Blood transfusion and filter set requirements with citrate anticoagulation compared with heparin in renal replacement therapy

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Introduction

Citrate is the recommended anticoagulant for continuous renal replacement therapy (RRT)[1], and confers numerous benefits over anticoagulation with heparin[2]. Benefits include prolonged filter life with an associated reduction in 'down-time', improved cost efficiency, and a reduced bleeding risk. Patient and kidney survival may also be improved[2,3]. Our ICU changed from heparin to citrate anticoagulation in June 2014.

This re-audit aimed to confirm whether blood transfusion requirements and haemofilter set life before and after the change to regional citrate anticoagulation were maintained.

Methodology

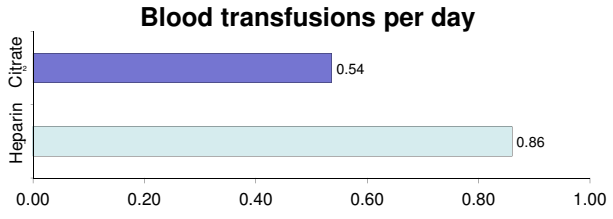
Data were collected on set life and the number of blood transfusions patients received during the period of filtration, and in the 24 hours afterwards. Our unit uses a transfusion trigger of 70 g/l[4] unless the clinical situation dictates otherwise. Data on transfusion requirements were removed if the transfusion was part of initial resuscitation or massive haemorrhage during the period of filtration.

All data were collected retrospectively, six months for heparin (14 Jan 2014 – 22 June 2014), and twelve months for citrate (14 June 2014 – 15 June 2015).

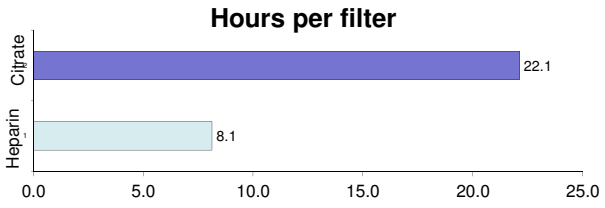
Results

6 months of filtration with and 12 months of citrate were observed. 150 patients required RRT, for a total of 11638 hours. Mean filter life increased from 8.1 h with heparin, to 22.1 h with citrate. The number of transfusions required fell from 0.86 units per day with heparin, to 0.54 units per day with citrate (p = 0.11 by Student t-test). There was no significant difference in the duration of RRT required between the 2 groups.

	Heparin (6m)	Citrate (12m)
Renal Hours	**3319**	**8319**
Median duration RRT per patient (hours)	32	56
Filter orders	408	376
Total filter cost per annum (£)	£65,614.56	£30,234.16
Average duration of filter set (h)	**8.1**	**22.1**
Filter cost per renal day (£)	**£237.23**	**£87.22**
Blood transfusions per day	**0.86**	**0.54**
Blood transfusion cost per day (£)	**£105.84**	**£66.00**



***Graph 1**: Number of blood transfusions with citrate ( ) compared with heparin ( ) anticoagulation*



***Graph 2**: Duration of haemofilter life with citrate ( ) compared with heparin ( ) anticoagulation*

Conclusions

Citrate anticoagulation increases filter life when compared with systemic heparinisation, with a cost saving of approximately £35,000 per year, in addition to previously reported patient benefits[2]. There is a non-significant trend towards a reduction in blood transfusion requirements, representing an annual cost saving of £6,400.

References

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2. Oudemans-van Straaten HM, Kellum JA, Bellomo R. Clinical review: Anticoagulation for continuous renal replacement therapy - heparin or citrate? Critical Care 2011; **15**: 202
3. Schilder *et al*. Citrate Anticoagulation versus systemic heparinisation in continuous venovenous hemofiltration in critically ill patients with acute kidney injury: a multi-centre randomised clinical trial. Critical Care 2014; **18**: 472
4. Hébert PC, Wells G, Blajchman MA *et al* and the Transfusion Requirements in Critical Care Investigators for the Canadian Critical Care Trials Group. A Multicenter, Randomized, Controlled Clinical Trial of Transfusion Requirements in Critical Care. N Engl J Med 1999; **340:** 409-417

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