

SPONTANEOUS PNEUMOPERITONEUM IN A SEVEN DAY OLD INFANT

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ABSTRACT

The term pneumoperitoneum is used to describe the presence of free gas or air within the peritoneal cavity. Spontaneous pneumoperitoneum or "non-surgical" pneumoperitoneum is a pneumoperitoneum not associated with a perforated viscus. This pneumoperitoneum is rare at any pediatric age. In the pediatric population, nonsurgical pneumoperitoneum occurs in 1% to 3% of mechanically ventilated infants, depend on the mode of the ventilation. Pneumoperitoneum without gastrointestinal perforation on the other hand is very rare, and this is usually seen in neonates with respiratory distress and on mechanically ventilator or CPAP. We reported a case of spontaneous pneumoperitoneum in a seven day old infant. The infant presented with a sudden abdominal distention and dyspnea. Plain abdominal x-ray showed a radiolucency image in the superior abdomen. In this patient is done the act of a needle aspirations for drainage air in the peritonium. This patient recovered well after done such action by pediatric surgical. [MEDICINA. 2012;43:196-200].

Keywords: neonatal, spontaneous pneumoperitoneum

PNEUMOPERITONEUM SPONTAN PADA BAYI BERUMUR TUJUH HARI

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ABSTRAK

Istilah pneumoperitoneum dipakai untuk menjelaskan adanya udara atau gas bebas di kavum peritoneum. Pnemoperitoneum spontan atau pneumoperitoneum "non-bedah" merupakan pneumoperitoneum tanpa adanya ruptur viskus. Kejadian pneumoperitoneum spontan jarang terjadi pada anak-anak di berbagai tingkat usia. Pada populasi anak-anak, pneumoperitoneum spontan dapat terjadi pada 1% - 3% neonatus yang menggunakan bantuan ventilasi mekanik, tergantung pada model ventilasi. Di sisi lain, pneumoperitoneum tanpa perforasi gastrointestinal sangat jarang terjadi, dan hal ini biasanya terlihat pada neonatus dengan distress pernapasan dan pada ventilator secara mekanik atau CPAP. Kami melaporkan kasus pneumoperitoneum spontan pada bayi berumur tujuh hari. Pada kasus ini didapatkan distensi abdomen dan adanya dispne. Foto polos abdomen menunjukkan adanya gambaran radiolusen pada bagian abdomen superior. Pada penderita ini dilakukan tindakan jarum aspirasi untuk drainase udara di peritoneum. Penderita sembuh dengan baik setelah dilakukan tindakan oleh ahli bedah anak. [MEDICINA. 2012;43:196-200].

Kata kunci: neonatus, pnemoperitoneum spontan

INTRODUCTION

Pneumoperitoneum is a radiologic term denoting an abnormal collection of air in the peritoneal cavity. The pneumoperitoneum was mentioned in the literature since 1902, which has been used diagnostic purposes. Pneumoperitoneum is a rare complication which may occur in neonatal intensive care unit.¹

Pneumoperitoneum not associated with a

perforated viscus can occur; this is called spontaneous pneumoperitoneum or "non-surgical" pneumoperitoneum.² Spontaneous pneumoperitoneum without gastrointestinal perforation on the other hand is very rare, and this is usually seen in neonates with respiratory distress and on mechanically ventilator or CPAP.³ Pneumoperitoneum may result from perforation of the gut, but may also be caused by air dissecting from chest

through the diaphragmatic foramina into the peritoneum. It is important to determine the causes accurately for the neonate with pneumoperitoneum. The definitive diagnosis is based on graphically documented by an abdominal roentgenogram.

Pneumoperitoneum without viscus rupture or spontaneous pneumoperitoneum is rare at any pediatric age. In the pediatric population, spontaneous pneumoperitoneum occurs

in 1% to 3% of mechanically ventilated preterm infants, depending on the mode of the ventilation and CPAP.⁴ Mestall et al⁵ find only 32 infants with pneumoperitoneum out of 60,000 admissions. Laparotomy is usually required to treat pneumoperitoneum due to bowel perforation. Pneumoperitoneum can, however, be caused due to air that has dissected down from the thorax. In the latter situation laparotomy is not indicated. An unnecessary laparotomy would be poorly tolerated by an ill, premature infant. Therefore, in any neonate with pneumoperitoneum, it is vital to determine the cause accurately.

In this paper, we reported a case of pneumoperitoneum in a seven day old infant.

CASE ILLUSTRATION

BV, a 7-day-old-girl, was treated in NICU since birth. She was diagnosed with preterm baby low birth weight, moderate asphyxia, respiratory distress i.e Hyalin Membrane Disease (HMD) grade II and was suspected with an early onset sepsis. She was suffered from stomach tension and respiratory distress in the 7th days of treatment without vomiting and there was not blood in the stool.

This patient was born on April 5th 2010 by section caesarian. Her mother had 32 weeks of pregnancy and routinely had antenatal care obstetrician. The birth weight was about 1700 grams, singleton, no cloudy amnion and body length was 41 cm at birth. There was not congenital abnormalities. Histories of

radiation, alcohol, herbs or drugs consumption during pregnancy were denied. Radiography after resuscitation at birth did not get appearance of pneumothorax or free air in abdominal cavity (**Figure 1**).

On physical examination, tonus reflex activity and crying were weak. The pulse rate was 159 x/minute, regular, well perfusion; respiration rate was 68 x/minute; axillary's temperature was 36.8°C; body weight was 1700 grams; and the height was 41 cm. On head examination, the head was normocephaly; major fontanel was flat; the hair was black. The conjunctivas were not pale and nor jaundice on the sclera. On heart examination, the apical heart beat was not seen but palpable at ICS V on the left side of mid clavicle line (MCL). The first and second of heart sound were normal, regular without murmur. Breath sounds was bronchovesicular on auscultation without wheezing or rales. On examination, there were distended, bowel sounds was slowly, the liver and the spleen were not enlarged of the abdomen. There were no signs of ascites, such as shifting dullness and undulating wave (**Figure 2**). Extremities were warm, no cyanosis nor edema.



Figure 1. Radiography after resuscitation at birth (no pneumothorax and free air in abdominal cavity).

Based on clinical manifestation and x-ray findings, abdominal distension, spontaneous pneumoperitoneum was diagnosed. We planned for further examination such as blood gases analysis, septic marker, electrolyte serum, and consultation for emergency pediatric surgery department.

The laboratory investigation showed the hemoglobin concentration was 16.1 g/dl; hematocrite was 49.9%; white blood cell was 20,0 K/ μ l with neutrophil 54.5% and



Figure 2. Patient with abdominal distension.

lymphocyte 30.4%; and platelet count was 398 K/ μ l. The electrolyte examination showed sodium was 129 mmol/L, potassium was 3,7 mmol/L, calcium was 8.4 mmol/L. The blood gases analyses showed pH was 7.34; pO₂ was 87,8 mm Hg; PCO₂ was 43.4 mm Hg; HCO₃⁻ was 26.3, BE ecf was 1,2 mmol/L; SaO₂ was 96%.

Plain abdominal X-ray : widening of intestine and stomach was seen. Picture of free air in cavum abdominal, no perforation (**Figure 3**). Consultation with pediatric surgery: currently there was free air detected in abdominal cavum in this patient with peritoneal compartment

was suspicion of primary pneumoperitoneum.

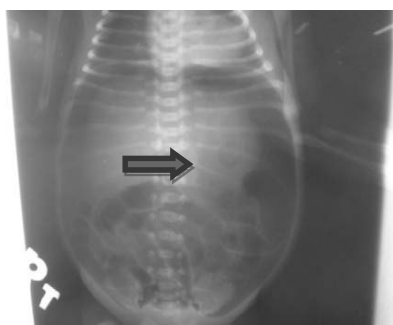


Figure 3. Plain abdominal x-ray: free air detected in abdominal cavity.

The problems of treatment in this patient were immediate management for the free air and compartment syndrome.



Figure 4. The patient in needle aspiration.

The patient treated in incubator with continuous positive air pressure (CPAP) from the first day with the final pressure before distension was FiO_2 30% and received PEEP at 6-8 cm H_2O . Medical management in this case was the drainage of the peritoneum by needle aspiration or by inserting a drainage tube⁶ (Figure 4). This procedure had been successfully done by needle aspiration with a good outcome which showed a decrease in stomach distension and no free air in the image of abdomen plain x-ray (Figure 5).

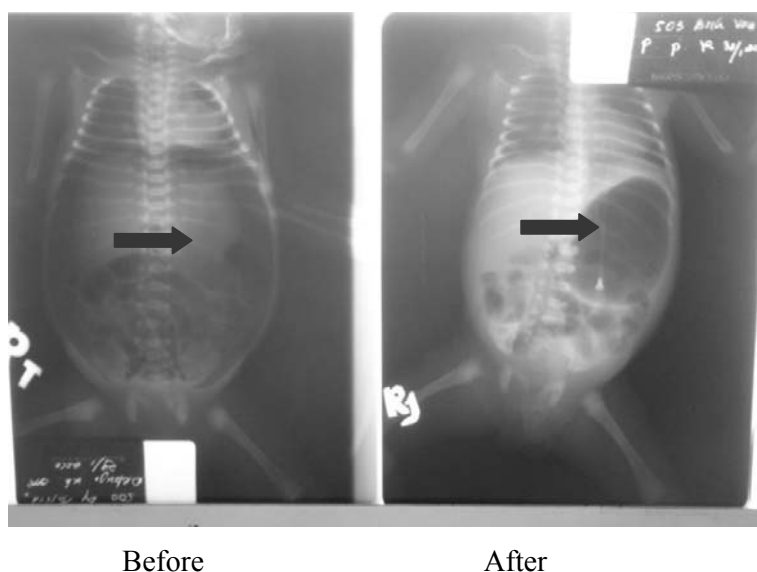


Figure 5. Abdomen plain x-ray before and after needle aspiration.

DISCUSSION

The term pneumoperitoneum is used to describe the presence of free gas or air within the peritoneal cavity.⁷ Pneumoperitoneum appears as a characteristic radiolucency seen below the diaphragm on chest radiograph or in a superiorly dependent location on abdominal radiography.⁸ In the appropriate clinical setting, the radiographic presence of intraperitoneal air often is believed to be a diagnostic finding.⁹ In the neonates, necrotizing enterocolitis continues to be the most common cause of pneumoperitoneum. In our case, there were picture-free air on abdominal cavity, there were no signs of necrotizing enterocolitis and bowel perforation.

Pneumoperitoneum not associated with a perforated viscus can occur; this is called spontaneous pneumoperitoneum or "non-surgical" pneumoperitoneum.² Spontaneous pneumoperitoneum can, however, be due to air that has dissected down from the thorax.¹⁰ Pneumoperitoneum without gastrointestinal perforation on the other hand is very rare, and this is usually seen in neonates with respiratory distress and on ventilator or CPAP.³

Pneumoperitoneum can occur following the development of pneumothorax, pneumomediastinum or sometime only interstitial emphysema. Air escaping from the alveoli after their rupture enter into the interstitial tissues of the lung and then into the mediastinum via the sheaths

of the pulmonary blood vessels and from these, air may enter the peritoneal cavity via the diaphragmatic hiatuses. On the other hand, suggested that in the presence of pulmonary interstitial emphysema, air may escape into the peritoneal cavity via the pulmonary and peritoneal lymphatics.³

Mularski et al⁹ find that the pneumoperitoneum in the neonate may be due to air that has dissected from the chest. Pneumoperitoneum, from thoracic air dissection, which occurred in the absence of pneumothorax or pneumomediastinum are reported in four infant. In our case, the patient pneumoperitoneum occurred in absence of pneumothorax or pneumomediastinum.

Spontaneous pneumoperitoneum without viscus rupture is rare at any pediatric age, Mestral et al⁵ find only 32 infants with pneumoperitoneum out of 60,000 admissions. In pneumoperitoneum abdominal distension may then appear suddenly and is associated with paralytic ileus. The free air in the peritoneal cavity limits diaphragmatic excursion, causing dyspnea and cyanosis. Early diagnosis, the key to successful therapy is achieved by radiological examination.

The 'air leak' phenomenon is a well recognised consequence of PEEP therapy in which there is rupture of an alveolar air cell into the perivascular and peribronchial interstitial tissues.⁷ One way to prove that the air comes from the chest is the analysis of oxygen content in peritoneal gas.¹¹ Unfortunately, in this case, we did not analysis of oxygen content in peritoneal

gas.

Spontaneous pneumoperitoneum can, however, be due to air that has dissected down from the thorax.¹⁰ In the latter situation laparotomy is not indicated. An unnecessary laparotomy would be poorly tolerated by an ill, premature infant. Laparotomy is usually required to treat pneumoperitoneum due to bowel perforation. Therefore, in any neonate with pneumoperitoneum it is vital that the cause be determined accurately. About 10% of the cases, pneumoperitoneum does not reflect perforation of a hollow viscus and may not always require prompt surgical intervention. These situations are reclassified as spontaneous free gas pneumoperitoneum, non-surgical pneumoperitoneum, or benign pneumoperitoneum. Air escaping from the lung might be expected to be visible in the pleural space or mediastinum before it appears in the peritoneum. However, be considered proof that bowel perforation is the cause of pneumoperitoneum.

In our case, patients with respiratory distress due to HMD GR II with positive end-expiratory pressure (PEEP) therapy on continuous positive airway pressure (CPAP), was suddenly suffered from stomach distention, dyspnea. A plain abdominal x-ray image showed a radiolucency image in superiorly abdomen, no perforation and thickening of intestine wall which is the sign of NEC were showed. This case should be diagnosed early in order to gain better outcome for the patient. This can be proved with plain abdominal x-ray which showed no free air in

abdomen cavity.

Pneumoperitoneum usually denotes a perforation of an intra-abdominal viscus, but in about 1-3 % of patients, a nonsurgical source is responsible for free air in the peritoneum and the radiographic findings.¹⁴ Patients receiving PEEP and CPAP therapy are at risk of spontaneous pneumoperitoneum.⁷ In our case the patient used CPAP and received PEEP at 6-8 cm H₂O.

The radiographic manifestation of free air in the peritoneal cavity suggests serious intra-abdominal disease and the need for urgent surgical management. If the abdomen is not under sufficient tension to cause respiratory embarrassment, then no treatment is necessary.⁵ When respiratory distress is acute, there is tension owing to the tremendous amount of air in the peritoneal cavity, emergency paracentesis may be lifesaving. This can be carried out simply with a needle and syringe.⁵ In this case, we found that there were abdomen tension, acute respiratory distress, and radiography image showed free air in the abdomen cavity. Hence, urgent surgical management was done by pediatric surgery department which was needle aspiration.

Prognosis in these patients for cases of spontaneous pneumoperitoneum depends on previous clinical results depend on the full blood, blood gases analysis, electrolyte serum, and the presence or absence of NEC.¹² In this case the full blood examination results, blood gases analysis, and electrolytes serum within normal limits and did not get

the NEC so patient had good prognosis.

Patient requested to be referred to Singapore after the action of needle aspiration and, at present, the patient had recovered.

SUMMARY

We reported a case of spontaneous pneumoperitoneum in a seven day old infant. This case presented with abdominal distension and confirmed by plain abdominal x-ray showed of free gas or air within the peritoneal cavity. The pediatric surgery department did drainage tube with needle aspiration. In this case the full blood examination results, blood gases analysis, and electrolytes serum within normal limits and patient did not get the NEC, so patient had good prognosis. This patient recovered well after conducted needle aspiration by pediatric surgeon.

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