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Case report

An Unusual Pneumoperitoneum in an Extremely Low Birth Weight Preterm Newborn

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Abstract. Pneumoperitoneum (PP) is a radiological diagnosis, characterized by the presence of air under the diaphragm, that in 90% of cases results from a perforated viscus while in 10% of cases it is not associated to perforation, the so-called non-surgical or spontaneous PP. Spontaneous PP is rare at any paediatric and neonatal age. In the neonatal population, sporadic cases of spontaneous PP have been described, almost invariably following mechanical ventilation. We presented the case of an extremely low birth weight infant (ELBW) with spontaneous PP secondary to pneumomediastinum who has never underwent mechanical ventilation or cardiopulmonary resuscitation. (www.actabiomedica.it)

Key words: Pneumoperitoneum; Extremely Low Birth Weight; Preterm Neonates

Introduction

Pneumoperitoneum (PP) is a radiological diagnosis, characterised by the presence of air under the diaphragm, that in 90% of cases results from a perforated viscus while in 10% of cases it is not associated to perforation, the so-called non-surgical or spontaneous PP (1). These last cases can originate from pathologic disorders in the thorax, abdomen and genitourinary tract (2). Spontaneous PP is rare at any paediatric age: an intra-thoracic source is the most frequent. It occurs in 1–3% of mechanically ventilated infants, depending on the mode of ventilation, or may develop following difficult intubation or mask ventilation (3,4). In the neonatal population, sporadic cases of spontaneous PP have been described, almost invariably following mechanical ventilation (5,6). We report a case of an extremely low birth weight infant (ELBW) with spontaneous PP secondary to pneumomediastinum who has never undergone mechanical ventilation or cardiopulmonary resuscitation.

Case Report

A 980 gr, small for gestational age, male preterm was born to a 35-year-old primiparous woman at 33 weeks of gestational age (GA), after an uncomplicated trigeminal trichorionic triamniotic pregnancy (inducted through in vitro fertilization and embryo transfer). The mother received a full course of antenatal steroids at 32 weeks of GA. Doppler flows in the umbilical vessels were normal. The baby was born through an elective caesarean section due to trigeminal pregnancy and growth retardation of the case twin of three. Apgar scores were 9 and 9 at 1 and 5 minutes. A thoraco-abdominal X-ray (TAX) was performed after birth, following umbilical vein catheterization and the presence of pneumomediastinum was noted (figure 1). The baby has always been in room air, with a flat and non-tender abdomen. Enteral feeding was started on day of life 2 and was well tolerated. On day of life 7 the baby underwent a second TAX following the insertion of a PICC line, which showed the presence of free air

in the peritoneum, confirmed by subsequent upright view TAXs (figure 1).

The baby was still clinically stable, the abdomen was distended but soft, heart rate (HR) was 130 bpm, mean arterial pressure (MAP) was within normal range, SPO_2 around 95-97%. Laboratory evaluation showed unremarkable complete blood count, blood gas, electrolyte panel and coagulation studies. Stools were heme negative. Enteral nutrition was withheld, and the baby was started on intravenous antibiotics. In accordance with the pediatric surgeon, we decided for a conservatory approach. During the following hours, the baby appeared less reactive, abdomen was mildly tender to the touch. HR was 170 bpm, capillary refill rime > 3s, pulsatile index of 0.5, MAP < 10th percentile. A normal saline bolus was given and dopamine infusion at a rate of 5 gamma/kg per minute was started. Together with the pediatric surgeon, we decided to perform an exploratory laparotomy which confirmed the presence of pneumoperitoneum but found no evidence of bowel perforation. Postoperative course has been unremarkable, parenteral antibiotics were withheld on postoperative day (POD) 5, enteral feeding was started on POD 6 and full enteral feeding was achieved on POD 15. After discharge from hospital, the baby was evaluated in our ambulatory care facility. Growth and neurocognitive development were normal in the next follow-up assessments up to 12 months corrected age.

Discussion

Nonsurgical pneumoperitoneum is defined by the presence of air in the peritoneal space detected by abdominal X-ray and in which laparotomy results non-diagnostic (7). The most likely mechanism is air tracking from ruptured alveoli along the sheaths of adjacent vessels into the mediastinum. With increasing pressure, from the mediastinum the air tracks into the retroperitoneum and then enters the peritoneal cavity through the foramen Winslow or via rupture along the mesenter (4). In adult patients, Mularsky (2) suggested that when abdominal pain and distension are minimal, peritoneal signs, fever, and leukocytosis are absent, nonsurgical causes of pneumoperitoneum should be considered for subsequent conservative management. Karaman (4) suggested that also paediatric patients who develop pneumoperitoneum after cardio-pulmonary resuscitation or mechanical ventilation, without signs or symptoms of perforation, may not need laparotomy. In newborns, nonsurgical pneumoperitoneum has been described in patients undergoing mechanical ventilation, usually associated with air leaks, pneumothorax or pneumomediastinum (5,6,8-10). In 2015 He et al. reported a case of an idiopathic neonatal pneumoperitoneum in a term newborn not previously ventilated, managed conservatively (11). Khan et al. published a case series of newborns with pneumop-

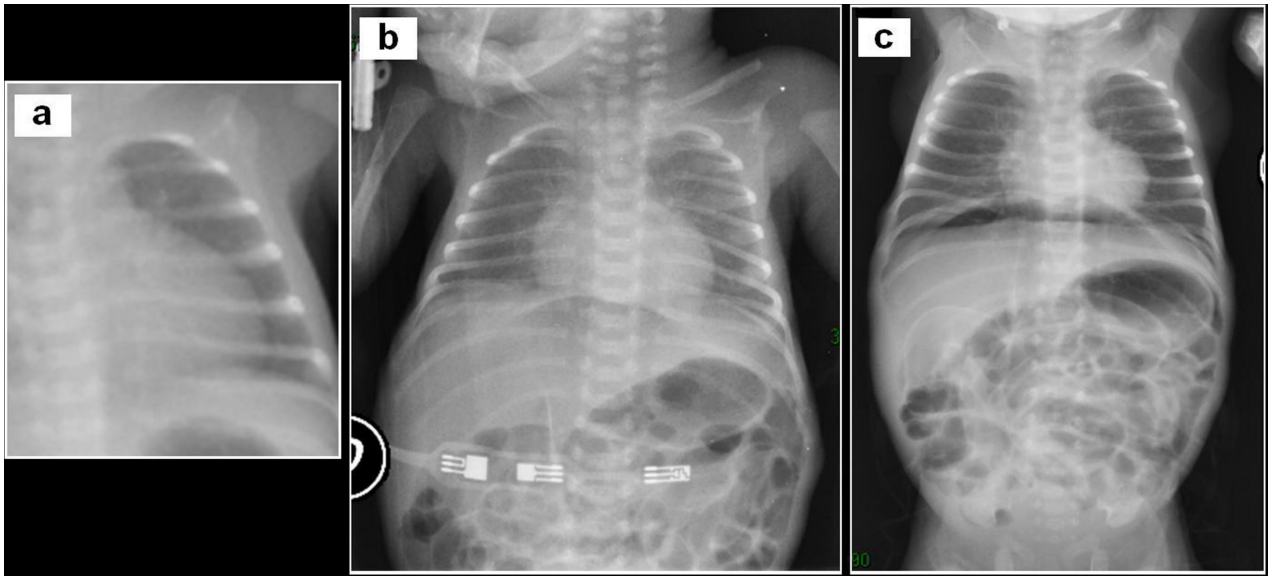

Figure 1. a) Thoraco-abdominal X-ray (TAX) after birth; b,c) TAXs on day of life 7

eritoneum, 7 out of 89 newborns had a nonsurgical pneumoperitoneum and only 3 of them were managed conservatively (5). Although, no information about the past clinical history of these patients is reported. Even in the absence of perforation, pneumoperitoneum can be associated with deterioration of clinical conditions if intra-abdominal hypertension develops. The abdominal cavity in fact, has a steady-state intra-abdominal pressure normally ranging between 5 and 7 mmHg. When intra-abdominal hypertension is present, the patient may develop an abdominal compartment syndrome, characterized by vascular compromise and organ ischemia. In these cases, decompression is indicated and therapeutic (12).

To our knowledge, this is the first case of nonsurgical pneumoperitoneum in an ELBW infant who has never undergone CPR or mechanical ventilation. Our infant was managed conservatively until his clinical conditions have deteriorated; laparotomy was then performed as we could not rule out a perforated viscus in an ELBW preterm infant. However, laparotomy with peritoneal lavage was performed and no evidence of intestinal pneumatosis, bowel perforation or intrabdominal congenital anomalies were found. We concluded this was a case of nonsurgical pneumoperitoneum secondary to a spontaneous pneumomediastinum in an ELBW infant.

In preterm infants, whether a case of pneumoperitoneum can be considered "benign pneumoperitoneum" and can so be observed, or whether it needs surgical treatment, it continues to remain a debatable issue; in particular, in ELBW infants, when the aetiology of free intra-peritoneal gas is unclear, surgical exploration is advised.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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