


Hemorrhagic disease of newborn

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- normally in all newborn infant → moderate ↓ in factors II , VII , IX , X by 48-72 hrs after birth , with gradually return to normal by 7-10 days → due to transient deficiency of vit K dependent factors & absence of bacterial flora which is normally responsible for synthesis of vit K .
- it is rarely among term infant .
- more frequently among pre-mature infant , there is a prolongation and accentuation of deficiency between 2nd -7th days of life .
- breast milk is a poor source of vitamin K .

-  **Forms of Vit K. :**
- **vit K1 (phylloquinone) – naturally in plants .**
- **vit K2 – naturally – endogenously in gut by bacteria (menaquinone) .**
- **vit K3 (menadione) – synthetic form .**

	Early onset	Classic disease	Late onset
Age	0-24 hrs	2-7 days	1-6 months
Site of hge	Cephalohematoma subglaleal , GIT , umbilicus , intra-abdomenal .	GIT , ear , nose , throat , mucosal , intra-cranial , cutaneous , injection site .	Intracranial , GIT , cutaneous , ear , nose , injection site , & thoracic .
Etiology / risk	Maternal drug like warfarin , phenytoin , phenobarbitone , INH , rifampcin .	Vit K deficiency , breast feeding	Cholestasis → malabsorption of vit k (biliary atresia , cystic fibrosis , hepatitis) . -a betalipoprotein deficiency , warfarin ingestion , idiopathic in Asian breast fed infant.
Prevention	-Possible vit k at birth or to mother (20mg) before birth . -avoid high risk medication .	-prevented by parental vit k at birth .	Prevented by parentral & high dose oral vit k .
Incidence	Very rare	2% if not given vit K	Depend on primary dz

- administering 1 mg oil soluble vit k I.M at birth prevent fall in vit k dependent factors in full term infant .
- in premature slow I.V infusion of 1-5 mg of vit k .
- serious bleeding & pre-mature or liver disease may require a transfusion of fresh frozen plasma .
- **follow up through PT .**
- PT , PTT , coagulation time will be \uparrow .
- level of prothrombin II , VII , IX and X \downarrow .

DDx

1. factor VIII & IX deficiency (inherited coagulopathy) .
2. DIC .
3. neonatal thrombocytopenic purpura – alloantibody – infection.
4. swallowed blood syndrome (diff by APT) .
5. fragile superficial blood vessels in face , neck ...
6. necrotizing enterocolitis .

note : prodromal or warning signs (mild bleeding) may occur before serious (ICH) intracranial hge .

Neonatal anemia :

- **definitions :**
- **anemia : central venous Hb < 13 g/dl or capillary Hb < 14.5 g/dl in infant > 34 wks and 0-28 days old .**
- **or Hct or Hb > 2 SD below mean for age (Hct = 45% in term) .**
- **average value for central venous Hb at birth for 34 wk GA is 17 g/dl .**
- **reticulocyte count in cord blood 3-7% .**
- **average MCV = 107 FL .**
- **fetal Hb ↑ with advancing GA at term → cord blood Hb is 16.8 g/dl .**
- **ranging from (14-20 g/dl) .**
- **Hb in VLBW infant are 1-2 g/dl , below those at term .**
- **physiological anemia in term infant noticed at 8-12 wk Hb will be 7-10 g/dl .**
- **infant born by C/S have lower (Hct) than born vaginally .**

◎ Anemia at birth as (pallor , tachycardia , CHF) .

- Hge disease of newborn .
- tearing or cutting of umbilical cord during delivery .
- placental as communicating vessels , previa , abruption & incision to placenta .
- internal bleeding – liver , spleen and intracranial .
- alpha thalassaemia .
- congenital previous & hypoplastic anemia .
- twin to twin transfusion .
- transplacental hge (fetomaternal circulation) .
- Dx by : (Kleihauer Betke test) → using maternal smear of blood stained with eosin → Fetal RBCs stained darkly , but adult RBCs don't stain .

Delay cord clamping :

- ~ 1-2 min or after cessation of cord pulsation preventing anemia beyond neonatal period .
- **but late clamping may result in delivery of an extra 20-40 ml of blood and 30-35 mg of iron .**
- in VLBW delayed clamping of umbilical cord with infant held below the level of the placenta may ↑ placental-infant transfusion & ↓ post-natal transfusion needs this maneuver should not be delayed → may lead to hyperviscosity

◎ anemia in first few days :

- **hge disease of newborn .**
- **hemolytic dz .**
- **improperly tied or clamped umbilical cord .**
- **large cephalohematoma .**
- **intracranial hge .**
- **subcapsular bleeding from rupture , liver , spleen , adrenal or kidney .**

◎ Late neonatal anemia :

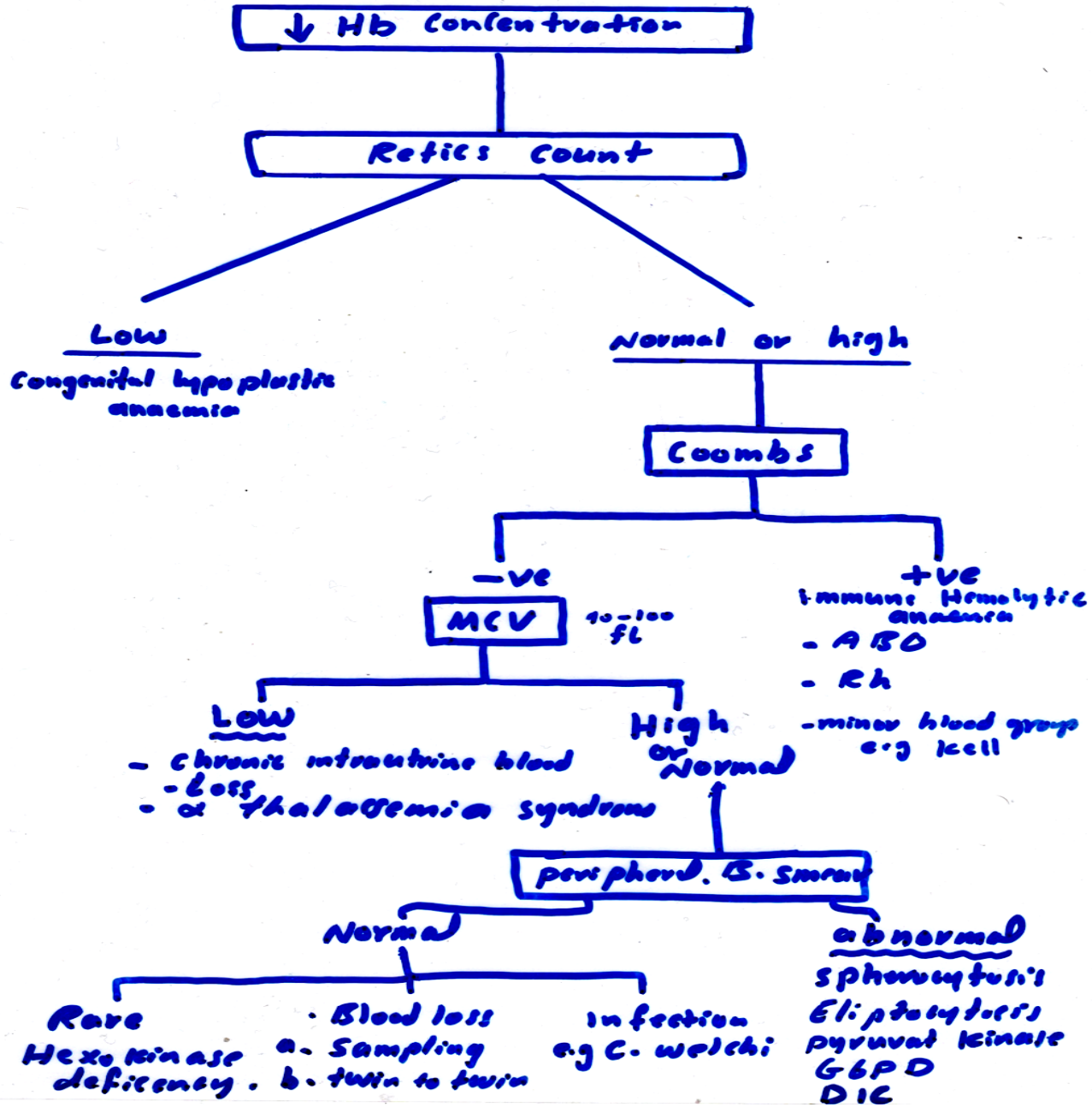
- **hemolytic anemia with or without exchange transfusion .**
- **spherocytosis .**
- **non-spherocytosis G6PD , pyruvate kinase .**
- **bleeding from hemangiomas , upper GIT & Meckle diverticulum .**
- **repeated blood sampling .**
- **copper deficiency (on TPN) .**

● anemia of premature occur in LBW :

- 1-3 months → repeated phlebotomy , shortened RBCs survival , rapid growth & transition from fetal to neonatal life (high PaO₂ & high Hb saturation) .
- The oxygen available for tissue is lower than that in adult , but a neonates erythropoietin response is attenuated for the degree of anemia .

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* Approach to anemia in neonate



Treatment :

- **blood transfusion depends on :**
- severity , Hb level & presence of comorbidity (BPD , HMD , congenital cyanotic HD)
- asymptomatic full term with Hb of 10 g/dl → observation .
- symptomatic → immediate transfusion with packet RBC → 10-15 ml/kg/ at rate of 2-3 ml/kg/hr.
- hemorrhagic Rx with whole blood or fluid resuscitation followed by packet RBCs transfusion .

- neonatal reticulocytopenia & Hb < 6.5 g/dl in need for transfusion .
- 2ml / kg of packet ↑ Hb level 0.5 – 1 gm/dl .
- recombinant human erythropoietin (eHuEpo) used to treat chronic anemia associated with prematurity , BPD , erythroblastosis fetalis , (eHuEpo) used I.V or S.C must supply with oral iron ± vit E .
- 400 u/kg dose → 3 days / weeks .