Common Hematologic Problems in the Newborn Nursery

Jon F. Watchko, MD

KEYWORDS

• Hyperbilirubinemia • Hemolysis • Anemia • Polycythemia • Thrombocytopenia
• Rh disease • G6PD deficiency

KEY POINTS

- Early clinical jaundice or rapidly developing hyperbilirubinemia are often signs of hemolysis, the differential diagnosis of which commonly includes immune-mediated disorders, red-cell enzyme deficiencies, and red-cell membrane defects.
- Knowledge of the maternal blood type and antibody screen is critical in identifying non-ABO alloantibodies in the maternal serum that may pose a risk for severe hemolytic disease in the newborn.
- Moderate to severe thrombocytopenia in an otherwise well-appearing newborn strongly suggests immune-mediated (alloimmune or autoimmune) thrombocytopenia.

INTRODUCTION

Hematologic problems often arise in the newborn nursery, particularly those related to the red blood cell (RBC), the primary focus of this review. Their timely identification is important to ensure appropriate care of the neonate. Common RBC disorders include hemolytic disease of the newborn, anemia, and polycythemia. Another clinically relevant hematologic issue in neonates to be covered herein is thrombocytopenia. Disorders of white blood cells will not be reviewed.

RED BLOOD CELL

Clinical signs of an RBC disorder in the immediate newborn period are jaundice (hemolysis), pallor (anemia), and plethora (polycythemia). Of these RBC disorders, hemolysis is the most frequently encountered and often heralded by early-onset jaundice

Disclosure Statement: Dr J.F. Watchko reports providing expert testimony in legal cases related to neonatal jaundice. No other potential conflict of interest was reported.
Division of Newborn Medicine, Department of Pediatrics, Magee-Womens Hospital, 300 Halket Street and Children's Hospital of Pittsburgh, University of Pittsburgh School of Medicine, 4401 Penn Avenue, Pittsburgh, PA 15213, USA
E-mail address: jwatchko@mail.magee.edu

Pediatr Clin N Am 62 (2015) 509–524
http://dx.doi.org/10.1016/j.pcl.2014.11.011 **pediatric.theclinics.com**
0031-3955/15/$ – see front matter

(≤24 hours of age).[1] In the current era of birth hospitalization, bilirubin screening using total serum bilirubin (TSB) or transcutaneous bilirubin (TcB) measurements,[2,3] an elevated hour specific bilirubin greater than 75% on the Bhutani nomogram also is a marker for hemolysis.[4] Although there are many diagnostic considerations in the interpretation of RBC disturbances in the neonatal period,[5] a systematic approach based on mechanism(s) of disease highlighted herein make this process more straightforward.

HEMOLYTIC DISEASE OF THE NEWBORN

Catabolism of RBC-derived heme produces bilirubin that results in jaundice, the most prevalent clinical condition requiring evaluation and management in neonates.[6–8] Although hepatic and gastrointestinal immaturities that limit bilirubin clearance contribute to neonatal jaundice, it is increasingly clear that accelerated RBC turnover (hemolysis) plays a pivotal role in the risk for subsequent severe hyperbilirubinemia.[4,8–11] Moreover, hemolysis potentiates the risk of bilirubin neurotoxicity[9–12] and treatment interventions are therefore recommended at lower TSB levels when hemolysis is present.[13,14] Pediatricians must therefore have a strong working knowledge of hemolytic disorders to properly care for the jaundiced neonate. These conditions are outlined in **Box 1** and include immune-mediated disorders, red-cell enzyme defects, red-cell membrane abnormalities, and, for completeness but exceedingly rare in neonates, hemoglobinopathies.[7–9]

Immune-Mediated Hemolytic Disorders

Immune-mediated disorders are the most common cause of hemolysis in neonates and should be suspected when there is (1) a heterospecific mother-infant pair in which

Box 1
Hemolytic conditions in the neonate

1. Immune-mediated (positive direct Coombs test)
   a. Rhesus blood group: Anti-D, -c, -C, -e, -E, C^w, and several others
   b. Non-Rhesus blood groups: Kell, Duffy, Kidd, Xg, Lewis, MNS, and others
   c. ABO blood group: Anti-A, -B
2. Red blood cell (RBC) enzyme defects
   a. Glucose-6-phosphate dehydrogenase (G6PD) deficiency
   b. Pyruvate kinase deficiency
   c. Others
3. RBC membrane defects
   a. Hereditary spherocytosis
   b. Elliptocytosis
   c. Stomatocytosis
   d. Pyknocytosis
   e. Others
4. Hemoglobinopathies
   a. alpha-thalassemia
   b. gamma-thalassemia