

RCH Perfusion :Modified Haemodialysis on Cardiopulmonary Bypass Protocol.

Background:

Conventional Haemofiltration during cardiopulmonary bypass utilizes a semi permeable membrane to facilitate the removal of solutes by way of convection principles. A positive hydrostatic pressure is used to drive water and solutes across a membrane, from within the blood compartment to the effluent compartment from where it is collected and removed. During bypass, filtration can be enlisted to concentrate the red cell mass or with the addition of specific replacement fluids (i.e. potassium depleted fluids) to regulate the electrolyte composition of the blood. In addition, postoperatively, the same filter can be utilized to perform modified ultra filtration to further concentrate the patient's red blood cell concentration and remove inflammatory mediators.

In certain cases, the use of haemofiltration is unable to adequately clear high potassium concentrations that are sometimes found. In such cases the same haemofiltration membrane can be employed to act as a haemodialysis membrane. In this procedure dialysis solution is run through the effluent compartment of the filter while at the same time haemofiltration continues. The combination of both filtration and dialysis is found to be effective in rapidly reducing the potassium concentration and is the basis of this protocol.

Equipment

2 x RCH Tubing set for use with Hemoconcentrator (Ref No 066207003)
1 x Terumo HC05 Hemoconcentrator (CX *HC05L)
3 x vacuum canister disposable liners
1 x giving set
1 x ¼" to leur lock adaptor (white adaptor)
1 x screw clamp
1 x 5000ml HEMOSOL BO, potassium free solution (located in ICU store, 1 door up from ICU Techs office)

Set up procedure

Most often conventional haemofiltration will have already been performed initially and thus this procedure refers to modifications to the standard RCH haemofilter circuit.

1. Clamp effluent line on filter
2. Turn off haemofiltration roller pump
3. Clamp inlet and outlet of haemofilter
4. Take out effluent line from spare circuit
5. Using adaptor, join effluent line to giving set

6. Rotate haemofilter to horizontal position and detach effluent line from top port and place onto bottom port
7. Attach new effluent line – giving set combo to top port
8. Spike 5000 ml dialysis bag with clamped giving set combo
9. Place screw clamp on giving set

Haemodialysis procedure.

The set up is now complete and the procedure can begin. Ideally the aim should be to run the 5000 ml dialysis solution in, over a 30 minute period (~150 ml/min) to avoid dramatic changes in electrolyte concentration. The dialysis fluid line should be opened and regulated via the screw clamp to obtain flow proportional to this 30 minute time frame.

1. Open inlet and outlet lines of haemofilter
2. Start haemofilter roller pump (< 20% Full flow)
3. Open dialysis solution line, regulating flow via screw clamp
4. Open bottom effluent line to disposable liner, utilizing ~ 100 mmHg vacuum

Circuit volume can be maintained by way of standard volume replacement fluids. The potassium concentration **must** be monitored closely by way of the CDI 500 with a blood gas performed approximately every 10 mins in order to track electrolyte changes. Because large volumes of effluent will be produced, the vacuum canister bag will need to be watched closely and changed 2 – 3 times during the procedure.

Alternative set-up:

Equipment

2 x RCH Tubing set for use with Hemoconcentrator (Ref No 066207003)
 1 x Terumo HC05 Hemoconcentrator (CX *HC05L)
 1 X Fresenius Waste bag (9006281)
 1 x Double ¼” IV Spike Line
 1 x 5000ml Baxter Hemofilter Replacement Fluid (AHK6032)
 ¼” – ¼” connector

Sodium Bicarbonate 8.4% 10.75 ml
 Potassium Di-Hydrogen Phosphate 13.6% 5.23 ml
 Potassium Acetate 2.45g/5ml 2.09 ml

Added to the 5000ml bag to give final concentration of:

Sodium 140 mmol/L
 Calcium 2 mmol/L
 Magnesium 1 mmol/L
 Chloride 100 mmol/L

Acetate 23 mmol/L
Bicarbonate 25 mmol/L
Potassium 3 mmol/L
Phosphate 1 mmol/L
Dextrose 0.18%

The Potassium Di-Hydrogen Phosphate and Potassium Acetate are optional if you want a potassium and phosphate free solution.

Set up procedure

Most often conventional haemofiltration will have already been performed initially and thus this procedure refers to modifications to the standard RCH haemofilter circuit.

10. Clamp effluent line on filter
11. Turn off haemofiltration roller pump
12. Clamp inlet and outlet of haemofilter
13. Take out effluent line from spare circuit
14. Cut one spike from the Double Spike Line
15. Using the $\frac{1}{4}$ " – $\frac{1}{4}$ " connector, join effluent line to $\frac{1}{4}$ " spike to create a hemofilter fluid inlet line.
16. Rotate haemofilter to horizontal position and detach effluent line from top port, place onto bottom port, detach from filter canister and attach to waste bag at the blue valved spike. Ensure the valve is open.
17. Attach the hemofilter fluid inlet line to top port
18. Spike 5000 ml hemofilter fluid bag with clamped hemofilter fluid inlet line.
19. Place the screw clamp on the hemofilter fluid inlet line

Haemodialysis procedure.

The set up is now complete and the procedure can begin. Ideally the aim should be to run the 5000 ml hemofilter solution in, over a 30 minute period (~150 ml/min) to avoid dramatic changes in electrolyte concentration. The hemofilter fluid line should be opened and regulated via the screw clamp to obtain flow proportional to this 30 minute time frame.

5. Open inlet and outlet lines of haemofilter
6. Start haemofilter roller pump (< 20% Full flow)
7. Open hemofilter solution line, regulating flow via screw clamp
8. Open bottom effluent line to waste bag.

Circuit volume can be maintained by way of standard volume replacement fluids. The potassium concentration **must** be monitored closely by way of the CDI 500 with a blood gas performed approximately every 10 mins in order to track electrolyte changes.