development of peritonitis (as a result of perforation) affects the success of the surgery and the rate of morbidity and mortality.

### Conclusion

Neonatal pneumoperitoneum usually occurs as a result of perforation and requires emergency surgery. Rare cases of idiopathic neonatal pneumoperitoneum must be considered with care. Eventually, unnecessary surgery can be prevented by establishing a differential diagnosis with clinical, laboratory, and imaging methods.

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### Conflicts of interest

There is no conflict of interest regarding the publication of this study.

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