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Therapeutic Plasma Exchange (TPE) Performed in Tandem with CRRT and/or ECMO: Experience of One Pediatric Center

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SUMMARY

The most common indications for starting tandem procedures were ASFA Category III indications, followed by un-categorized indications. Similar to other reports in literature, hypocalcemia and hypotension were the most common complications. Transfusion reactions were rare, despite the use of large volumes of plasma. Tandem procedures in critically ill pediatric patients require close monitoring and excellent communication between staff members.

Purpose and Methods

Performing TPE in tandem with CRRT and/or ECMO in critically ill pediatric patients is a complex process requiring a multidisciplinary approach.

We sought to characterize tandem procedures and to determine patients' demographics, primary diagnosis, outcomes at 24 hours and one month after completion of tandem procedures, blood product utilization, ASFA category indications and the most common complications.

A retrospective review of patients' medical records, nursing flow sheets and Apheresis Patient Database from July 2013 – July 2017 was performed.



Reference

Mitchell Dyer, Matthew D. Neal, Marian A. Rollins-Raval and Jay S. Raval: Simultaneous extracorporeal membrane oxygenation and therapeutic plasma exchange procedures are tolerable in both pediatric and adult patients

Results

Demographics of Patients Undergoing TPE in Tandem				
Type of Treatment	TPE/CRRT	TPE/ECMO	TPE/ECMO/CRRT	Total
Number of patients	9	4	9	20 <small>2 patients received 2 types of therapies</small>
Mean Age	5.8 yrs (6 mo. - 16yrs)	3.3 yrs. (8 d - 6.5 yrs)	4.1 yrs. (4 wks. - 17yr)	4.4 yrs. (8 days - 17 years)
Gender: Male Female	Male 6 Female 3	Male 3 Female 1	Male 5 Female 4	Male 14 Female 6
Mean Body Weight (kg)	27.7	10.6	31.4	23.2
Primary diagnosis	SKID 1 Pneumonia 1 Lymphoma 1 Sepsis 1 Warm Hemolytic anemia 1 Cystic fibrosis 1 Hemolytic Uremic Syndrome 2 Heat stroke 1	Sepsis 1 Gestational liver disease 1 Neuroblastoma 1 Cystic fibrosis 1	ALL 3 MPO 1 Severe Bum 1 HLHS 1 Congenital Heart Disease 2 ARDS 1	ALL 3 HUS 2 Sepsis 2 Congenital Heart Disease 2
Survival at 24 h after completion of TPE series	Survived 8 Expired 1	Survived 3 Expired 1	Survived 7 Expired 2	Survived 18 Expired 4
Survival at 30 days after completion of TPE series	Survived 6 Expired 3	Survived 3 Expired 1	Survived 3 Expired 6	Survived 12 Expired 10

Indications for TPE in Tandem				
Type of Treatment	TPE/CRRT	TPE/ECMO	TPE/ECMO/CRRT	Total
ASFA Category I Conditions	0	0	0	0
ASFA Category II Conditions	0	0	0	0
ASFA Category III Conditions	8	1	4	13
ASFA Category IV Conditions	1	0	0	1
Non-categorized Conditions	0	2	4	6

TPE Procedures Performed in Tandem				
Type of Treatment	TPE/CRRT	TPE/ECMO	TPE/ECMO/CRRT	Total
Number of procedures	52	23	30	105
Mean number of procedures per patient	5.2	5.75	3.3	4.75
Number of procedures using RBC prime (%)	34 (65)	17 (74)	16 (53)	22.33
Mean FFP used per procedure (ml)	964	1469	1599	1344
Mean FFP used per body weight per procedure (ml/kg)	49.2 (19.2-79)	118.2 (78.1-163.3)	106.5 (42.6-193.5)	91.3 (19.2-193.5)

Complications During TPE in Tandem				
Type of Treatment	TPE/CRRT	TPE/ECMO	TPE/ECMO/CRRT	Total
Number of procedures with hypocalcemic* episodes (%)	40 (77)	13 (56)	10 (33)	63 (60) <small>50 treatments (79%) were classified with lowest Calcium < 1.13</small>
Number of patients with hypocalcemia* (%)	9 (100)	3 (75)	6 (66)	18 (82)
Number of hypotension** episodes (%)	4 (7)	2 (8)	3 (10)	9 (8)
Number of patients with hypotension**	3	1	2	6
Number of transfusion reaction episodes	1	1	1	3
Number of patients with transfusion reactions	1	1	1	3

*Hypocalcemia defined as ionized calcium level less than 1.13 mmol/L.
**Hypotension defined as significant change in baseline BP requiring intervention.