709 Reconfiguration: Extracorporeal blood purification of a burn patient on ECMO

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Introduction: Patients who require extracorporeal membrane oxygenation (ECMO) have a very high mortality if they develop septic shock. Extracorporeal blood purification has been studied as an adjunct to antimicrobials but has yielded mixed or even disappointing results. The Seraph-100 Microbind Affinity Blood Filter (ExThera Medical Corporation, Martinez, CA) is currently undergoing clinical trials. The filter consists of polyethylene beads, coated in heparin sulfate, that irreversibly binds bacteria, fungi, viruses, and toxins. Seraph-100 therapy is traditionally delivered through conventional hemodialysis or continuous renal replacement therapy (CRRT), with the filter being placed in-line with these circuits. We present a case of a burn patient on veno-venous (VV) ECMO in septic shock, who was treated with a Seraph filter by connecting it directly to the ECMO circuit.
Methods: We present a case.
Results: A 34-year-old male presented with 56% thermal burns and grade 1 inhalation injury from a fuel tank explosion. He underwent a large-volume resuscitation for burn shock with lactated Ringer's and albumin, receiving 18,152 mL (163 mL/kg) in the first 24 hours. He was placed on CRRT for acute kidney injury and underwent escharotomies of the hands and legs. On day 4, he developed bacteremia, septic shock and progressed to acute respiratory distress syndrome requiring VV ECMO. Extracorporeal blood purification was started via the Seraph-100 filter. Due to limitations of blood flow rates on CRRT, the Seraph-100 filter was added directly into the ECMO circuit. Inflow tubing was connected to an existing port on the oxygenator (Fig 1) and returned to the venous drainage by cutting a new port into the drainage tubing (Fig 2). The filter itself did not require any special configuration or orientation (Fig 3). This configuration allowed for pressures generated by the ECMO circuit to drive blood flow through the Seraph-100 filter (Fig 4). After 6 hours of treatment, vasopressor requirements drastically decreased.
Conclusions: Complications related to the Seraph-100 filter are rare but may include catheter thrombosis. This is typically due to the type of catheter used and/or the blood-flow rate through the filter rather than the filter itself. This issue was avoided with the ECMO configuration. Similarly, clinicians can avoid transient hypotension, blood loss from a clotted circuit, catheter-site bleeding, and other complications frequently associated with a renal replacement circuit.

710 Specific Patterns of Vital Sign Fluctuations Predict Bloodstream Infection in Pediatric Burn Patients

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Introduction: Early recognition of the clinical signs of bloodstream infection in pediatric burn patients is key to improving survival rates in the burn unit. The objective of this study was to propose a simple scoring criteria that used readily available temperature, heart rate (HR) and mean arterial pressure (MAP) data to accurately predict bloodstream infection in pediatric burn patients.
Methods: A retrospective chart review included 100 patients admitted to the pediatric burn unit for >20% total body surface area (TBSA) burn injuries. Each patient had multiple blood culture tests, and each test was treated as a separate and independent "infection event" for analysis. The time at each blood culture draw was time 0 for that event, and temperature, HR and MAP data was collected for 24 hours after the blood culture was drawn. "Infection events" included in this study had at least six complete sets of temperature, HR and MAP data entries. Median temperature, HR and MAP, as well as mean fever spikes, HR spikes and MAP dips, were compared between infection group (positive blood cultures) and control group (negative blood cultures). These vital sign fluctuations were evaluated individually and as a combination of all three as timely predictors of bloodstream infection. In addition, we tested the prediction of Gram-negative bacteria versus Gram-positive or fungi present in blood cultures.
Results: Patients in the infection group had significantly higher median temperatures ($p < 0.001$), mean fever spikes ($p < 0.001$) and mean HR spikes ($p < 0.001$), compared to the control group. Using the combination scoring criteria to predict bloodstream infection, the strongest predictive values in the 24-hour timeframe had high sensitivity (93%) and specificity (81%). The predictive test metric based on vital sign spikes predicted Gram-negative bacteria, but with limited sensitivity (57%) and specificity (44%).
Conclusions: This study found that using a combination scoring criteria of fever spikes, HR spikes and MAP dips predicted bloodstream infection in pediatric patients with burn injuries with 87% accuracy, which may justify its use in resource-poor environments, or in cases where practical supporting evidence is needed for preemptive antibiotic treatment before culture results are available.