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NEONATAL PNEUMOMEDIASTINUM: A PATHOGNOMONIC RADIOLOGICAL SIGN

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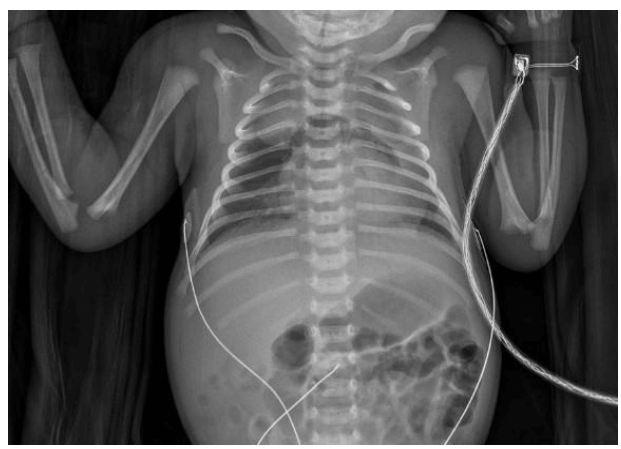
A male term newborn was born from a monitored and uneventful 38 weeks gestation via an elective caesarean section with Apgar scores of 8/8/8 at first, fifth and tenth minutes respectively and with a birth weight of 2980 g. Two minutes after birth he began to have irregular respiratory movements and started intermittent positive pressure ventilation followed by alveolar recruitment. Since he maintained signs of respiratory distress he was admitted to a neonatal intensive care unit (NICU) and was put on continuous positive airway pressure (CPAP) of 4,5 cm H2O and fraction of inspired oxygen of 0,30. Laboratory markers for infection were negative and arterial blood gas excluded respiratory or metabolic acidosis. Two hours after admission in the NICU, the newborn showed signs of clinical improvement and suspended CPAP, beginning spontaneous breathing with no need of supplemental oxygen and with arterial oxygen saturation above 94%. An anterior-posterior chest-radiography (CXR) at six hours of life revealed a hyperlucency around the left cardiac border and wedge-shaped opacities of the upper third of the right hemithorax and of the two upper thirds of the left hemithorax (Figure 1). For better understanding of this image, a low-radiation axial computed tomography (CT-scan) of the chest was performed revealing a normal airway and pulmonary parenchyma and a centered mediastinum showing evidence of a small amount of air. Pulmonary congenital malformations or other masses were excluded. Since the newborn remained haemodynamically stable, the clinicians opted for a conservative approach. There was a favorable clinical evolution and he was discharged at four days of age, asymptomatic and with radiological improvement. Follow-up after four weeks revealed a full radiographic resolution.

What is the diagnosis?

Neonatal pneumomediastinum is estimated to occur in 4-25 of 10000 live births[1,2], but it may be underestimated because many infants have minimal symptoms.[3] The spontaneous pneumomediastinum following an uncomplicated delivery is rare[4] and is the result of air leak due to increases in alveolar pressure.[5] It is often associated with meconium aspiration, hyaline membrane disease, positive pressure ventilation or birth trauma, although it can be idiopathic.[5,6,7] Caesarean section delivery has also been associated with an increased risk of pneumomediastinum. The pathophysiological mechanism, known as Macklin effect, begins with a rupture along the alveolar tree that increases the intra-alveolar pressure suddenly. This allows the air to dissect centripetally through the pulmonary interstitium until reaching the pulmonary hilum and into the mediastinum. In term newborns it has been associated with vigorous respiratory efforts together with irregular inflation of alveoli at birth, especially in those delivered by caesarean section.[7,8,9] In most cases, the infant is asymptomatic, meaning not all cases are detected.[3,10] Clinical features, if present, are those of respiratory distress. Air leak in another anatomical location may also occur, such as a concomitant pneumothorax.[2] Pneumomediastinum's diagnosis is based on clinical presentation and imaging findings.[4,11] In most cases, CRX is enough to confirm the diagnosis, especially when the pathognomonic spinnaker-sail sign is present.[2,6,12,13] Both thymus lobes are lifted and

Figure 1. Hyperlucency around the left cardiac border and wedge-shaped opacities of the upper third of the right hemithorax and of the two upper thirds of the left hemithorax, raising suspicion of a pneumomediastinum.



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displaced laterally due to the air in the mediastinum. This creates a wedge-shaped opacity that extends into the superior mediastinum and that is sharply outlined inferiorly by translucent mediastinal air.[6,10,13] The spinnaker-sail sign is named after the headsail of a boat, which has a similar shape when it is stretched by the wind. In some cases the spinnaker-sail sign isn't completely well defined, raising concerns about underlying congenital pathologies including congenital mediastinal cyst, subpulmonary bleb, subpulmonary pneumothorax, large hiatal hernia and pneumopericardium.[3] In such cases, a CT-scan may be helpful for evaluation of suspected mediastinal masses and may provide additional clinical information for differential diagnosis.[3,14,15] The spinnaker-sail sign, when present, is pathognomonic of pneumomediastinum and may avoid unnecessary radiation exposure.[4] Even though most pneumomediastinum are self-resolving or require minimal care (oxygen supplementation)[2,3,4,5,6,12,13], timely recognition and close follow-up is warranted due to the potential risk of complications, such as pneumothorax, subcutaneous and interstitial emphysema.[4,5]

Compliance with ethical standards
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