Neonatal anemia

A. cause
   a. blood loss (the most common cause)-
      (1) obstetrical cause: placental abruption, placenta previa, trauma to placenta or umbilical cord, etc.
      (2) feto-maternal transfusion: 8% of normal pregnancies
      (3) feto-placental transfusion
      (4) twin to twin transfusion: occur only with monochorionic twins
      (5) internal hemorrhage: ICH, subgaleal hemorrhage, adrenal hemorrhage, etc
      (6) introgenic blood loss: secondary to sampling of blood for lab tests, the commonest cause of anemia in small preterm infants
   b. RBC destruction increase
      (1) intrinsic cause-
         RBC enzyme defects (G6PD def)
         RBC membrane defects (hereditary spherocytosis)
         Hemoglobinopathies (α thalassemia)
      (2) extrinsic cause-
         * immune hemolysis- Rh/ABO incompitability, hemangioma (kasabach merritt syndrome)
         * acquired hemolysis- infection, vit E def (rare), drugs
   c. RBC production decrease
      (1) anemia of prematurity due to transient deficiency of EPO
      (2) aplastic or hypoplastic anemia (eg. Diamond-blackfan syn)
      (3) bone marrow suppression (eg. with rubella or parvovirus B19 infection)
      (4) nutritional anemia (eg. iron def.)

B. clinical finding, vary with the severity of anemia, including-
   pallor, tachycardia, tachypnea, apnea, increase O2 requirement, lethargy, poor feeding, HSM, jaundice, wide pulse pressure, hypotension, metabolic acidosis with severe anemia, decrease tolerance of labor with fetal anemia

C. diagnostic evaluation-
   (1) History
   (2) Lab evaluation: CBC, PB smear, reticulocyte count, Blood type, Coombs test, T/D bilirubin, KB test, sono for internal bleeding
      * hemoglobin electrophoresis and RBC enzyme
D. **management**- depend on cause and severity of anemia

(1) prenatal- fetal transfusion
(2) postnatal-
   * anemia of prematurity- limit blood drawing
     treat with EPO
     transfusion with pRBC
   * other cause of anemia- treat underlying disease, transfusion if indicated
   * **severe anemia**- suggest *partial exchange transfusion*
     When severe, symptomatic anemia, the infant’s cardiovascular system may not be able to tolerate the increased blood volume from simple transfusion of pRBCs.

Volume of pRBCs for exchange = \( \frac{(\text{Desired Hct} - \text{Pt Hct}) \times \text{BW (kg)} \times 90\text{cc/kg}}{\text{pRBC Hct} - \text{Pt Hct}} \)

---

Table. Average hematological values for term and preterm infants

<table>
<thead>
<tr>
<th>GA (wks)</th>
<th>Hct (%)</th>
<th>Hb (g/dL)</th>
<th>reticulocyte (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>37-40</td>
<td>53</td>
<td>16.8</td>
<td>3-7</td>
</tr>
<tr>
<td>32</td>
<td>47</td>
<td>15.0</td>
<td>3-10</td>
</tr>
<tr>
<td>28</td>
<td>45</td>
<td>14.5</td>
<td>5-10</td>
</tr>
<tr>
<td>26-30</td>
<td>41</td>
<td>13.4</td>
<td>--</td>
</tr>
</tbody>
</table>