

BALLOON ATRIAL SEPTOSTOMY PERFORMED IN GCNC - CHW

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- Neonates with Transposition of the Great Arteries (TGA) may require an emergency balloon atrial septostomy (BAS) at the bedside under echocardiographic (ECHO) guidance.
- The need for a BAS will be decided by the on call cardiology team and may occasionally include neonates with other complex cardiac conditions
- The infant may be a rapid transfer for the birth unit at Westmead Hospital.
- All equipment to be prepared and ready when requested
- The Blue Balloon Septostomy Trolley is restocked after each procedure and left ready in the store room.
- Specific circumstances may require the BAS to be performed in the cardiac catheterisation laboratory.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st February 2017	Review Period: 3 years
Team Leader:	Nurse Educator	Area/Dept: GCNC

CHANGE SUMMARY

- A list of updated equipment required for performing a balloon atrial septostomy in Grace Centre for Newborn Care.
- Revision of terminology throughout document to ensure consistency
- Addition of photos of equipment stocked in trolley to assist with staff familiarisation
- Revised checking and sealing process for the trolley

READ ACKNOWLEDGEMENT

- All clinicians working in Grace Centre for Newborn Care are required to read a hard copy of the guideline which will be available in the unit and sign in order to verify reading guideline.
- Notification of the revised policy will be communicated to staff via the units Clinical Practice review Forum.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

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Introduction

Balloon atrial septostomy (BAS) is an endovascular or catheter technique for enlarging the foramen (foramen ovale) communication between the left and right atrium¹. It is primarily used for preliminary improvement or stabilisation of oxygenation in TGA (Transposition of the Great Arteries) pending corrective surgery. However, the procedure can be beneficial for selected patients with other defects where atrial septal mixing optimises oxygenation or circulation (e.g. hypoplastic left heart syndrome).

The aim of this procedure is to create an adequate communication between the right and left side of the heart to facilitate mixing of blood to provide oxygen delivery systemically²⁻⁴. This procedure is usually performed as an emergency procedure at the bedside with ultrasound guidance, but can be performed in the cardiac catheter laboratory.

Pathophysiology

TGA is a congenital heart defect where the aorta and the pulmonary arteries are transposed. This results in two separate parallel circulations, one pulmonary and one systemic which rely on a degree of mixing either at the atrial level via PFO or ASD or at the ventricular level via a VSD in order to provide oxygenated blood to the systemic circulation⁶. After diagnosis, low dose prostaglandin E1, usually 5-10ng/kg/min, is administered as a continuous infusion in order to maintain ductal patency and facilitate mixing at the atrial level.

Post birth, the foramen ovale reduces in size which further decreases the oxygenated blood available for systemic circulation. This may not be responsive to Prostin enhanced left atrial filling, and therefore, the infant becomes more hypoxic, requiring a BAS.

BAS is performed by inserting a catheter with a deflated balloon at the tip through the femoral or umbilical vein. With the guidance of an echocardiogram (ECHO) the catheter is directed into the right atrium and through the patent foramen ovale to the left atrium. The balloon is then inflated and vigorously pulled from the left atrium to the right resulting in tearing of the valve of the fossa ovalis (fine tissue normally covering the foramen ovale) and producing an enlarged atrial communication³⁻⁷. Creating an atrial septal defect in patients with TGA will enhance bidirectional mixing of the pulmonary and systemic venous blood, hence improving oxygen saturation⁵.

Following the procedure it is usually possible to wean the infant from respiratory support and it may be possible to wean the prostaglandin whilst awaiting corrective surgery.

For some infants a BAS maybe an emergency procedure performed immediately when the baby arrives on the unit. It may be a necessary lifesaving procedure to perform prior to obtaining parental consent.

Procedures

Admission to Ward:

- The staff in the birth unit at Westmead Hospital will notify the cardiology and neonatal teams when the delivery is imminent or planned.
- The neonatologist and cardiology team should be notified immediately when the infant arrives in Grace Centre for Newborn Care. The consultant cardiologist and cardiac fellow should be made aware prior to the infant's admission if TGA is suspected so that if critical hypoxia is present action can be taken in a timely fashion.
- Prepare a bed space that is fully accessible and if possible has vacant bed spaces on either side of the allocated bed space.
- See policy: [Admitting a neonate to Grace Centre for newborn care](#).
- Ensure BAS trolley and emergency trolley is fully stocked and ready for use.

Preparation for procedure:

Parental Consent:

Written consent is obtained prior to the procedure from parents by the cardiology team (preferably the cardiologist performing the procedure)⁷. In the case of an emergency, phone consent should be obtained. Consent includes:

- The procedure and the possible outcomes/risks should be explained to the parents in a language they understand, have an interpreter available if required.⁷

Pre-procedural observations:

Baseline observations of heart rate, respiratory rate, oxygen saturations, blood pressure, blood sugar levels, urine output, and pain assessment are documented prior to the procedure.

Pre-procedural tests and interventions:

- ECHO⁷
- Full blood count, blood gas, cross match including a maternal blood sample
- 1 unit of cross matched blood available in blood bank prior to the procedure commencing
- IV cannula in place for procedure
- Infant is usually intubated and mechanically ventilated for analgesic control and to facilitate the procedure. There may or may not be adequate time for a CXR to check ETT position and cardiorespiratory review.
- Sedation with IV Morphine is commenced and the infant may be muscle relaxed immediately prior to the procedure if requested by the cardiologist.

Caveat to guideline:

If life is at immediate risk an emergency BAS is required to be performed immediately post admission. Then the following steps may be attended simultaneously or post procedure:

- Consent is implied
- Chest X-ray
- 1 Unit of blood availability

Procedure:

- BAS is organised in consultation with the neonatologist and cardiologist. The family is informed when the time has been confirmed.
- The Cardiologist & Cardiac Fellow will perform the procedure⁹.
- The Cardiologist or Cardiac Fellow guides the procedure via ECHO.
- The Cardiologist will be in attendance other than exceptional circumstances.
- The Neonatologist or Neonatal fellow assists with management of mechanical ventilation.
- The assigned nurse must be at the neonate's bedside during the procedure, assessing signs of the infant's pain and level of sedation, and assisting with positioning and mechanical ventilation as required.
- Ongoing assessment of vital signs is required.
- A second nurse must be available to assist the cardiologist in a scout role.

Equipment:

1. ECHO machine (arranged by cardiology)
2. Dressing trolley and clear sterile drape
3. Defibrillator, checked for use and on standby.
See policy: [Cardiopulmonary Resuscitation](#).
4. BAS Trolley common equipment required (refer to equipment table for more information):
 - i. Sterile gowns and gloves, cap and mask (for each proceduralist)
 - ii. Balloon septostomy venous catheter tray
 - iii. Intravenous (IV) cut-down tray + Lignocaine 1% ampoule (for femoral access)
 - iv. Umbilical tie, scalpel/blade, suture material (for umbilical access)
 - v. Fogarty® balloon septostomy catheter 5F
 - vi. 6F sheath/ 7F sheath
 - vii. Dressing pack

- viii. Large and small green drapes
- ix. Syringes 2mL, 5mL, 10mL
- x. Blunt needles
- xi. Aqueous chlorhexidine
- xii. Normal saline ampoules
- xiii. Heparinised saline 50IU/5mL
- xiv. UAC, UVC lines and 5F NGT may be used

5. A full surgical thoracotomy set is available from PICU if required.

Individual cardiologists may request equipment in addition to the list above.

Pain relief:

All infants are given 50-100mcg/kg of IV Morphine prior to the procedure. A continuous Morphine infusion is administered and titrated as appropriate.

If the neonate is muscle relaxed, the heart rate and blood pressure are monitored to assess pain. Have 2 doses of muscle relaxation drawn up in case an additional dose is required during the procedure.

- See policy: [Pain management in newborn infants](#)

Privacy:

Visitors and other parents located near the infant are asked to leave the immediate area for the duration of the procedure. A privacy screen should be placed around the bed space.

Post-Procedure:

A successful procedure will usually result in an increase in oxygen saturation to 80-85%. Intravenous prostaglandin can often be weaned and discontinued following the procedure on the advice of the cardiologist and neonatologist.

It is not uncommon for the oxygen saturation to fall over the subsequent days. The "acceptable" saturation level for the infant is identified by the neonatologist and cardiologist to identify when there is a need for cardiology consultation and possible adjustments in treatment including recommencing prostaglandin. These levels are documented in the patient's notes.

Most infants will be weaned from the ventilator and extubated following the procedure. The timing will be influenced by the infant's condition prior to the procedure and any associated co-morbidity.

Observations:

- Arterial blood gas – attend immediately post-procedure then as guided clinically or requested by neonatologist.
- Complete physical assessment.
- Continuous cardio-respiratory and oxygen saturation monitoring.
- Blood pressure – usually continuous via invasive line. If not should at least be documented hourly for four hours and then every four hours for 24 hours.
- Monitor the axilla temperature every four hours and continuously monitor skin temperature.
- Circulation observations on lower limbs (for umbilical access) and affected limb (for femoral access). Every 15minutes for one hour, then every 30 minutes for two hours, then hourly for a further two hours then 2-4 hourly for the next 24 hours¹¹.
- Check site for bleeding and formation of a haematoma.
- Check renal output – target >1mL/kg/hour although this may take some time as the baby has just been born and GFR is usually low in this period.
- Observe for signs of abdominal distension or tenderness ie internal bleeding/extravasation.
- Undertake regular pain assessment and document scores in the CCIS

Restocking after BAS procedure

The nurse caring for the infant is responsible to ensure the BAS trolley is restocked at the completion of the procedure including:

- Dirty instruments are returned to CSSD and a replacement pack is obtained
- Instructions on where to obtain additional stock can be located on the BAS checklist
- Do not add more items to the draw than what is listed on the trolley checklist

Checking BAS Trolley

- The BAS trolley is checked each week by nursing staff
- The task is allocated via the NUM or Team Leader in the allocation book a signature in the allocation book is required to demonstrate the trolley has been checked
- If the trolley has a secure tag in place that is not broken the contents are considered complete. Document in the allocation book the serial number of the tag and sign that the check has been completed.
- If there is not a tag in place the trolley contents are required to be checked and a new tag applied to the trolley. Document the new tag number and sign to indicate the check has been completed in the allocation book.

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Guideline: Balloon Atrial Septostomy Performed in GCNC - CHW

- In the event stock is required that is not stored in GCNC contact: Brooke Woodcock (cardiac physiologist) for catheter items

Complications:

Complication	Signs	Action
Bleeding/haematoma ¹²	<ul style="list-style-type: none"> • Oozing from site • Haematoma • Hypertension 	<ul style="list-style-type: none"> • Place pressure over site • Alert medical staff
Thrombosis ¹²	<ul style="list-style-type: none"> • Poor perfusion • Cool peripheries • Absent pedal pulse/s • Pale lower limbs • Limb puffiness/congestion 	<ul style="list-style-type: none"> • Alert medical staff • Consider heparin infusion
Arrhythmias ¹²	<ul style="list-style-type: none"> • Ventricular tachycardia • Ventricular fibrillation 	<ul style="list-style-type: none"> • Alert medical staff • Defibrillation
Cardiac Tamponade ¹²	<ul style="list-style-type: none"> • Hypotension • Tachycardia • Tachypnoea • Cool and sweaty • Decreased oxygen saturation • Cardiac arrest 	<ul style="list-style-type: none"> • Medical emergency • Pericardial drainage
Cerebral Vascular Accident ¹²	<ul style="list-style-type: none"> • Decreased level of consciousness • Balloon catheter not intact 	<ul style="list-style-type: none"> • Alert medical staff

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Equipment Utilised During Balloon Atrial Septostomy

It is important for nurses and to become familiar with equipment used in BAS procedures some of the items are listed below:

Item	Image	Location
Medicut Cannula 20G & 22G		Draw 3
Wire guides		Draw 3
Wire Dilator 6F	 	Draw 4
Atrio-septostomy Catheter 5fg		Draw 6

BAS Trolley Checklist *Items highlighted in red require re-stocking from the cardiac catheter laboratory.

Draw	Contents	Number
1 Syringes and injectables	3ml luer lock syringes	4
	5ml non- luer lock syringes	4
	18G needles	4
	19G needles	4
	21G needles	4
	25G needles	4
	3 way taps	2
	Heparinised saline 5ml	4
	0.9% sodium chloride 10ml	4
	Xylocaine 1% ampoules	2
	Red caps	4
	Filters	2
	Chooks foot	2
	2 Dressing equipment	Small tegaderm dressing
Steri strips		4
Gauze squares		10
Umbilical tapes		2
Cotton balls		10
Small leucoplast		1
Large leucoplast		1
Cord clamp cutter		2
Suture material		2
Disposable scalpel		4
Stitch cutter		4
Aqueous chlorhexidine		4
Iodine		1
3 Cardiac catheter preparation		<i>Insite 20G cannula</i>
	<i>Insite 22G cannula</i>	4
	<i>Green medicut</i>	6
	<i>Pink medicut</i>	6
	<i>0.021 spring wire</i>	2
	<i>0.025 spring wire</i>	2
	<i>0.035 spring wire</i>	2
	<i>Arrow guide wire</i>	2
	<i>NG tubes (Green)</i>	Unable to be restocked
4 Cardiac catheterisation	<i>6Fr sheath</i>	2
	<i>7Fr sheath</i>	2
5 Surgical/ procedural equipment	Umbilical cut down tray	2
	Septostomy tray	2
	<i>Aterioseptostomy catheter</i>	2
	Leg stabiliser	1
6 Sterile preparation	Sterile gowns	3
	Clear sterile sheet	2
	Probe cover	2
	Fenestrated drape	3
	Minor procedure drape	3
	Sterile gloves; size 6-8	2 of each size
	Face masks	3
	Hats	3
Dressing pack	4	

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