

Intensive Care Nursery House Staff Manual

Pulmonary Hemorrhage

DEFINITION: Pulmonary hemorrhage (P-Hem) is an acute, catastrophic event characterized by discharge of bloody fluid from the upper respiratory tract or the endotracheal tube. The incidence of P-Hem is 1 in 1,000 live births. P-Hem is present in 7 to 10% of neonatal autopsies, but up to 80% of autopsies of very preterm infants. When evident clinically, P-Hem is usually massive, is associated with bleeding in other sites, involves more than one third of the lungs, and has a high mortality rate.

ETIOLOGY & PATHOGENESIS: Prematurity is the factor most commonly associated with P-Hem; other associated factors are those that predispose to perinatal asphyxia or bleeding disorders, including toxemia of pregnancy, maternal cocaine use, erythroblastosis fetalis, breech delivery, hypothermia, infection, Respiratory Distress Syndrome, administration of exogenous surfactant (in some studies) and ECMO.

Although the pathogenesis is uncertain, it is probable that P-Hem is hemorrhagic pulmonary edema, as the hematocrit is lower than blood and the concentration of small proteins is higher than in plasma. It is postulated that the infant suffers an asphyxial insult with resultant myocardial failure; this increases pulmonary microvascular pressure resulting in pulmonary edema. Subsequently, there is frank bleeding into the pulmonary interstitial and alveolar spaces. Contributing factors include factors that favor increased filtration of fluid from pulmonary capillaries (*e.g.*, low concentration of plasma proteins, high alveolar surface tension, lung damage, hypervolemia).

CLINICAL FEATURES: The onset of P-Hem is characterized by oozing of bloody fluid from the nose and mouth or endotracheal tube with associated rapid worsening of the respiratory status, cyanosis and, in severe cases, shock. Bleeding may be noted from other sites. Radiographic findings range from patchy infiltrates to complete opacification of lung fields. Hematocrit of the P-Hem fluid is usually 15 to 20% less than blood.

TREATMENT & OUTCOME: Immediate treatment of P-Hem should include tracheal suction, oxygen and positive pressure ventilation. To assist in decreasing P-Hem, mean airway pressure should be increased, either by a relatively high PEEP (*i.e.*, 6 to 10 cmH₂O) or by high frequency ventilation. Correct underlying abnormalities, especially disorders of coagulation. When blood loss is large, prompt blood transfusion may be needed to maintain an adequate circulating blood volume. The outcome is dependent on the cause of P-Hem. Mortality is 30 to 40%.