Aga Khan University Hospital

Title:	Cardiopulmonary Bypass (CPB): Initiation and Maintenance		
Department / Division:	Anaesthesiology / Operating Room		
Approved By:		**Document No.:**	OR-PP-013
Section Head, Cardio-thoracic Surgery		**Issuance Date:**	January 01, 1997
Chief Perfusionist, Operating Room		**Revision Date:**	July 24, 2023
		Revision No.:	07
		Prepared By:	OR Team
		Total Pages:	03

1. Purpose(s):

To provide guidelines for the Perfusionist to safely perfuse the patient, during open heart surgery.

2. Scope:

2.1. To provide smooth transition of body circulation from physiological to artificial blood flow

2.2. To perfuse body optimally during surgery, while maintaining blood chemistry and blood gases as physiological as possible.

2.3. To present bloodless and motionless heart to surgeon in order to perform surgery.

3. Responsibility:

Cardiac Perfusionist.

4. Terms & Definition: -

An arterial blood gas (ABGs), test measures the acidity (pH) and the levels of oxygen and carbon dioxide in the blood from an arterial. This test is used to check how well your patient's status and oxygenators are able to move oxygen into the blood and remove carbon dioxide from the blood.

5. Process/ Process:-

Steps	*Rationale*

	Steps		Rationale
5.1	Before going on bypass arterial line should be checked for: 5.1.1 forward flow 5.1.2 pulsatile flow 5.1.3 pressure correlation	5.1	To ensure proper position of arterial cannula and also to prevent aneurysm if it is in false lumen.
5.2	Set the air/O_2 blender mixture at appropriate level. Start oxymeter and timer for bypass.	5.2	To allow proper oxygenation.
5.3	Remove venous clamp and ensure venous return (for bio-medicus pump)	5.3	To make sure venous line and cannula are patent.
5.4	Increase bio-medicus pump revolutions per minute (RPM) to 1600, then remove arterial line clamp.	5.4	To prevent retrograde flow through the arterial cannula.
5.5	Quickly increase flow up to the calculated blood flow.	5.5	It gives an indication of safe and smooth initiation.
5.6	If using roller pump, remove clamp from arterial line, slowly start the flow, then completely remove the venous clamp to ensure proper venous return.	5.6	Surgeon can correct position of cannula.
5.7	Simultaneously watch for pressure, color of blood and level in reservoirs.	5.7	Allows surgeon to continue with procedure and allow anesthetist to stop ventilation.
5.8	If any venous drainage problems occur at this point, the Perfusionist must notify the surgeon.	5.8	Get the blood cardioplegia system ready to arrest heart when needed.
5.9	When at full flow (arterial), open the purge line and the Perfusionist will inform both surgeon and anesthetist.		
5.10	When patient is stable on CPB, the blood component of cardioplegia system can be primed using the high K^+ crystalloid solution.		
	Maintenance During CPB		
5.11	Always keep blood level above 200 cc in the reservoir.	5.11	To avoid getting air into the system.
5.12	Maintain arterial pressure above 50mmHg or according to individual surgeon's preference.	5.12	It gives an indication of perfusion to vital organs.
5.13	Maintain venous O2 saturation above 60%.		

Steps	Rationale
5.14 Make sure there is urine output (may vary from patient to patient and case to case).	5.14 It gives some guidance for the Perfusionist about renal perfusion.
5.15 Check ABGs, electrolytes and haematocrit every 30 minutes on pump. It must be within normal limits. If it is abnormal, correct the problem immediately by the appropriate action and record on CPB form.	5.15 To ensure proper ventilation, exchange of gas, and acid base status of patient.
5.16 Check ACT every 30 minutes.	5.16 To ensure that ACT is about 450 seconds. If less than 450 second there is a chance of clotting in the system heparin may be given according.
5.17 Run cardioplegia according to surgeon's preference (see protocol)	5.17 To prevent ischemia and also keep informed about ischemic time.
NOTE: For adult notify surgeon after every 20 minutes for each cardioplegia delivery& for pediatric inform to surgeon after every 30 minutes for each cardioplegia delivery.	
5.18 Document all parameters and actions every 15 minutes CPB record form.	

6. References:

Gravlee, G.P., Davis R.F., Kurusz, M., & Utley, J.R (2000). Cardiopulmonary Bypass: Principles and Practice. (2ndedition). New York: Lippincott Williams & Wilkins.

Cardiopulmonary Bypass: Principles and Practice. 3rd Edition (2008).By Glenn P. Gravlee

7. Annexure:

Document Change Record:

Review #	Review Date (dd-mm-yyyy)	Description Of Change	Identification of Change
04	06-Jun-2015	Change in new format	Choose an item
05	01-Feb-2016	Formatting as per service line. Change in document no.	-
06	01-Feb-2019		
07	24-July-2023	Formatting as per Department / Division	