

Pneumoperitoneum and free meconium without gastrointestinal perforation in a neonate

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ABSTRACT

A newborn was referred to our hospital because of poor feeding and abdominal distension and was found to have pneumoperitoneum on abdominal x-ray. At operation there was free intraperitoneal air with no free fluid in the peritoneal cavity. In addition there was free air and meconium retroperitoneally on the left side but there was no evidence of gastrointestinal perforation. This case is rare and unique in that no demonstrable cause for the free air and free meconium could be demonstrated.

Keywords: Pneumoperitoneum.

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Pneumoperitoneum in the newborn infant is almost always indicative of gastrointestinal perforation that requires immediate laparotomy.¹ Very rarely pneumoperitoneum is seen in the absence of gastrointestinal perforation.¹⁻³ This is usually seen in newborns with respiratory distress and following pneumothorax and pneumomediastinum or both,²⁻⁴ but not uncommonly pneumoperitoneum is seen in newborns where a cause can not be demonstrated during surgery or at autopsy.⁵

The rarity of this condition prompts this report of a neonate with pneumoperitoneum without gastrointestinal perforation and without interstitial pulmonary emphysema, pneumomediastinum or pneumothorax. In our patient pneumoperitoneum was found in association with free retroperitoneal air and meconium but no gastrointestinal perforation. This report is the first of such an association.

Case Report. A 32 hour old baby boy, a product of full term normal vaginal delivery following an

uneventful pregnancy to a 40 year old G13 P12 + 0 mother was delivered in a dispensary and referred to our hospital because of poor feeding and abdominal distension. He passed meconium 6 times and there was no vomiting. His birth weight was 3.3kg. He was not in respiratory distress. Clinical examination revealed no abnormality apart from abdominal distension. He was diagnosed to have sepsis and because his abdominal x-ray (Figure 1) showed pneumoperitoneum, necrotizing enterocolitis was suspected. His investigations showed Hb = 16mg/dl, WBC = $10.7 \times 10^3/\text{mm}^3$, platelets = $179000/\text{mm}^3$, Na^+ = 135 mEq/dl, K^+ = 3.3mEq/dl and his blood sugar was 262mg/dl.

Operation. He was operated on the same day after resuscitation. Exploration revealed pneumoperitoneum with no free fluid in the peritoneal cavity. There was also a localized tense retroperitoneal collection of air and meconium in the left paracolic gutter (Figure 1). This area was opened and air and meconium was evacuated. The meconium was fresh

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Figure 1 - Plain abdominal x-ray showing pneumoperitoneum.
Note: In addition an area of localized air representing the site of sequestered air and meconium in the retroperitoneal space.

and not old. Exploration of the whole gastrointestinal tract revealed no perforation and meticulous exploration of the colon at the site of air and meconium collection after it was mobilized revealed no colonic perforation. The colonic content was milked down to the rectum with no evidence of a leak. The peritoneal cavity was washed and cleaned with warm normal saline. A drain was left at the site of air and meconium collection. This however did not drain anything and so was removed on the second post-operative day. Post-operatively the patient did well. He was started feeding on the 5th post-operative day which he tolerated well. He was passing stools normally and was discharged home 2 weeks post-operatively. His blood culture did not grow any organisms.

Discussion. In the neonates, necrotizing enterocolitis continues to be the most common cause of pneumoperitoneum. Pneumoperitoneum without gastrointestinal perforation on the other hand is very rare, and this is usually seen in neonates with respiratory distress and on ventilators.^{2,4,5} Pneumoperitoneum in these patients occurs following the development of pneumothorax, pneumomediastinum or sometime only interstitial

emphysema. The exact mechanism by which pneumoperitoneum develops in these patients is not known. 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.³ Brown and Keenan, 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.⁴ In the presence of pneumothorax and pneumomediastinum or both, air may also escape retroperitoneally and then burst into the peritoneal cavity leading to pneumoperitoneum.³ Based on this, Zerella et al made the distinction between medical pneumoperitoneum and surgical pneumoperitoneum.³ The distinction is of valuable importance because whereas the presence of pneumoperitoneum and because of the high incidence of associated intestinal perforation immediate laparotomy is indicated, the presence of pneumothorax and pneumomediastinum or both prior to simultaneous to the appearance of pneumoperitoneum calls for a conservative approach.^{3,6} Medical pneumoperitoneum is commonly seen in critically ill neonates with respiratory distress where a laparotomy may be fatal.⁶

This however is not the case always and there are reports of pneumoperitoneum in neonates where no cause could be demonstrated either at surgery or at autopsy.⁵ Our patient had a pneumoperitoneum without bowel perforation and without pneumothorax or pneumomediastinum. Not only this but our patient had in addition to pneumoperitoneum free meconium mixed with air retroperitoneally on the left side. This is to my knowledge the first report of free meconium and pneumoperitoneum without gastrointestinal perforation. The exact cause of this is not known. In some patients and in the event of intestinal mucosal damage from any cause, air may escape to enter the subserosa forming air cysts which can rupture leading to pneumoperitoneum without gastrointestinal perforation,² but the presence of meconium in our patient is more indicative of intestinal perforation. The fact that the meconium and air were localized retroperitoneally on the left side suggested a retroperitoneal perforation and leak of both meconium and air. The air which was found to be under tension leaked from the retroperitoneal space into the peritoneal cavity leading to pneumoperitoneum. There was however no demonstrable perforation in any part of the gastrointestinal tract in our patient and if there was a perforation it had already sealed. So the exact cause of pneumoperitoneum and free meconium in our patient is not known and the mechanism remains a matter of speculation.

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