

3.8.5. Neonatal Haemorhagic diseases

Unit 3 · Topic 8.5 Neonatal Hemorrhagic Diseases (Navajāta Raktasrāva-vyādhi)

Learning goals

By the end of this chapter you will be able to:

- define neonatal hemorrhagic diseases and list the major causes;
- classify Vitamin K Deficiency Bleeding (VKDB) (early, classic, late) and write risk factors, clinical features, investigations, and management;
- differentiate VKDB from thrombocytopenic bleeding (alloimmune/autoimmune), DIC/sepsis-associated coagulopathy, and congenital factor deficiencies (e.g., hemophilia);
- write evidence-based prophylaxis recommendations for India and international practice;
- counsel parents and document danger signs.

1) Classical anchor (why bleeding matters)

"रक्तं जीवितमित्याहुर्ब्राह्मणा वेदपारगाः । तस्मात् तद्भिषजा रक्ष्यं विशेषेण प्रयत्नतः ॥" — Suśruta Saṃhitā, Sūtrasthāna **14/45**. ("Blood is life," say the learned; hence the physician must protect it with special effort.)

This verse justifies our vigilance in preventing, recognising, and treating neonatal bleeding promptly.

2) Definition & spectrum

Neonatal hemorrhagic diseases are conditions in the first **28 days** of life characterised by abnormal bleeding due to **coagulation factor deficiency (e.g., VKDB)**, **platelet disorders** (alloimmune/autoimmune thrombocytopenia), **disseminated intravascular coagulation (DIC)** (usually with sepsis/asphyxia), **congenital factor deficiencies** (hemophilia A/B), or **hepatic/cholestatic disease**.

Common bleeding sites: umbilical oozing, GI bleed (melena/hematemesis), mucosal/skin petechiae/purpura, post-procedural ooze (heel-prick, injection), cephalohematoma/ICH in severe forms.

3) Vitamin K Deficiency Bleeding (VKDB)

3.1 What and why

Newborns have **low vitamin K stores** (poor placental transfer, low milk vitamin K, delayed gut colonisation), making factors **II, VII, IX, X** undercarboxylated and the **extrinsic pathway** weak. VKDB was formerly "hemorrhagic disease of newborn."

3.2 Clinical classification

- Early VKDB: <24 h; usually maternal drugs (warfarin, anticonvulsants—phenytoin/phenobarbital, antituberculars—rifampicin). Neonatal vitamin K does not prevent early VKDB; manage maternal meds/predelivery dosing.
- Classic VKDB: 24 h-7 days; umbilical/Gl/skin bleeding; prevented by neonatal prophylaxis.

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• Late VKDB: 2-12 weeks (up to 6 months); mainly exclusively breastfed or cholestatic infants without effective prophylaxis; ICH common and life-threatening. (

3.3 Risk factors

Exclusive breastfeeding without prophylaxis; maternal drugs affecting vitamin K; prolonged antibiotic use; **cholestasis/malabsorption**; home birth without prophylaxis; refusal of injection.

3.4 Lab pattern (VKDB)

- PT (INR) prolonged (often more than aPTT); platelets normal; fibrinogen usually normal.
- Rapid correction after vitamin K supports diagnosis.

4) Prophylaxis

4.1 India (MoHFW, Government of India)

- All facility births: Vitamin K1 (phytonadione) IM soon after birth (within 24 h).
 - o Birth weight ≥1000 g: 1 mg IM once.
 - <1000 g: 0.5 mg IM once.
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- IM route preferred; oral regimens need multiple doses and are **not preferred**.

4.2 International (AAP/CPS)

- AAP 2022: 1 mg IM for >1500 g within 6 h; ≤1500 g: 0.3-0.5 mg/kg IM single dose.
- Canadian Paediatric Society (2018): 0.5 mg IM if ≤1500 g; 1 mg IM if >1500 g within 6 h. If IM declined: 2 mg oral at birth, repeat at 2-4 weeks and 6-8 weeks (less effective; avoid in cholestasis).

Key viva line: IM vitamin K at birth nearly eliminates classic and late VKDB; oral regimens are **inferior** for late VKDB and **contraindicated** in cholestasis.

5) Diagnosing and managing VKDB (stepwise)

5.1 Presentations you must recognise

- Classic: oozing from umbilicus/injection sites; melena; pallor.
- Late: irritability, seizures, bulging fontanelle (ICH); pallor/shock.

5.2 Investigations

• CBC (Hb/platelets), PT/INR, aPTT, fibrinogen, LFTs; consider neurosonogram/CT if neuro signs.

5.3 Treatment (acute bleed)

- 1. **Stabilise ABC**; IV access; blood conservation.
- 2. Vitamin K1 (phytonadione) 1 mg IV slow or IM (preterm: 0.5-1 mg; critically ill often given IV slowly).
- 3. **FFP 10-20 mL/kg** if major bleeding/ICH or markedly deranged PT while vitamin K takes effect; **PCC** if available for life-threatening bleed and guided by haematology.
- 4. **Packed RBC** for anaemia/shock; **neurosurgery** for ICH as indicated. (Summarised from contemporary guideline syntheses.)

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6) Thrombocytopenic bleeding in neonates

6.1 Neonatal alloimmune thrombocytopenia (NAIT/FNAIT)

Pathogenesis: maternal antibodies against fetal platelet antigens (e.g., HPA-1a).

Clues: severe thrombocytopenia (often $<30\times10^9$ /L), petechiae/purpura at birth, risk of ICH even before delivery. Management (neonate):

- Immediate platelet transfusion if significant bleeding or platelets very low; matched (antigen-negative) platelets ideal; if unavailable, transfuse available platelets without delay and switch when matched become available.
- IVIG 1 g/kg/day for 1-2 days as adjunct if counts fail to rise or bleeding ongoing.
- Avoid IM injections invasive procedures until platelets stabilise.

6.2 Neonatal autoimmune thrombocytopenia (maternal ITP)

Mechanism: transplacental maternal anti-platelet antibodies.

Management: IVIG 1 g/kg (single or on 2 consecutive days) if platelets <30×10°/L or bleeding; platelets only if bleeding severe or before procedures.

Lab pattern (thrombocytopenia): Platelets low; PT/aPTT normal (unless DIC).

7) DIC/sepsis-associated coagulopathy

Triggers: severe sepsis, perinatal asphyxia, hypothermia, severe RDS, shock.

Labs: Prolonged PT & aPTT, thrombocytopenia, low fibrinogen, high D-dimer/FDP.

Management: treat the underlying cause + goal-directed blood product support (FFP, cryoprecipitate for fibrinogen <100-150 mg/dL, platelets if $<50\times10^9$ /L with bleeding). Avoid prophylactic FFP when not bleeding.

8) Congenital factor deficiencies — focus on hemophilia A/B

Clues: family history; **cephalhematoma**, **prolonged oozing** after procedures, **APTT prolonged** (PT normal), normal platelets; ICH may occur.

Acute management: factor replacement—recombinant FVIII/FIX to target **50-100**% activity for serious bleeds/ICH, under haematology guidance.

Vitamin K in suspected hemophilia?

 Recommendations vary by institution. Some centres still give IM vitamin K with precautions (fine-gauge needle; firm pressure 5-10 min) following haemophilia-society advice; others prefer oral/subcutaneous dosing to avoid intramuscular hematoma. Follow local haemostasis team protocol.

9) Quick differential diagnosis (high-yield table)

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Feature	VKDB	NAIT/Autoimmune Thrombocytopenia	DIC	Hemophilia
Onset	Early: <24 h (maternal drugs); Classic: 1-7 d; Late: 2-12 w	Birth-first days	Any time with sepsis/asphyxia	Birth-neonate
Bleeding pattern	Umbilical/Gl/skin; ICH in late	Petechiae/purpura, mucosal; risk ICH	Oozing, petechiae, organ bleed	Procedure bleeds, cephalohematoma, ICH
Platelets	Normal	Low	Low	Normal
PT/INR	Prolonged (± aPTT)	Normal	Prolonged both	aPTT prolonged , PT normal
Fibrinogen	Normal	Normal	Low	Normal
Key therapy	Vit K + FFP if severe	Platelets ± IVIG	Treat cause + FFP/cryoprecipitate/platelets	Factor VIII/IX
Prevention	IM Vit K at birth	_	Infection prevention	Genetic counselling

(Compiled from MoHFW/AAP/CPS and haemostasis literature.)

10) OSCE-ready algorithms

A) "Umbilical oozing on Day 3"

- 1. Vitals, ABC → IV access.
- 2. **Labs:** CBC, PT/INR, aPTT, fibrinogen.
- 3. If PT↑, platelets normal → VKDB likely → Vit K₁ 1 mg IV slow/IM; if bleeding significant, FFP 10-20 mL/kg.
- 4. Observe for cessation; investigate risk factors (breastfeeding without prophylaxis).

B) "Day 20, breastfed infant with seizures"

- 1. Suspect late VKDB with ICH.
- 2. ABC, neuroprotective care, Vit K + FFP, urgent neuroimaging, neurosurgery/haematology liaison.

C) "Term baby with widespread petechiae at birth; platelets 18×10°/L"

- NAIT likely → immediate platelet transfusion (matched if available; else any readily available unit), IVIG 1 g/kg.
- 2. Avoid IM shots; monitor for ICH.

D) "Septic neonate, oozing from lines; PT/aPTT prolonged, fibrinogen 80 mg/dL"

1. Treat sepsis; cryoprecipitate for low fibrinogen, FFP for coagulopathy, platelets if <50×10°/L and bleeding.

11) Prevention & counselling (copy for discharge notes)

- Vitamin K at birth: ensure documentation (dose, route, time). If parents initially refused, re-counsel using data that IM vitamin K prevents fatal ICH; oral options are inferior and not for cholestasis.
- Breastfeeding is encouraged; vitamin K prophylaxis complements—not contradicts—exclusive breastfeeding.
- **Danger signs** to return urgently: poor feeding, pallor, **black stools**, vomiting blood, persistent oozing, excessive bruising, lethargy, seizures, bulging fontanelle.
- For families with a **history of hemophilia/bleeding disorder**: involve haemostasis team **antenatally**; delivery planning; clarify local policy on the **route of vitamin K**.

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12) Practical documentation template

- Bleeding site/time: ...
- Vitals & haemodynamics: ...
- Labs: Hb ...; platelets ...; PT/INR ...; aPTT ...; fibrinogen ...
- Provisional diagnosis: VKDB / NAIT / DIC / Hemophilia / mixed ...
- Immediate treatment given: Vit K (dose/route/time), blood products with dose, antibiotics (if sepsis) ...
- Consults: neonatology/haematology/neurosurgery ...
- Parent counselling + follow-up: done/handouts provided.

13) Quick revision (mnemonics)

- VKDB "E-C-L": Early (<24 h, maternal drugs), Classic (1-7 d), Late (2-12 w, Lethal ICH).
- Thrombocytopenia bleed = Platelets low; PT/aPTT ok.
- DIC = PT↑ + aPTT↑ + Fibrinogen↓ + D-dimer↑ + Platelets↓.
- Hemophilia = aPTT1 only; treat with factor.
- Prevention = IM Vitamin K at birth (India: ≥1000 g-1 mg; <1000 g-0.5 mg).

Self-assessment

MCQs (one best answer)

- 1. A term, breastfed baby on day 25 presents with seizures and pallor. The most likely diagnosis is:
 - A. Sepsis with DIC B. Late VKDB C. Hemophilia A D. NAIT
- 2. In VKDB, the most typical lab abnormality is:
 - A. PT normal, aPTT prolonged B. Platelets <30×109/L
 - C. PT (INR) prolonged, platelets normal D. Fibrinogen very low
- 3. For **NAIT** with platelets 18×10⁹/L and petechiae at birth, the **first step** is:
 - A. Wait for HPA-matched platelets only
 - B. Start steroids
 - C. Transfuse available platelets immediately ± IVIG
 - D. Give IM vitamin K in the same thigh as Hep-B vaccine
- 4. Which pair is correctly matched?
 - A. DIC—normal fibrinogen
 - B. Hemophilia-prolonged aPTT with normal PT
 - C. VKDB—low platelets
 - D. NAIT-PT prolonged
- 5. According to **MoHFW India**, recommended vitamin K prophylaxis **at birth** is:
 - A. 1 mg IM for all weights
 - B. 1 mg IM if ≥1000 g; 0.5 mg IM if <1000 g
 - C. Oral 2 mg once for all
 - D. 0.3 mg/kg IV for all

Answer key: 1-B, 2-C, 3-C, 4-B, 5-B.

Short answers (3-5 lines)

- 1. Classify VKDB and list two risk factors for each.
- 2. Write the laboratory differences between VKDB and NAIT.
- 3. Outline **DIC management** in a bleeding neonate.

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- 4. In suspected hemophilia at birth, how do policies differ regarding vitamin K administration?
- 5. Write a one-page algorithm for "Day-3 umbilical oozing" including treatment doses.

Long answers (10-12 marks)

- 1. Discuss **Neonatal Hemorrhagic Diseases** under causes, clinical patterns, investigations, management and prevention; emphasise **VKDB** and its prophylaxis (Indian & international).
- 2. Write short notes on **NAIT vs Autoimmune thrombocytopenia** (pathogenesis, diagnosis, treatment, prognosis) and **DIC in neonates** (triggers, labs, product therapy).

60-second recap

Neonatal bleeding arises from VKDB, thrombocytopenia (NAIT/autoimmune), DIC, or factor deficiencies (hemophilia). IM vitamin K at birth is the single most powerful preventive step (India: ≥1000 g−1 mg; <1000 g−0.5 mg). Late VKDB presents between 2-12 weeks with ICH—treat rapidly with vitamin K + FFP. Thrombocytopenic bleeds need platelets ± IVIG; DIC requires cause-directed resuscitation and blood products; hemophilia needs factor replacement and locally agreed vitamin K strategy. Keep rakta-rakṣaṇa in mind—protect the blood, protect life.

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