

CME article

Respiratory Distress of the Term Newborn Infant

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EDUCATIONAL AIMS

The reader will be able to:

- Recognise the importance of respiratory distress in term newborn infants.
- Discuss the differential diagnosis of respiratory distress in term newborn infants.
- Describe the more common causes of respiratory distress in term newborn infants.
- Initiate a management plan for the term newborn infant presenting with respiratory distress.

ARTICLE INFO

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 Transient tachypnoea of the newborn
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 Extracorporeal membrane oxygenation

SUMMARY

Respiratory distress is recognised as any signs of breathing difficulties in neonates. In the early neonatal period respiratory distress is common, occurring in up to 7% of newborn infants, resulting in significant numbers of term-born infants being admitted to neonatal units. Many risk factors are involved; the increasing number of term infants delivered by elective caesarean section has also increased the incidence. Additionally the risk decreases with each advancing week of gestation. At 37 weeks, the chances are three times greater than at 39–40 weeks gestation. Multiple conditions can present with features of respiratory distress. Common causes in term newborn infants include transient tachypnoea of the newborn, respiratory distress syndrome, pneumonia, meconium aspiration syndrome, persistent pulmonary hypertension of the neonate and pneumothorax. Early recognition of respiratory distress and initiation of appropriate treatment is important to ensure optimal outcomes. This review will discuss these common causes of respiratory distress in term-born infants.

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INTRODUCTION

Respiratory distress is common in the early neonatal period and occurs in up to 7% of newborn infants.¹ Much of the focus has been on respiratory distress syndrome and chronic lung disease of prematurity in preterm infants (<37 weeks of gestation)^{2,3} but every year a significant number of term-born infants are admitted to neonatal units for management of their respiratory distress.^{4–6} Multiple conditions can cause respiratory distress in term newborn infants (Table 1). Conditions such as surfactant protein deficiency syndromes or alveolar capillary dysplasia are rare and the reader is referred to recent excellent reviews.^{7,8}

In Switzerland, Ersch et al. reported an increasing incidence of respiratory distress of all neonates admitted to neonatal units

between 1974 and 2004 citing three possible explanations: an increase in extremely low birth weight infants, changes in admission policies and increasing numbers of infants delivered by caesarean section.⁹ The impact of elective caesarean sections has specifically increased the incidence of respiratory distress in term infants.¹⁰ This has been known for many years; in 1995 Morrison et al. estimated that 2,000 cases per year required neonatal admission for pulmonary diseases following caesarean section before onset of labour in the United Kingdom (UK).¹¹

There were 706,248 live births in England and Wales in 2009 and approximately 94% of these were full term deliveries (≥ 37 weeks of gestation).^{12,13} Between 1990 and 2002, the admission rate to a busy neonatal unit in England was 8.6% of all live births.¹⁴ The commonest reason for admission was respiratory distress.^{6,9} There is a clear inverse relationship between gestational age and incidence of respiratory distress most notably by transient tachypnoea of the newborn (TTN) and respiratory distress syndrome (RDS).^{4,10} Gouyon et al. also noted that a major risk factor for severe respiratory distress in term infants was elective caesarean section at 37–38 weeks gestation but with meconium

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Table 1

Differential diagnosis of respiratory distress in term-born infants.

Common conditions	Less common conditions
<ul style="list-style-type: none"> • Transient tachypnoea of the newborn • Respiratory distress syndrome • Pneumonia • Meconium aspiration syndrome • Pneumothorax • Primary or secondary pulmonary arterial hypertension • Cardiac failure (due to congenital heart disease) • Hypoxic-ischaemic encephalopathy • Aspiration of milk or blood 	<ul style="list-style-type: none"> • Pulmonary haemorrhage • Pleural effusion (chylothorax) • Neuromuscular disorders (e.g. congenital myotonic dystrophy) • Metabolic acidosis (secondary to inborn error of metabolism) • Congenital or surgical conditions <ul style="list-style-type: none"> • Diaphragmatic hernia • Tracheo-oesophageal fistula • Choanal atresia • Cystic congenital adenomatoid malformation (CCAM) • Lobar emphysema • Pulmonary sequestration • Pulmonary hypoplasia
	Rare causes <ul style="list-style-type: none"> • Surfactant protein deficiency syndromes • Alveolar capillary dysplasia

stained liquor being most frequently noted at 39–41 weeks gestation.¹⁰ Thus, avoiding routine elective caesarean sections prior to 38 weeks of gestation would markedly decrease the incidence of respiratory problems in the term infant.

ASSESSMENT

Respiratory distress is recognised as any signs of breathing difficulties in the neonate (Figure 1). Useful questions to ask are shown in Figure 2. The initial assessment of any infant with respiratory distress should include blood tests (full blood count, C-reactive protein, blood culture and blood gases), pulse oximetry and chest radiography. The initial treatment will aim to reverse the hypoxia, hypercapnia and acidosis that may have developed.

TRANSIENT TACHYPNOEA OF THE NEWBORN

TTN was first coined by Avery in 1966 and is now recognised as the commonest cause of respiratory distress in newborn term infants.¹⁵ It is caused by the delay in the absorption of fluid in the lungs after birth (i.e. excessive lung fluid).¹⁰ Thus, TTN is frequently seen in babies born following elective caesarean section. It usually presents with grunting and mild signs of respiratory distress, which persist for up to 48 hours and is generally a self-limiting disorder. However, some infants develop an oxygen requirement that necessitates admission to the neonatal unit for a few days accounting for approximately 10% of all newborn term admissions.¹⁶

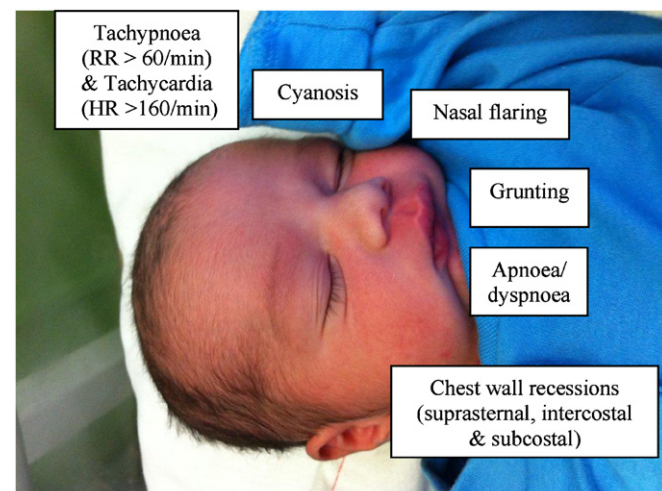


Figure 1. The common signs and symptoms of respiratory distress in term newborn infants.

Pathophysiology

The lungs in utero are constantly secreting fluid to aid lung growth and development. However the rate of lung fluid production and volume of foetal lung lumen decreases before birth, most notably during labour.¹⁷ The mechanism for fluid absorption is triggered by neuroendocrine hormones, which cause lymphatic vessel dilatation. As the lung pulmonary circulation increases following the first breath, the fluid in the lungs is cleared thus interruption of this process of clearing fluid from the lungs may result in respiratory distress.

Risk factors

The main risk factor for TTN is delivery following elective caesarean section. The usual mechanisms to clear fluid, which occur after the onset of labour, are not activated after elective caesarean section thus there is often inadequate clearance of pulmonary fluid, which can result in TTN.^{18,19} Other risk factors include delivery prior to 38 weeks of gestation, male sex, low birth weight and macrosomia^{20,21} and maternal diseases such as gestational diabetes and asthma.^{22–24}

Prevention

The Burgundy Perinatal Network has shown that the incidence of TTN requiring ventilation is significantly reduced for each extra week in utero decreasing from 34% at 37 weeks to 0.5% at 41 weeks gestation.¹⁰ A recent multicentre pragmatic randomised trial showed that administration of antenatal steroids prior to elective caesarean delivery at 37–39 weeks' gestation reduces the incidence of TTN.²⁵ As the long term effects are currently unknown, at present the best course is to avoid elective caesarean sections prior to 38 weeks wherever possible.

Management

It is important to establish the diagnosis by taking a thorough history and performing a physical examination. TTN commonly presents within the first few hours of life and is often managed conservatively i.e. a period of close observation on the postnatal ward or in the neonatal unit but must be weighed against other differential diagnoses (Table 1) including RDS and pneumonia which may progress rapidly in newborn infants. Chest radiographs often show “a wet silhouette” around the heart (Figure 3) with fluid in the horizontal fissures.²⁶ Some infants may require oxygen therapy or other forms of respiratory support for several days to aid recovery. Antibiotics are often routinely used, as differentiation from an infective process is often difficult. Other forms of therapies

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