Worcestershire Acute Hospitals NHS Trust

Management of Polycythaemia

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Key Amendments

Date	Amendments	Approved by

Polycythaemia in the newborn is common and affects approximately between 1 to 5% of newborns. It is defined as a packed cell volume (haematocrit) of over 65% on a venous specimen. Not all babies with polycythaemia have hyperviscosity. However when hyperviscosity occurs, serious clinical problems may arise due to decreased blood flow, impaired tissue perfusion and microthrombus formation.

Because of the variability in measurements for haematocrit obtained from capillary samples, the diagnosis of polycythaemia is based upon peripheral venous samples. A raised haematocrit on a capillary specimen must always be confirmed on a venous blood count.

Patients covered
Newborn infants up to 7 days of age.

High Risk Infants

- Infant of a diabetic mother
- Intrauterine growth retardation
- Twin to twin transfusion
- Delayed cord clamping
- Endocrine abnormalities- CAH, hypothyroidism, hyperthyroidism
- Chromosomal anomalies- Trisomies 21,18 and 13.

Signs of Polycythaemia

Signs and symptoms evolve over the first 24 hours as the haematocrit rises with the physiological decrease in plasma volume. The infants appear plethoric and can become cyanosed, particularly when active.

- hypoglycaemia
- lethargy
- jaundice
- hypotonia
- poor feeding
- vomiting
- irritability when aroused
- tachypnea, respiratory distress
- tachycardia, cardiac failure

Hyperviscosity Can Lead To

- Cerebral vascular occlusion
- Renal vein thrombosis, haematuria, oliguria
- Platelet consumption
- Convulsions, permanent neurological sequelae
- NEC

Exclude Dehydration

Before making a diagnosis of polycythaemia, it is important to exclude dehydration. Re-weigh the baby to look for excessive weight loss. Examine for signs of dehydration. Check urea and electrolytes. If present, correct by increasing fluid intake. Measure the haematocrit again after correction of dehydration.

Management

The management of polycythaemia is controversial because it is uncertain whether intervention affects long term outcome. Also, intervention may be associated with some gastrointestinal morbidity. All polycythaemic infants should be observed closely and monitored for common complications such as hypoglycaemia and hyperbilirubinaemia.

Asymptomatic Infants

Current evidence suggests that there is no benefit in treating asymptomatic babies. See Cochrane Database of Systematic Reviews 2010, CD005089 (reference 6).

Venous haematocrit 65-70%: observe, ensure adequate hydration and glucose intake by monitoring oral intake, body weight and urine output. Repeat venous haematocrit in 12 hours. If it remains less than 70% and the infant remains asymptomatic, continue this approach for 24 hours and recheck haematocrit.

Venous haematocrit >70%: many clinicians perform a partial exchange transfusion (PET) even if the infant is asymptomatic. However, in view of evidence suggesting that PET may lead to an increase in the risk of NEC, continued observation with hydration may be appropriate. Discuss with consultant. Start intravenous fluid 10% glucose infusion at daily fluid requirement plus extra 30mls/kg/day and monitor closely. Check urea and electrolytes and bilirubin regularly and start maintenance sodium chloride (and potassium chloride) additives at 24-48 hours of life to avoid iatrogenic hyponatraemia/hypokalaemia. Recheck the venous haematocrit in 6-12 hours. Consider PET if infant becomes symptomatic- discuss with consultant.

Symptomatic Infants

Venous haematocrit >65%: many clinicians perform PET to lower the haematocrit when the infant has symptoms that may be attributed to hyperviscosity. See procedure below.
Another approach for mildly affected infants is observation and hydration (IV infusion as above). Discuss with consultant. PET is performed if there is worsening of symptoms such as persistent hypoglycaemia or respiratory distress.

Partial Exchange Transfusion

Isovolumetric PET reduces the haematocrit without causing hypovolaemia. The procedure reverses the reduction in cerebral blood flow, cardiac index and oxygen transport attributed to hyperviscosity. However, PET does not appear to affect long term outcome. The long term outcome is more likely to be related to the underlying cause of polycythaemia.

Evidence suggests that umbilical PET may be associated with an increased risk of NEC. Therefore, perform PET via peripheral arterial and venous lines ideally. If this is difficult and using UVC, perform isovolaemic exchange transfusion, that is, blood withdrawal (UVC) and fluid infusion (peripheral venous cannula) conducted simultaneously.

Procedure

The volume to be exchanged is 20mls/kg (this usually reduces the haematocrit to below 60%). Exchange with 0.9% saline over 30 minutes.

1. Insert peripheral venous catheter and peripheral arterial catheter **or** insert umbilical venous catheter.
2. Start infusion of 20mls/kg 0.9% saline over 30 minutes via peripheral venous catheter.
3. Remove 5-10 mls aliquots of blood via peripheral arterial catheter (or UVC if using).
4. Continue removing 5-10 ml aliquots until a total of 20 ml/kg has been exchanged over 30 minutes.
5. Recheck FBC and venous haematocrit at end of procedure.
6. Remove lines if no longer required.

Continuous nursing observation will be required during the exchange transfusion

References

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Monitoring Tool

How will monitoring be carried out? Clinical Audit

Who will monitor compliance with the guideline? Paediatric Clinical Governance Committee

STANDARDS	%	CLINICAL EXCEPTIONS
Diagnose polycythaemia on a venous blood sample in all cases	100%	Arterial blood sample can be used if arterial line in situ
Infants with venous haematocrit over 65% should be assessed for signs and symptoms of polycythaemia / hyperviscosity	100%	
Polycythaemic infants should have blood glucose and bilirubin levels monitored	100%	

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