Therapeutic Plasma Exchange for Sepsis in the Pediatric Setting

A Retrospective Review

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World Sepsis Day

We Support

Stop sepsis save lives

13 September
SEPSIS

• Global health problem that carries high risk of death - more common than a heart attack & claims more lives than cancer.
• Non discriminatory. Affects all age groups and not respectful of lifestyle choices. Most vulnerable: new born, small children and the elderly, those with chronic disease and weakened immune systems.
• Sepsis remains the primary cause of death from infection, with a mortality rate of 28-50%, increasing to 70% for multi-organ dysfunction syndrome, despite advances in modern medicine
• CDC National Centre for Health Statistics (US) estimates that, based on billing information, the number of times people were in the hospital with sepsis increased from 621,000 in the year 2000 to 1,141,000 in 2008.
PURPOSE

• Limited data for therapeutic plasma exchange (TPE) in the pediatric intensive care (ICU)
• Less on sepsis or suspected sepsis with multi-organ failure (MOF)
• TPE can improve coagulation, hemodynamic stability, and possibly survival in severe sepsis
• Role of TPE in modern sepsis therapy remains unclear
• Rationale for TPE in the septic pediatric population:
  1. Remove endotoxins, pro-inflammatory cytokines, chemokines & pro-coagulant factors
  2. Replace anti-inflammatory factors, immunoglobulins
  3. Restore hemostasis
METHODS

• Retrospective, single centre review of all patients who underwent TPE for severe sepsis or septic shock between 2005- 2015.
• Utilizing COBE Spectra and Spectra Optia
• Examined:
  1. Indications for apheresis
  2. Supportive therapy received in ICU
  3. Evidence to support the effectiveness of TPE using inotropes and blood values as markers
  4. Report response to TPE, outcomes and where possible, complications and late effects
PATIENTS

• 14 patients received plasma exchanges for Sepsis- 53 procedures total
• 13 patients had Multi-organ failure
• Age range: 10 days to 20 years
• Weight range: 4.2 Kg to 70Kg (420mL- 4383mL)
• 5 Patients with septic shock had underlying diagnosis/history of leukemia (4 AML, 1 ALL)
• 3 patients ASFA classification Category IA1 due to TTP like picture
• 3 patients had no ASFA classification
• 8 patients had ASFA classification Category III Grade 2B
PROCEDURE

• 10 Patients had >1 procedure
• 4 Patients required only 1 procedure
• 3 patients were on tandem plasma exchange with Extra Corporeal Membrane Oxygenation (ECMO)
INFECTIONS

• Bacterial in 9 Patients (one patient had both gram negative and gram positive microbial infection)
  a) 7 gram positive
  b) 6 gram negative
  c) 1 atypical bacteria
• Viral in 4 Patients
• Fungal in 1 patient
• Suspected sepsis with no organism isolated in 2 Patients
RSV, Adenovirus, Influenza A, Candi, MRSA, Staph aureus, Strep Viridans, Enterococcus, Meningococcus Neisseria, E. Coli, Rickettsia, Citrobacter, Klebsiella, Mycoplasma, RSV, Adenovirus, Influenza A, Candida, Not Isolated
SURVIVORS
11 out of 14 patients

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<th>Patients</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</table>
11 patients survived septic episode (one death 30 days post TPE due to underlying disease)

10 out of 11 patients has resolution of multi-organ failure

3 deaths 24-48 hours post last procedure due to overwhelming sepsis

OVERALL SURVIVAL in this population - 78%
COMPLICATIONS/ LONG TERM EFFECTS

- Line blockage or failure - 3 procedures
- Femoral line thrombosis - 2 patients
- Hyper/hypotension - 3 procedures
- Collection set failure/loading failure - 1 procedure
- DVT (micro)- 1 patient- LMWH- full resolution
- Kidney failure requiring Kidney Transplant- 1 patient
ASFA Classification

Category III:
Optimum role of apheresis therapy is not established. Decision making should be individual.

Grade 2B:
Weak recommendation. Moderate quality evidence- RCT with important limitations or exceptionally strong evidence from observational studies.
The Argument for the Role of Plasma Exchange in Severe Sepsis with Multiple Organ Failure - Joseph Kiss, MD

The Argument Against the Role of Plasma Exchange in Severe Sepsis with Multiple Organ Failure - Tom Raife, MD
The use of therapeutic plasma exchange in the pediatric ICU population can be used effectively to improve the outcome and patient survival in those with documented or suspected sepsis with multi-organ failure. This study will add to the body of evidence to inform and support a rational approach to the use of therapeutic plasma exchange in the pediatric ICU population with severe sepsis or an infectious process.
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