GUIDELINE

Subgaleal Haemorrhage (SGH) Detection and Management in the Newborn

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA, PNW

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this disclaimer

Contents

Aim

Subgaleal Haemorrhage (SGH) is an accumulation of blood in the loose connective tissue of the subgaleal space. This guideline outlines the diagnosis and management of the condition.

Risk

Most catastrophic complication of instrumental delivery and, while rare, is associated with significant morbidity and mortality. Early recognition with a low threshold of suspicion is essential to initiate timely and effective management.

Background

Naegele first described SGH in 1819. SGH can occur following normal birth, forceps delivery or caesarean section, most frequently follows vacuum assisted birth. The incidence has been estimated approximately as 1 in 2500 spontaneous vaginal deliveries without the use of vacuum or forceps, and a 10-fold increase is reported with the use of forceps. SGH is associated with 12-25% mortality due to potential of hypovolemic shock with 20-40% neonatal blood volume shifting into subgaleal space.

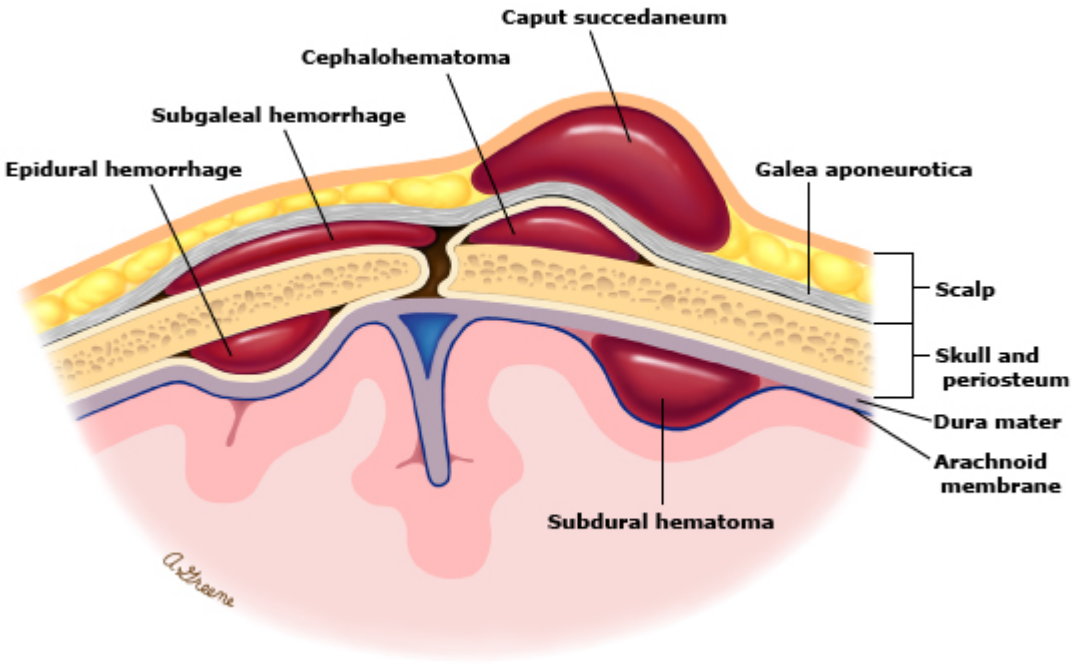

Figure 1: Extracranial haemorrhage in a newborn

Risk Factors

Vacuum extraction

SGH is often preceded by a difficult vacuum extraction with either incorrect positioning of the cup, prolonged extraction time (>20 minutes), >3 pulls or >2 cup detachments or failed vacuum extraction. Boo[3] and colleagues also showed that nulliparity (adjusted Odds Ratio - OR 4.0), 5-minute Apgar score < 8, (OR 5.0), cup marks on the sagittal suture (OR 4.4), leading edge of cup < 3cm from anterior fontanelle (OR 6.0) or failed vacuum extraction (OR 16.4) were significant risk factors for SGH.

Other Risk Factors

Maternal factors: PROM >12 hours, maternal exhaustion and prolonged second stage, previous high or mid cavity forceps delivery.

Neonatal factors: Macrosomia, neonatal coagulopathy (Vitamin K deficiency, Factor VIII deficiency, Factor IX deficiency), low birthweight, male sex (2:1 to 8:1), low Apgar scores (< 8 at 5 minutes), need for resuscitation at birth and cord blood acidosis, fetal malpresentation.

Pathophysiology

Tractional and rotational forces with the use of vacuum extraction can result in rupture of veins and haemorrhage into different layers of the scalp. Most significantly, SGH may result from rupture of **emissary veins** into the subgaleal space. 62-72% cases of SGH may be associated with perinatal hypoxia.

Recognition of SGH

Local Signs

- **Early recognition is crucial for survival.** Combination of inspection and palpation to confirm SGH.
- Diffuse, fluctuant swelling of head which may shift with movement. Palpation of the scalp has been described as a **leather pouch filled with fluid**.
- As the haemorrhage extends, elevation and displacement of the ear lobes and peri orbital oedema (puffy eyelids) can be observed.
- Irritability and pain on handling will be noted.
- Days later bruising appears behind the ears and or the eyelids.

Systemic Signs

- Signs consistent with **hypovolemic shock**: tachycardia (HR>160), tachypnoea (RR>60), dropping haematocrit on blood gases, increasing lactates (>3) or worsening acidosis, poor perfusion (CRT>3 secs), poor activity, pallor, hypotension, relatively lethargic or irritable baby and acidosis. Neurological dysfunction and seizures are a late sign. Ischemic end organ damage to liver or

kidneys can manifest as worsening liver and renal function and this is a poor prognostic indicator.

- 6% of SGH cases are asymptomatic, 15-20% are mild, 40-50% are moderate and 25-33% are severe. Profound shock can occur rapidly with blood loss.
- ***Normal BP and HR can be falsely reassuring in a sick looking infant.***

Differential Diagnosis (refer to Figure 1)

- ***Cephalhaematoma*:** well demarcated and does not cross suture lines. **SGH crosses suture lines**.
- ***Caput succedaneum*:** An oedematous collection of serosanguinous fluid in the subcutaneous scalp layer. A caput **has distinct borders, doesn't enlarge** and is **not fluctuant**. It is located where the vacuum was positioned, usually at the presenting part of the scalp. It typically resolves within 12-18 hours and there are no complications beyond a circular area of bruising.
- ***Chignon (artificial caput succedaneum):*** A collection of interstitial fluid and small haemorrhages that occur under the vacuum cap. It may cross suture lines, is most obvious after immediate removal of the cap and is firm in consistency. It starts resolving within an hour of birth and should completely resolve within 18 hours. There is no long-term significance for the newborn.

Initial Action

Administer intramuscular vitamin K as soon as possible.

RANZCOG recommendations include:

Level 1 surveillance

Minimum for all infants delivered by instrumental delivery. These infants may be cared for on the postnatal ward.

- Baseline observations (activity, colour, heart rate, respiratory rate and head circumference) at one hour.
- Avoid hats/ bonnets (or remove frequently) to note head shape (increase in head circumference by 1cm may suggest 40mL blood seepage into subgaleal space).
- Clinical concerns (to increase observation frequency/ escalate to Level 2 surveillance).

Level 2 surveillance

Indicated: if vacuum extraction time total >20 minutes and/or > 3 pulls and/or > 2 cup detachments, clinical concerns from level 1 surveillance. These infants should be admitted to the neonatal unit. Take cord blood (acid base status, pH, and lactate).

- Full blood picture
- Hourly observations for first 2hrs, then 2hrly for next 6hrs. Can extend observations for at least first 12-24 hours, consider saturation monitoring.

- Document activity, colour, heart rate, respiratory rate, head size and shape, location and nature of swelling.

Level 3 surveillance

Indications: clinical suspicion of SGH immediately following delivery, clinical concerns on Level 2 surveillance

- Urgent review by paediatric senior registrar or consultant paediatrician. If SGH confirmed, consider admission to special care nursery.

Immediate Investigations

- Refer to Appendix 1: Subgaleal Haemorrhage Management Checklist for monitoring, investigations and red flags.
- Full blood picture and Coagulation profile: on admission and repeated at clinical team's discretion. Up to 81% of neonates with SGH may develop coagulopathy.
- Group & hold if blood needed urgently. Refer to KEMH Transfusion Medicine Policy: Critical Bleeding Protocol and Neonatal Critical Bleeding Protocol.

Venous/capillary gas (2-4 hourly). The basis of effective management is aggressive resuscitation to restore blood volume, provide circulatory support, correction of acidosis and coagulopathy.

See Neonatal Critical Bleeding Protocol

Above investigations to be carried out after insertion of a peripheral intravenous access, which should be left indwelling for 12 hours if baby remaining in nursery.

Ongoing Monitoring

- Continuously monitor heart rate, respiration, and oxygen saturation) at least for the first 24 hours.
- Continue to assess capillary refill and peripheral perfusion.
- Regularly observe and palpate scalp swelling to assess for continuing blood loss, change in head shape or head circumference.
    - Measure head circumference hourly for the first 6-8 hours of life, (refer to criteria for determining severity of SGH from Chadwick et al: Table below), change in colour, displacement of ears.

	Head Size	Jaundice	Hypovolemia
Mild	Increase of <1cm	Absent	None
Moderate	Increase of 1-3 cm	Present	Mild: plasma expander only
Severe	Increase of >3cm	Present	Blood and plasma expander, may need multiple transfusions

- Volume replacement: 20 mL/kg of normal saline, if severe hypovolemia, request for urgent O negative blood and FFP. Refer to Critical Bleeding Protocol Neonatal.
- Monitor urine output.
- Repeat FBC and coagulations studies, (4-6 hours after initial assessment).
- If coagulation studies are abnormal then correct with 20mLs/kg of Fresh Frozen Plasma. Consider giving Cryoprecipitate 5mLs/kg, if there is continued bleeding or the fibrinogen level are < 1.5 g/l. Discuss with on call haematologist about the need for other agents.
- If thrombocytopenic, consider platelet transfusion (if platelet count<50).
- Inotropes, vasopressors and multiple packed red cell transfusions may be required for severe cases of shock.
- Ongoing assessment for jaundice.

Recognition of Hypovolaemia

Pointers to significant volume loss include:

- A high or increasing heart rate (> 160 bpm), low or falling haemoglobin or haematocrit, poor peripheral perfusion with slow capillary refill (>3 seconds), presence of or worsening of a metabolic acidosis.
- Consideration of a functional bedside echocardiography (by the attending neonatologist) can be useful in assessment of volume status. Small systemic veins and low ventricular filling volumes can be pointers to hypovolaemia.

Consider Elective Intubation and Ventilation for Worsening Shock.

- Once stabilized, consider neuroimaging (cranial ultrasound or MRI)

Communication with Parents

- Keep parents informed and obtain consent for the administration of blood products.
- Reassure and keep communication open and honest.

Discharge criteria and Follow-Up

- Discharge from the neonatal unit: This is a case-by-case basis depending on severity of SGH, discharge and follow up is to be discussed with neonatal consultant.
- Following discharge from postnatal wards, VMS / CHN/ GP review within 1-2 weeks.

Related CAHS internal policies, procedures and guidelines

Transfusion Medicine KEMH: Critical Bleeding Protocol

Neonatal Clinical Guideline: Critical Bleeding Protocol Neonatal.

References and related external legislation, policies, and guidelines

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This document can be made available in alternative formats on request.

Document Owner:	Neonatology		
Reviewer / Team:	Neonatal Coordinating Group		
Date First Issued:	December 2015	Last Reviewed:	November 2024
Amendment Dates:	Nov 2024 inclusion of PNW in scope. Amended sections to clarify PNW process.	Next Review Date:	November 2027
Approved by:	Neonatal Coordinating Group	Date:	November 2024
Endorsed by:	Neonatal Coordinating Group	Date:	
Standards Applicable:	NSQHS Standards:  Child Safe Standards: 1,10		

Appendix 1: Subgaleal Haemorrhage Management Checklist

Vital Signs	Hourly for 6 hours then • 2 hourly for 24 hours
Blood Pressure	15 minutely for 4 hours **or**
	15 minutely for first hour, then • hourly for 4 hours, then • 4 hourly thereafter
Head Circumference	Hourly for at least 8 hours, then • 2 hourly for 8 hours, then if stable • 4 hourly for 8 hours
INVESTIGATIONS	
Initial	FBC, blood group and cross match Coagulation profile Blood gas (lactate)
Subsequent testing	Hb/ blood gas 2-4 hourly Liver function test SBR/ TCB if >36 weeks
	If unstable • FBE 4-6 hourly (for Hb and PLT monitoring) • Coagulation profile 4-6 hourly
Red Flags	
• INR >2 • Tachycardia>160 bpm or HR>20 bpm above baseline • Trend of dropping Hb • Rising lactate or worsening perfusion CRT>3 sec • Worsening base deficit; pH<7.3 or lactate ≥3 mmol/L	
Review for concomitant injuries • Neonatal encephalopathy (62-72% cases with SGH) • Intracranial haemorrhage (33-40% cases with SGH) • Rare: Skull fracture, dural tear with herniation, superior sagittal sinus rupture, pseudo meningocele and encephalocele, subconjunctival or retinal haemorrhage	