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Introduction

Sublingual microcirculation analysis has emerged as a valuable bedside technique for investigating the impact of septic shock on organ perfusion and assessing the efficacy of therapeutic interventions by directly visualizing microvascular blood flow

Methods

This was a pre-planned secondary analysis of a Phase-II interventional single-arm pilot study conducted in the Pediatric Intensive Care Unit (PICU) at the Bambino Gesù Children's Hospital in Rome, Italy. We enrolled a total of 17 patients, with 13 meeting the criteria for inclusion with sublingual microcirculation monitoring. A CytoSorb adsorber was integrated into the CRRT circuit, and configured to operate in continuous veno-venous hemodiafiltration (CVVHDF) mode. Within the CRRT circuit, the CytoSorb cartridge was strategically positioned in series with the hemofilter, with routine replacement scheduled for every 24 h. This arrangement was sustained for a maximum duration of 96 h. Sublingual microcirculation assessments were conducted daily for five consecutive days starting from the initiation of blood purification. Several critical microcirculatory parameters were computed, including total small vessel density (TVD), proportion of perfused vessels (PPV), and perfused microvascular density (PVD).

Results

Thirteen patients were eligible to be investigated with sublingual microcirculation at baseline, 24, 48, 72 and 96 h from the onset of blood purification. Patients achieving a microvascular flow index (MFI) ≥ 2.5 and/or proportion of perfused vessels (PPV) exceeding 90% by 96 h were defined as responders. Among responders (10/13, 77%), a significant improvement in MFIs ($p = 0.01$) and PPVs% ($p = 0.04$) was noted between the baseline and 24 h from the end of treatment (see table 1)

Conclusion

In this pilot study, we have found a potential association between CytoSorb hemoadsorption and a microcirculation improvement in pediatric patients with septic shock, particularly when this observation has been associated with hemodynamic improvement.

Table 1: Median data of microcirculatory parameters for small vessels ($<20 \mu\text{m}$) of microvascular flow index (MFI) and proportion of perfused vessels (PPV) in responders and non-responders patients at different time points. Baseline: before the onset of blood purification (BP); 24 h from the onset of BP (24 h); 48 h from the onset of BP (48 h); 72 h from the onset of BP (72 h); 96 h from the onset of BP (96 h)

MFIs AU (median)						
	Baseline	24 h	48 h	72 h	96 h	p value
All	2.3	2.5	2.6	2.5	2.8	0.2
Responders	2.3	2.5	2.4	2.8	2.8	0.01
Non Responders	2.7	2.5	2.7	1.3	1.1	0.2
PPVs% (median)						
	Baseline	24 h	48 h	72 h	96 h	p value
All	91	24.9	94.8	93.4	94.1	0.7
Responders	90	95	95	93	93	0.04
Non Resonders	93.2	96.4	98.8	62.5	54	0.4