CONTINUOUS VENO-VENOUS HAEMOFILTRATION USING CITRATE ANTICOAGULATION

Indications

- U/Es are within normal range
- Acid-base balance normalised

Changing treatment from CVVHDF to CVVH

When swapping from CVVHDF to CVVH → request a new total calcium and obtain an ionised calcium level so that the calcium ratio can be checked.

All 3 substitution fluid bags continue to be suspended on each of the scales:

1. The citrate bag is suspended on the pre-blood pump (PBP) or white scale. Change the citrate dose as per the appropriate volume in the infusion rate table below.
2. A bag containing phoxilium is already suspended on the dialysate or green scale. However the dialysate infusion rate now needs to be switched off → turn dialysate infusion rate to 0ml/hr.
3. A bag containing phoxilium is suspended on the replacement or purple scale. Change the replacement infusion rate to the appropriate volume as per infusion rate table below.
4. Use **35ml/kg/hr as default starting dose** – refer to the row shaded pale blue. Both the PBP and replacement infusions will run at the same rate e.g. for 80kg weight range, the PBP infusion rate will be 2150ml/hr and the replacement infusion rate will also be 2150ml/hr.
5. Only use 25ml/kg/hr if U/Es are at lower end of normal.
6. Frequency of calcium monitoring: the same principles apply as for CVVHDF

Infusion Rate Starting Settings for CVVH treatment using CITRATE anticoagulation													
Bodyweight	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
Blood flow	80	80	100	100	100	100	120	120	120	120	150	150	150
Citrate dose	3	3	3	3	3	3	3	3	3	3	3	3	3
Ca2+ comp%	100	100	100	100	100	100	100	100	100	100	100	100	100
35ml/kg/hr	850	1050	1100	1350	1550	1750	1750	1950	2150	2350	2300	2500	2700
25ml/kg/hr	350	500	500	650	800	950	900	1000	1150	1300	1150	1300	1450

Stopping citrate anticoagulation and changing over to heparin or NO anticoagulation

- In the rare event of citrate accumulation, citrate anticoagulation will need to be stopped and changed to heparin anticoagulation or no anticoagulation if there are contra-indications to heparin.
- However, before changing over, ensure that the troubleshooting guidance on the opposite page has been carried out.
- When changing over to heparin anticoagulation or no anticoagulation, higher blood flow rates will need to be used to ensure reasonable filter life.
- Pre-dilution will not be required during haemofiltration with heparin.
- Refer to the guidance on the opposite page for using CVVH with heparin or NO anticoagulation

In the rare event of citrate accumulation – citrate treatment will be discontinued as follows

First refer to the following troubleshooting guidance for calcium ratio > 2.5 as this may reduce the need to discontinue citrate treatment:

- Seek medical support. If the following troubleshooting processes fail to correct the problem the citrate infusion needs to be stopped. Phone the 24-hour helpline as appropriate.
- Aim post filter calcium of 0.4 to 0.5mmol/L by reducing citrate dose in 0.2mmol/L increments until this range is achieved.
- Repeat ionised calcium check and new total calcium sample at 1 hour. If ratio remains above 2.5 despite post filter calcium of 0.4 to 0.5mmol/L then consider:

    1. Reducing blood pump speed by 20: this will reduce total administered citrate dose. Repeat calcium ratio at 1 hour i.e. ionised calcium check and new total calcium check.
    2. If the calcium ratio at 1 hour remains above 2.5, consider doubling the base line dialysate flow: this will increase citrate clearance.
    3. Repeat calcium ratio at 1 hour i.e. ionised calcium check and new total calcium check. If at 1 hour the calcium ratio remains above 2.5, consider stopping citrate and use an alternative anticoagulant or no anticoagulant.

Stopping the citrate infusion and changing over to heparin or NO anticoagulation:

- All 3 substitution fluid bags continue to be suspended on each of the scales but the citrate infusion is switched off.
- In the anticoagulation display screen turn **citrate dose to zero** and do same for calcium compensation.
- A minimum calcium compensation of 5% may still appear on the display screen – this is ok as the calcium infusion rate should now read 0ml/hr. **Clamp the calcium infusion line**.
- However the blood flow rate needs to change to 200 – 250ml/min. Refer to the table below.
- Proceed to heparin anticoagulation if there are no contra-indications and ensure heparin is prescribed in the continuous infusion section of the drug kardex.
- Heparin dose range 500units to 1500units per hour. Request APPT ratio at 0600hrs and 1800hrs.
- Using a 20ml **leur-lock** syringe draw up 20,000 units heparin in 20ml and install into an external syringe driver i.e. agilia and connect directly to the anticoagulation port on the haemofiltration circuit.

Treatment dose:

- All replacement will now be delivered by using a **single 5-litre bag of phoxilium on the purple replacement** scale.
- In the context of ongoing acidosis/sepsis refer to the exchange volume in the 35ml/kg/hr row.
- In the context of near-normalised U/E's and resolving acidosis refer to the exchange volume in the 25ml/kg/hr row.

Infusion Rate Starting Settings for CVVH treatment using HEPARIN anticoagulation or No anticoagulation													
Bodyweight	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
Blood flow	250	250	250	250	250	250	250	250	250	250	250	250	250
35ml/kg/hr	1400	1575	1750	1925	2100	2275	2450	2625	2800	2975	3150	3325	3500
25ml/kg/hr	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125	2250	2375	2500

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