



Clinical Protocol

CP.XX.xxx

The objective of this document is to be a resource, not a replacement for institutional specific protocols. It is intended as a template for your perfusion team to edit and adapt into a resource that fits your institutional specific needs. These Clinical Protocols may also be superseded by the judgment of the healthcare professional considering the facts and circumstances of the individual case.

SUBJECT/TITLE: PULMONARY ARTERY FLOW STUDY FOR UNIFOCALIZATIONS

PURPOSE: This technique will be performed on select patients with tetralogy of Fallot (TOF), pulmonary atresia, or aortopulmonary collaterals (MAPCA's) who are undergoing unifocalization, to guide the surgical management of the ventricular septal defect (VSD). This protocol outlines the perfusionists role and responsibility for the conduct of an intraoperative pulmonary flow study to determine the appropriateness of ventricular septal defect closure in the presence of pulmonary atresia and major aortopulmonary collaterals. This procedure is for use with roller pump cardiopulmonary bypass (CPB) circuits only.

TARGET POPULATION: Patients with TOF, pulmonary atresia, and aortopulmonary collaterals (MAPCA's) undergoing a unifocalization procedure.

DEFINITIONS:

1. **Tetralogy of Fallot (TOF):** A congenital heart condition including a VSD, overriding aorta, pulmonary stenosis, and RV hypertrophy.
2. **Major Aortopulmonary Collateral Arteries (MAPCA's):** A congenital heart defect with persistent tortuous fetal arteries that arise from the descending aorta and supply blood to pulmonary arteries in the lungs usually at the posterior aspect of hilum.
3. **Ventricular Septal Defect (VSD):** A congenital heart defect in which there is a defect in the ventricular septum.
4. **Pulmonary Atresia:** A congenital heart defect resulting in an absent pulmonary valve.
5. **Unifocalization:** A cardiac surgery performed soon after birth to reroute MAPCAs from the aorta to the pulmonary artery and restore the normal circulation from the lungs to the heart.

POLICY: This is a guideline that outlines the perfusionist's role and responsibility for the conduct of an intraoperative pulmonary flow study.

PERFUSION PUMP CONSIDERATIONS:

Equipment considerations are described as follows:

1. Standard CPB set up utilizing roller pump arterial head,

- appropriately sized to the patient.
- 2. An additional roller head.
- 3. Sterile tubing the same size as the arterial line for the sterile field to hand back to perfusionist.
- 4. Consider a larger or additional LV vent(s) due to pulmonary flow returning to the pump through this vent during the PA flow study.
- 5. Consider adding additional suckers to compensate for the MAPCAs and any additional blood loss.
- 6. Additional PA cannula, same size as the arterial cannula.
- 7. Monitor pressure in the additional PA cannula/line AND patient PA pressure.
- 8. This study is based on volume, so while vacuum assisted venous drainage (VAVD) can be used, adequate volume is critical
- 9. PA and LA recorded at a steady flow rate

Circuit modifications are described as follows:

- 1. Insert a wye connector into the pump boot tubing post venous reservoir and pre arterial pump.
- 2. One leg of the wye connects to the arterial pump boot and the other leg connects to the PA flow study pump boot (appropriately sized to accommodate a 3.0 CI.)
- 3. Insert a straight lured connector post PA flow study pump to attach a pressure line to monitor the flow study circuit pressure
- 4. Prime the circuit as normal and make sure to check the occlusion of the PA flow study pump. The PA flow study pump can be temporarily connected to the cardiotomy to prime the system and check occlusions. Consider linking the PA flow study pump to the arterial pump, stopping both pumps for pressure, level, or bubble alarms.
- 5. Consider adjusting transducer pressure limits to accommodate the size of patient and total blood flows required for the 2.5-3.0 CI blood flow.

PROCEDURE:

Prior to initiation of PA Flow Study

- 1. Upon pushing up to the operating table, connect the sterile tubing to be used for the PA flow study to the connector on the outflow side of the flow study pump. Prime this line up to the field
- 2. Initiate bypass and conduct the case according to institutional protocol. Be prepared for the use of pH stat blood gas management for patients with major aortopulmonary collaterals. Have extra volume available (blood products may be necessary) for the initiation of the PA flow study
- 3. Additional cooling may be appropriate

Conduct of the PA Flow Study

1. Prior to the start of the study, ensure adequate volume in the reservoir to handle the extra flow generated by the PA flow study. The surgeon will instruct initiation of the study and specify a target cardiac index for the PA flow study pump.
2. At the request of the surgeon, increase vent speed to match PA flow study pump.
3. Increase PA flow study pump at the direction of the surgeon.
4. Record pulmonary flow and pulmonary pressure for each stage of the PA flow study.
5. At the request of the surgeon, turn off the PA flow study pump.

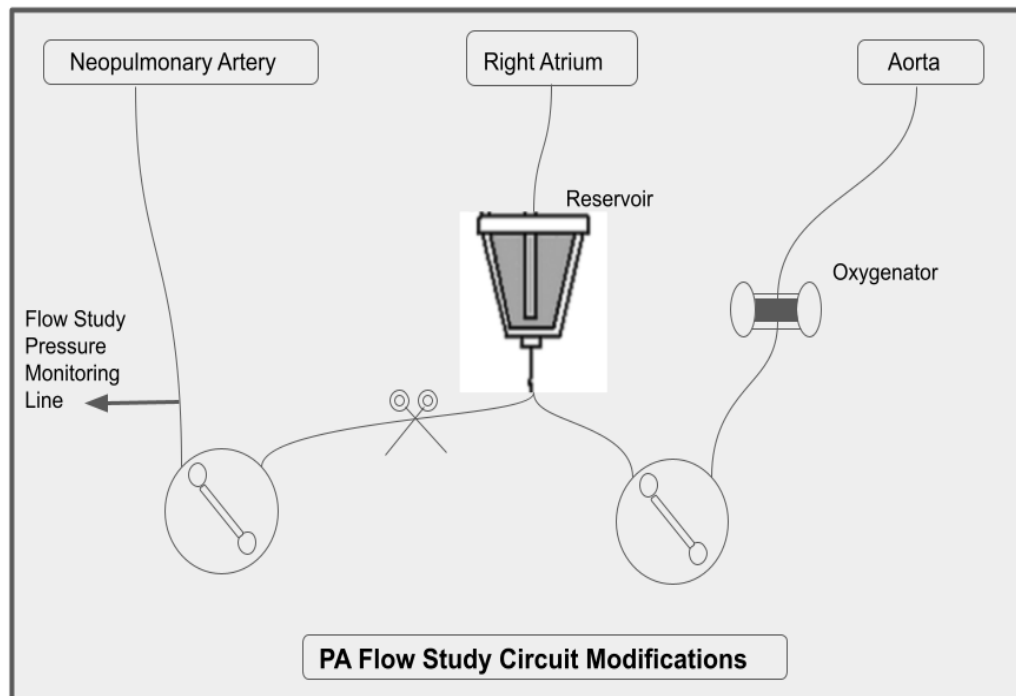
CLINICAL ASSESSMENT/SCREENING:

A. Contraindications: Inability to adequately vent the LA, which results in myocardial distension and inappropriately high measured PA pressure.

B. Screening:

1. The surgeon will assess the PA pressure through a pressure line that was given to anesthesia.
 - a. If the pressure is less than 25 mmHg, the surgeon will ask you to increase systemic flow to a 2.0 l/min/m CI and will go up to a 2.5 or 3.0 CI if the pressure stays below 25 mmHg.
2. Once pressure gets above 25 mmHg the surgeon will stop the study.
 - a. If the pressure was greater than 25 mmHg, they will most likely not close the VSD, or they will close it and fenestrate it.
 - b. Target systemic flows 2.5 L/min/m²- 3.0 l/min/m.

If PA pressure <15mmHg at ~1.25 L/min/m², then proceed with a bidirectional Glenn procedure.



Schematic Drawing of PA Flow Study Circuit Modifications

RELATED DOCUMENTS:

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IMPORTANT INFORMATION ABOUT THESE PROTOCOLS:

If this protocol/process is adopted as is, the AmSECT logo must be removed and replaced with an institution specific logo.

This protocol/process encourages high quality patient care but observing it cannot guarantee any specific patient outcome.

This protocol/process should be reviewed or revised as warranted by institutional specific protocol, taking into account the evolution of technology and practice.

Review period: Review as changes occur or per institutional protocol.

Original hard copies and/or computer copies of this protocol are stored under the supervision of the Chief Perfusionist, Department of Cardiovascular Perfusion.

APPROVED BY: *(signature of CMO and CNE only required)*

Source: *(originating department/committee)*

Effective Date: *(can use 'created date' for this)*

Version Number: *(should match # of revisions, use 1.0 if new document)*

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