COAGULOPATHY ● 1/2

- Haemostasis is immature during the neonatal period and does not attain full function until aged 6 months
- prolonged prothrombin time (PT) and activated partial thromboplastin time (APTT) are associated with intraventricular haemorrhage (IVH) in unstable (e.g. hypotensive or hypoxic) or bruised extremely preterm babies
- 75% of cases of IVH occur within the first 24 hr of life and 90% within the first 7 days
- IVH can occur in the absence of a coagulopathy
- prophylactic fresh frozen plasma (FFP) does not prevent IVH in preterm baby without evidence of coagulopathy

INVESTIGATIONS

Check clotting in:

- Any bruised or bleeding baby (e.g. IVH, pulmonary haemorrhage, gastrointestinal bleeding, suspected haemorrhagic disease of newborn etc.)
- Preterm <30 weeks' gestation (due to IVH risk) if clinical concerns about bleeding
- Moderate-to-severe encephalopathy (e.g. babies who are being cooled)
- Septicaemia
- Necrotising enterocolitis (NEC)
- Sick or unstable baby (e.g. ventilated, inotropic support etc.)
- Metabolic disease: urea cycle disorder, galactosaemia, tyrosinaemia, organic acidaemia
- Liver dysfunction or conjugated jaundice
- Babies undergoing surgery or tissue biopsy who have had previous bleeding problems
- Family history of inherited bleeding disorder (after discussion with consultant haematologist)
- Thrombocytopenia (see **Thrombocytopenia** guideline)

Sampling

- Ensure sample from a free-flowing vein (peripheral or umbilical) or from an arterial line before heparinising
- Fill exactly to black mark on tube (usually 1.3 mL)
- If sample clots (this does not confirm normal coagulation), repeat
- If sampling from arterial line with heparin infusion, take larger volume (e.g. 2.5 mL) from dead-space (see **Arterial line sampling** guideline)

Request

- INR (measure of PT)
- APTT
- Fibrinogen
- If features of DIC (e.g. bruising, bleeding, sepsis), request fibrin degradation products and D-dimer (if available)
- If concerned/unsure about initial results, seek senior advice

IMMEDIATE TREATMENT

- If INR alone is prolonged, and clotting samples were performed before first dose of vitamin K, repeat clotting screen
- If prolonged INR and normal APTT in stable term baby (e.g. clotting screen performed as part of conjugated jaundice screen), give repeat dose of vitamin K 100 microgram/kg (maximum 1 mg per dose) IV. If repeat INR not improving after 6 hr, discuss with senior/haematologist to explore other causes and the need for FFP or regular vitamin K
- In preterm baby <30 weeks (with risk of IVH) or unwell with prolonged INR, repeat vitamin K 100 microgram/kg (maximum 1 mg per dose) IV with FFP
- If APTT beyond upper limit of reference range, give FFP (see below)
- In case of persistently prolonged INR or liver disorder/conjugated jaundice, give regular doses of vitamin K
- In persistently prolonged APTT, give further doses of FFP (or cryoprecipitate – see below)

Use of FFP and cryoprecipitate

Do not use FFP or cryoprecipitate purely for volume replacement or polycythaemia without coagulopathy

Treatment thresholds for use of FFP

- If APTT above treatment thresholds give FFP 10–20 mL/kg over 30–60 min

COAGULOPATHY ● 2/2

Clotting parameter	Gestation	Stable baby	Unstable*, significant bleeding† or invasive procedure‡
INR	Term	≥1.6	≥1.5
	Preterm (<37 weeks)	≥2	≥1.8
APTT	Term	APTT ratio ≥1.6 **or** APTT value ≥55 sec	APTT ratio ≥1.5 **or** APTT value ≥45 sec
	Preterm (<37 weeks)	APTT ratio ≥2 **or** APTT value ≥70 sec	APTT ratio ≥1.8 **or** APTT value ≥60 sec

*Unstable (e.g. DIC, significant sepsis, NEC, ventilated, hypotensive etc.)
†Significant bleeding (e.g. significant bruising, IVH, gastrointestinal bleeding, pulmonary haemorrhage etc.)
‡Invasive procedures (e.g. lumbar puncture, umbilical lines, long lines, chest drain, exchange transfusion etc.)

- In inherited clotting factor deficiencies, use FFP only when pathogen inactivated factor unavailable. Discuss with consultant haematologist before giving FFP
- If APTT ratio still ≥1.8 after giving FFP (especially if fibrinogen <1.2), consider cryoprecipitate (5–10 mL/kg over 30–60 min) after discussion with on-call consultant and haematologist

MONITORING

- Repeat coagulation profile 2–4 hr after FFP/cryoprecipitate or every 12–24 hr as indicated
- Look for and treat causes of abnormal coagulation:
  - sepsis
  - shock
  - haemorrhage
  - severe hypothermia
  - hypoxia
- If abnormal coagulation persists for >24 hr in the absence of any precipitating factors, seek advice from paediatric haematologist about factor assays and 50:50 mixture correction test