RNSHICU

Continuous veno-veno haemodiafiltration for refractory shock in severe burns: A Case Series

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- **Aims**
  - To present 3 cases of patients with severe burns and refractory shock
  - To demonstrate the effect of continuous veno-veno haemodiafiltration (CVVHDF) on haemodynamic stability, vasopressor requirements and organ perfusion
- **Method**
  - Observational case series from patients treated at a specialist burns referral centre.

Introduction

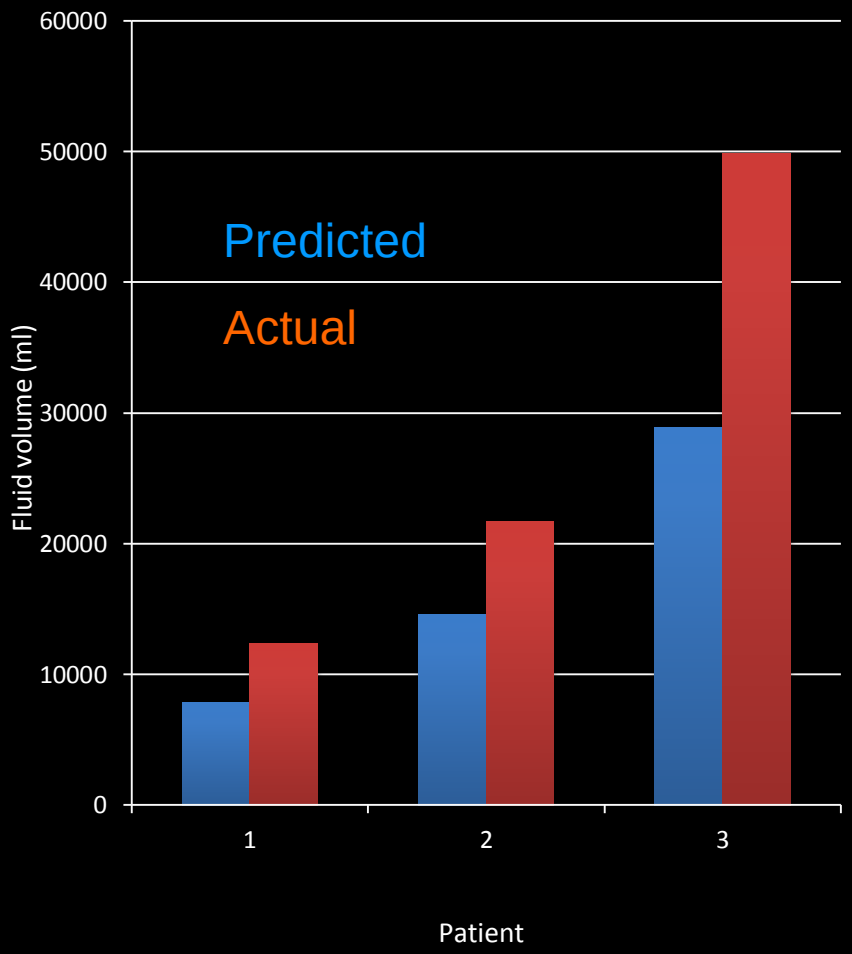
- 3 patients presented with partial/full thickness burns of 30%, 52% and 85% total body surface area (TBSA).
- Initial resuscitation in all 3 patients was guided by the Parkland Formula (4ml/kg/24h) and markers of perfusion (urine output, lactate, MAP)
- All patients had refractory shock and were difficult to resuscitate leading to the delivery of large volumes of IV fluid
- Continuous veno-veno haemodiafiltration (CVVHDF) was commenced in the early resuscitation phase with the aim of removing inflammatory mediators (cytokines), thereby improving haemodynamics and end organ perfusion, and reducing fluid creep

Case series

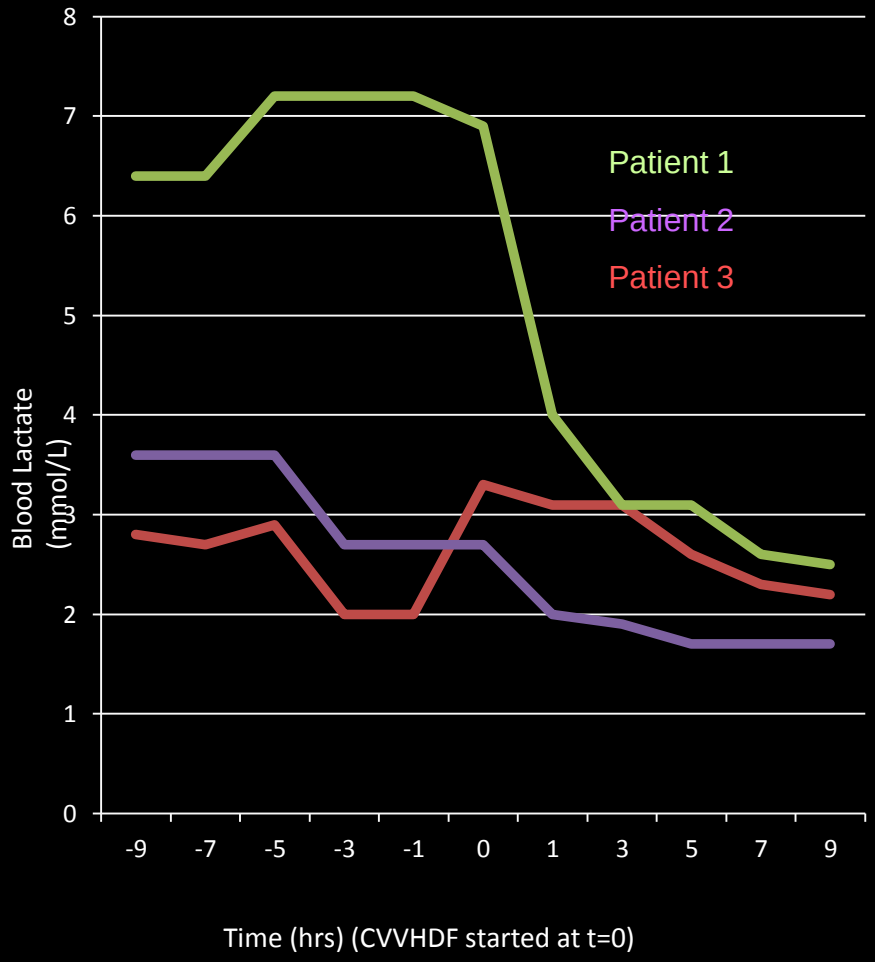
Patient no.	1	2	3
sex	F	F	M
Mechanism of burn injury	Gas blast	Petrol flame	Gas blast
Body Surface area involved (%)	32	50	85
Inhalational injury	Yes	Yes	Yes
Early complications	Lower limb and abdominal compartment syndrome	4 limb and abdominal compartment syndrome	4 limb and abdominal compartment syndrome (required laparostomy)
CVVHDF started	Day 1	Day 4	Day 1
Outcome	Survived	Died in ICU	Died in ICU

Results

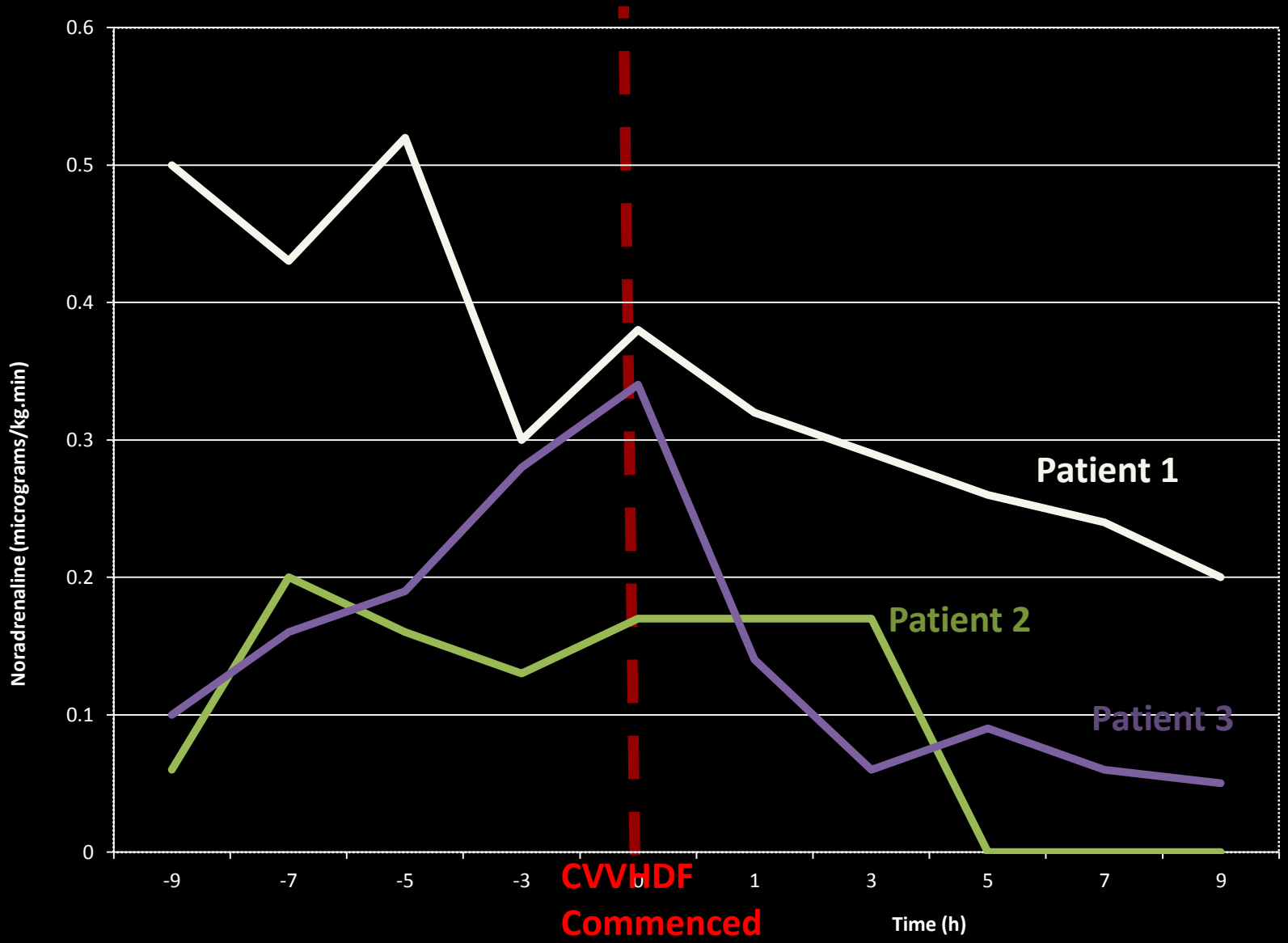
Predicted (4ml/kg/24h) vs Actual fluid replacement



Blood Lactate level pre and post CVVHDF



Noradrenaline infusion rate pre and post CVVHDF



Discussion

- Although 2 patients did not survive, all showed a reduction in blood lactate, a reduction in noradrenaline requirement, an increase in urine output and a reduction in the volume of IV fluid replacement.

- Patients with extensive (>15% BSA) burns have complex fluid requirements and experience a significant early systemic inflammatory response independent of clearly defined sepsis later on.

- Our 3 patients were resuscitated according to the Parkland formula, but all were difficult to resuscitate with refactory shock.

- Continuing fluid resuscitation is guided by markers of perfusion (lactate, urine output and MAP), with patients frequently requiring vasopressors (known to impair peripheral tissue perfusion) to maintain a perfusing blood pressure

- High-volume resuscitation is known to lead to complications as a consequence of ‘fluid creep’ with serious morbidity and mortality

- Recent evidence advocates lower-volume resuscitation which can be problematic in the patient with a severe SIRS response and escalating vasopressor requirements [1].

Discussion

- CVVHDF for the purpose of pro-inflammatory cytokines is a potentially useful adjuvant therapy in sepsis [2]
- Total Plasma exchange has been described in patients with severe burns to improve resuscitation and reduce vasopressor requirements [3]
- There are some small case series which suggest the potentially useful role of CVVHDF in the removal of cytokines in burned patients with sepsis [4]
- There is currently no published evidence to demonstrate improvements in either morbidity or mortality, but the use of CVVHDF in the context of early burns resuscitation is an area of potential interest and further research.

1. Hoffmann J et al. Removal of Mediators by Continuous Haemofiltration in Septic Patients. World J Surg 2001; 25:651-659
2. Neff L, Allmann J, Holmes J. The use of therapeutic plasma exchange (TPE) in the setting of refractory burn shock. Burns 2010; 36: 372-378
3. Peng Y, Yuang Z, Li H. Removal of inflammatory cytokines and endotoxin by V-V continuous RRT for burned patients with sepsis. Burns 2005; 31:623-628
4. Arlati S et al. Decreased fluid volume to reduce organ damage: a new approach to burn shock resuscitation? Resuscitation 2007; 72:371-8