

# Pneumothorax (neonatology)

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**Pneumothorax** (PNO) is caused by alveolar rupture due to excessive alveolar pressure resulting from uneven alveolar ventilation, air trapping and large fluctuations in transpulmonary pressure. Free air travels along the pulmonary vessels to the mediastinum where it accumulates. The accumulated air may then flow into the pleura, mediastinum, pericardium or extra-thoracic areas. According to an alternative hypothesis, free air from the interstitium enters directly into the pleural cavity. The lungs of immature neonates are more susceptible to uneven ventilation due to the lower number of channels connecting the alveoli (Kohn pores) and thus allowing pressure redistribution.

Pneumothorax is usually a complication of respiratory disease, such as RDS, meconium aspiration or congenital malformation. Spontaneous pneumothorax may occur immediately after birth due to high fluctuations in transpulmonary pressure generated during the first breaths of the newborn or during active resuscitation. Rarely, it arises as a result of direct injury to the lung during perforation with a suction catheter, tracheal intubation with a cannula with introducer or insertion of a central venous catheter. The incidence of pneumothorax in neonates decreased significantly after the introduction of surfactant therapy and more sparing ventilation regimens.

Pneumothorax is, together with pulmonary interstitial emphysema (PIE), one of the most common forms of airleaks in neonates. Less common forms of airleaks include pneumomediastinum, pneumopericardium and pneumoperitoneum. Very rare complications of multiple airleaks include subcutaneous emphysema and systemic air embolism.

## Clinical picture

- asymptomatic (small PNO)
- picture of respiratory distress (large PNO)
- dramatic deterioration in general condition, pallor, shock, impaired oxygenation (very large or tension PNO)
- in tension PNO, mediastinal shift
- abdominal distension due to displacement of diaphragm or liver in right-sided PNO
- during PNO there is increased cerebral blood flow, therefore higher risk of bleeding into the germinal matrix and lateral ventricles in immature neonates
- arginine and vasopressin levels may be elevated, leading to fluid retention

## Diagnosis

- change in vital signs
- chest transillumination
- chest x-ray

## Treatment

- asymptomatic PNO - observation only
- mild symptoms - oxygen therapy
- symptomatic or tension PNO - chest drainage, ev. emergent needle aspiration (18 G, second intercostal space anteriorly) - needle may injure expanding lung when excessive air is withdrawn

### Chest drainage

- insertion of a chest drain (10-14 FG) under anaesthesia
- chest suction (5-10 cm H<sub>2</sub>O)
- complications of chest drain malposition: chylothorax (injury to the ductus thoracicus), cardiac tamponade (hemorrhagic pericardial effusion), and injury to the nervus phrenicus. <sup>[1]</sup>

## References

### Related articles

- Pneumothorax - Cyanosis (neonatology) - Artificial pulmonary ventilation (neonatology)

### External links

## References

1. RENNIE, JM, et al. *Textbook of Neonatology*. 5. vydání. Churchill Livingstone Elsevier, 2012. s. 486 - 491. ISBN 978-0-7020-3479-4.

