



# Can Ultrasound be Used to Risk Stratify SOS Patient Outcomes?

Thumar, Vishal D.<sup>2</sup> ; Robinson, Amie L.<sup>1</sup> ; Reid, Kimberly J.<sup>1</sup> ; Shah, Vidhi<sup>2</sup> ; Chan, Sherwin S.<sup>1,2</sup>

<sup>1</sup>Children's Mercy Hospital, Department of Radiology, Kansas City, MO, United States

<sup>2</sup>University of Missouri-Kansas City School of Medicine, Kansas City, MO, United States



## INTRODUCTION

- Sinusoidal obstruction syndrome (SOS) is a potentially fatal hepatic veno-occlusive disease that can be a complication after bone marrow transplantation (BMT)
- Patients with severe SOS develop signs and symptoms of portal hypertension and eventually multi-organ dysfunction
- The severe form of SOS is fatal in an overwhelming majority of patients despite available treatments and prophylaxis
- Our primary objective was to identify differences in liver ultrasound parameters between BMT patients who survived SOS episodes and those who do not

## METHODS

- A single center cohort retrospective study on patients ages 0-21 years who underwent a BMT between September 2001 and May 2016, only including patients who developed SOS as a part of their post-transplant course.
- Complete abdominal ultrasound with abdominal Doppler was performed with GE Logiq E9 and Phillips IU22 machines using curved and linear transducers.
- Grayscale, color Doppler, and spectral Doppler liver ultrasound findings were identified and correlated to the development of SOS and patient outcomes
- T-tests and nonparametric tests were used to compare continuous and categorical variables respectively. Linear trend tests and Mantel-Haenszel trend tests were used to compare continuous and categorical variables over time respectively.

## RESULTS

- 95 ultrasound examinations were performed on 22 patients
- 12 (54%) subjects were male, 16 (73%) had malignant disease, and 13 (59%) are deceased
- Trends of change in ascites (Figure 1), reversal of portal venous flow and main portal vein pulsatility were statistically significant (Table 1)
- No grayscale or Doppler ultrasound variables were significantly different between the group that died of SOS and the group that survived their episode of SOS

Table 1: Trends Over US Time points

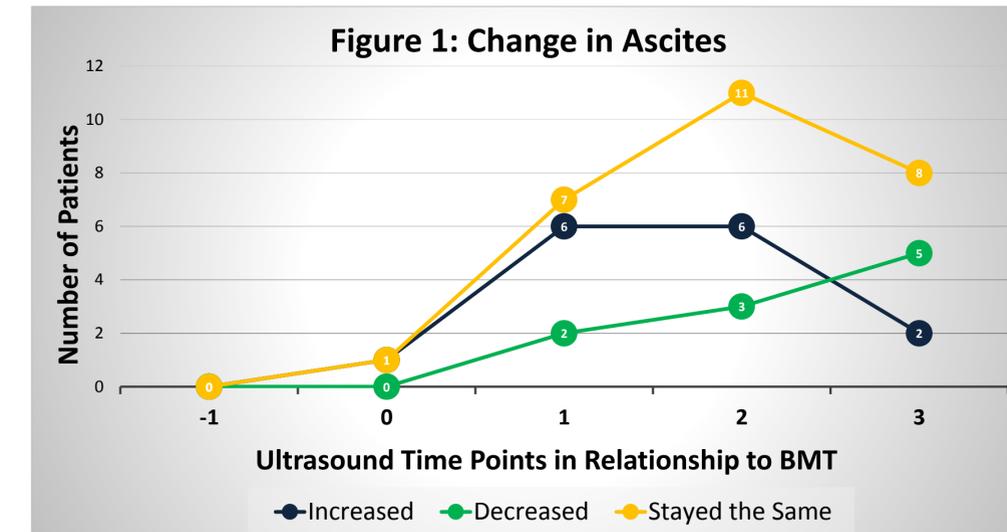
	Ultrasound Time Points in Relationship to BMT					P-Value
	-1	0	1	2	3	
Hepatomegaly?	0 (0.0%)	12 (60.0%)	12 (70.6%)	15 (75.0%)	10 (66.7%)	0.222
Hepatic Echotexture Heterogeneous?	0 (0.0%)	3 (15.0%)	4 (23.5%)	6 (30.0%)	6 (40.0%)	0.057
Ascites						0.684
None	0 (0.0%)	3 (15.0%)	2 (11.8%)	1 (5.0%)	2 (12.5%)	
Mild	2 (100.0%)	5 (25.0%)	4 (23.5%)	4 (20.0%)	6 (37.5%)	
Moderate	0 (0.0%)	12 (60.0%)	11 (64.7%)	15 (75.0%)	8 (50.0%)	
Change in Ascites						< 0.001
Increased	0 (0.0%)	1 (5.0%)	6 (35.3%)	6 (30.0%)	2 (12.5%)	
Decreased	0 (0.0%)	0 (0.0%)	2 (11.8%)	3 (15.0%)	5 (31.3%)	
Stayed the same	0 (0.0%)	1 (5.0%)	7 (41.2%)	11 (55.0%)	8 (50.0%)	
Reversal of MPV flow?	0 (0.0%)	4 (21.1%)	7 (35.0%)	10 (50.0%)	10 (52.6%)	0.004
MPV Velocity:	14.9 ± 6.7	12.9 ± 12.3	22.2 ± 57.2	20.9 ± 57.6	8.9 ± 19.2	0.924
MPV Pulsatility:	2.7 ± 0.5	1.5 ± 0.8	1.6 ± 0.8	1.5 ± 0.7	1.3 ± 0.6	< 0.001

## CONCLUSION

- Reversal of MPV flow and MPV pulsatility related to the portal vein change with progression of SOS and correlate with disease progression.
- MPV pulsatility decreased while the MPV reversal of flow increased as disease progressed

## CONCLUSION CONTINUED

- None of the ultrasound variables that we examined are able to predict which patients will die of SOS.



## SUMMARY

- SOS is an overwhelmingly fatal disease in its most severe form with no studies in the literature examining liver ultrasound.
- Although no ultrasound variables examined are able to predict which patients will die of SOS, MPV pulsatility and MPV reversal of flow can be used to monitor progression of disease

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