Continuous Renal Replacement Therapy In Children With Transplant-Associated Thrombotic Microangiopathy Post Hematopoietic Stem Cell Transplantation

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LAMA ELBAHLAWAN, MD; REBECCA EPPERLY, MD; YVONNE AVENT, MSN, APRN-PC

ST JUDE CHILDREN'S RESEARCH HOSPITAL

Abstract

BACKGROUND: Transplant-associated thrombotic microangiopathy (TA-TMA) is a life-threatening complication that occurs early in the post hematopoietic cell transplantation (HCT) phase. Acute kidney injury is common in children who develop TA-TMA post-HCT, and ~15% will require renal replacement therapy. The outcome of children with TA-TMA post-HCT who require continuous renal replacement therapy (CRRT) hasn't been described. Our study aimed to describe the course and outcome of CRRT in critically ill children with TA-TMA post HCT.
METHODS: Retrospective review of all children admitted to the intensive care unit (ICU) with TA-TMA who received CRRT from 2019-2020.
RESULTS: Four patients (3 males and 1 female) underwent CRRT for TA-TMA related AKI after autologous (n=2) or allogeneic (n=2) HCT. Oncologic diagnosis was acute lymphoblastic leukemia (ALL) in 50%, and neuroblastoma in 50%. Invasive mechanical ventilation and vasopressor support was required in 75% of our cohort. All patients had stage 3 AKI at the time of TA-TMA diagnosis. The median time of onset TA-TMA was 18 days (range: 8-25) post-HCT. Median duration of CRRT courses was 5 days (3-21 days). Two patients (50%) survived and didn't require future renal replacement therapy. All patients received eculizumab with a median number of doses of 5 (range: 3-9).
CONCLUSION: CRRT can benefit children with AKI related to TA-TMA. Furthermore, children who survive their CRRT course didn't require further renal replacement therapy in our case series. Further prospective research studies are needed to improve the management and outcomes of TA-TMA.

Introduction

- TA-TMA is seen in 2-3% in patients who underwent HCT
- TA-TMA can be associated with multiorgan dysfunction, most commonly AKI
- TA-TMA increases the risk of death in this population
- Objective: Investigate the outcome of children post-HCT who developed TA-TMA and required CRRT

Methods and Materials

- Retrospective chart review
- 2019-2020
- Children post-HCT who had TA-TMA diagnosis and received CRRT
- All patients received continuous veno-venous hemodiafiltration
- Regional citrate anticoagulation was utilized in all children

	Age (y)	Gender	Oncologic diagnosis	HCT	D from HCT to onset of TA-TMA	Vasopressor support	MV
1	3	M	NEUROBLASTOMA	AUTO	8	N	N
2	3	F	ALL	ALLOGENEIC	15	Y	Y
3	4	M	NEUROBLASTOMA	AUTO	21	Y	Y
4	2	M	ALL	ALLOGENEIC	25	Y	Y

Results

- 4 children post-HCT developed TA-TMA and required CRRT
- Autologous HCT in 50%
- All patients had AKI stage 3 at the time of TA-TMA diagnosis
- 75% required MV and vasopressor support
- CRRT course was short with a median of 5 d (range 3-21 d)
- 50% of cohort survived
- All who survived didn't require further renal replacement therapy after CRRT run

	CRRT d	ICU d	ICU survival	AKI stage (TMA onset)	eculizumab doses (#)
1	3	9	Y	3	7
2	5	20	N	3	3
3	21	70	Y	3	3
4	5	52	N	3	9

Discussion

- Patients post-HCT with TA-TMA are at 3-fold increased risk of death and at 7-fold increased risk of need for RRT compared to those without TA-TMA
- In our cohort of children with TA-TMA post-HCT who required CRRT, mortality rate was 50%
- All children developed TMA < 1 m post-HCT
- Multiorgan dysfunction was highly prevalent in our cohort
- CRRT courses were brief without significant complications
- 50% survived and didn't require future RRT

Conclusions

- CRRT can benefit children with AKI related to TA-TMA
- Kidney function tends to improve post CRRT course in survivors with TA-TMA
- Early recognition and prompt management of TA-TMA is warranted to prevent complications and improve survival rate

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