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INTRODUCTION

Transcranial Doppler (TCD) can be used to noninvasively monitor cerebral blood flow (CBF) in patients undergoing extracorporeal membrane oxygenation (ECMO). The aim of this study is to describe TCD-CBF patterns in patients undergoing veno-venous (VV) and veno-arterial (VA) ECMO, and determine possible neurological complications in this patient population.

METHODS

A Neuro-ECMO surveillance protocol was initiated among all ECMO patients as part of a quality improvement project at our institution. Daily neurological exam, TCD, brain-CT on days one and three and 24-hr continuous EEG were performed on all patients undergoing VV and VA ECMO. Demographics, clinical and imaging data were collected for the duration of ECMO support. Mean flow velocities, Lindegaard ratios (LR), pulsatility (PI) and resistance indices (RI) were collected.

RESULTS

		COHORT	
Total N		67	
Percent Female		34.3%	
Mean Age (yr.)		57	
Mortality		59.7%	
Incidence of...	ICH	2.9%	
	SAH	1.5%	
	Seizures	0.0%	
	Stroke	17.6%	
TCD Studies Completed		190	
Mean TCD Studies per Patient		2.83	
Average MCA Velocity		60.13 (L)	57.26 (R)
Lindegaard Ratio (LR)		1.55 (L)	1.68 (R)
Average MCA Pulsatility (PI)		1.37 (L)	1.04 (R)
Average MCA Resistance Indices (RI)		0.58 (L)	0.59 (R)

	VA ECMO	VV ECMO
Total Number ^	43 (71.6%)	6 (11.9%)
Average MCA Velocity	57.7	62.3
Average MCA PI	1.05 (L); 1.02 (R)	1.10 (L); 1.02 (R)
Incidence of Stroke	18.6% (11/59)	5.3% (1/19)

^Both VA and VV ECMO = 11 (16.4%)

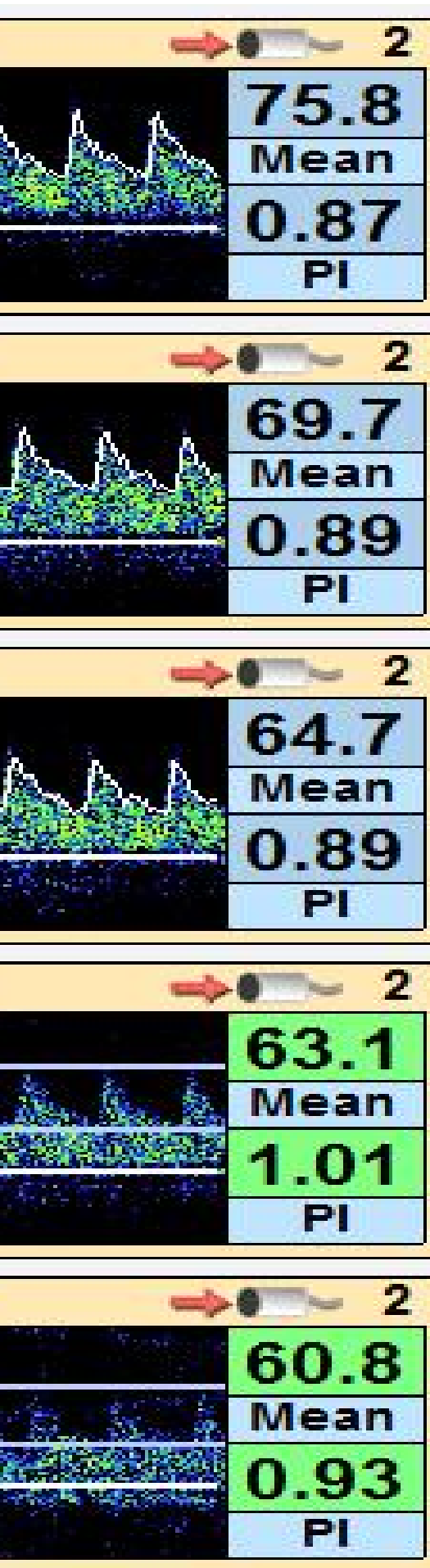
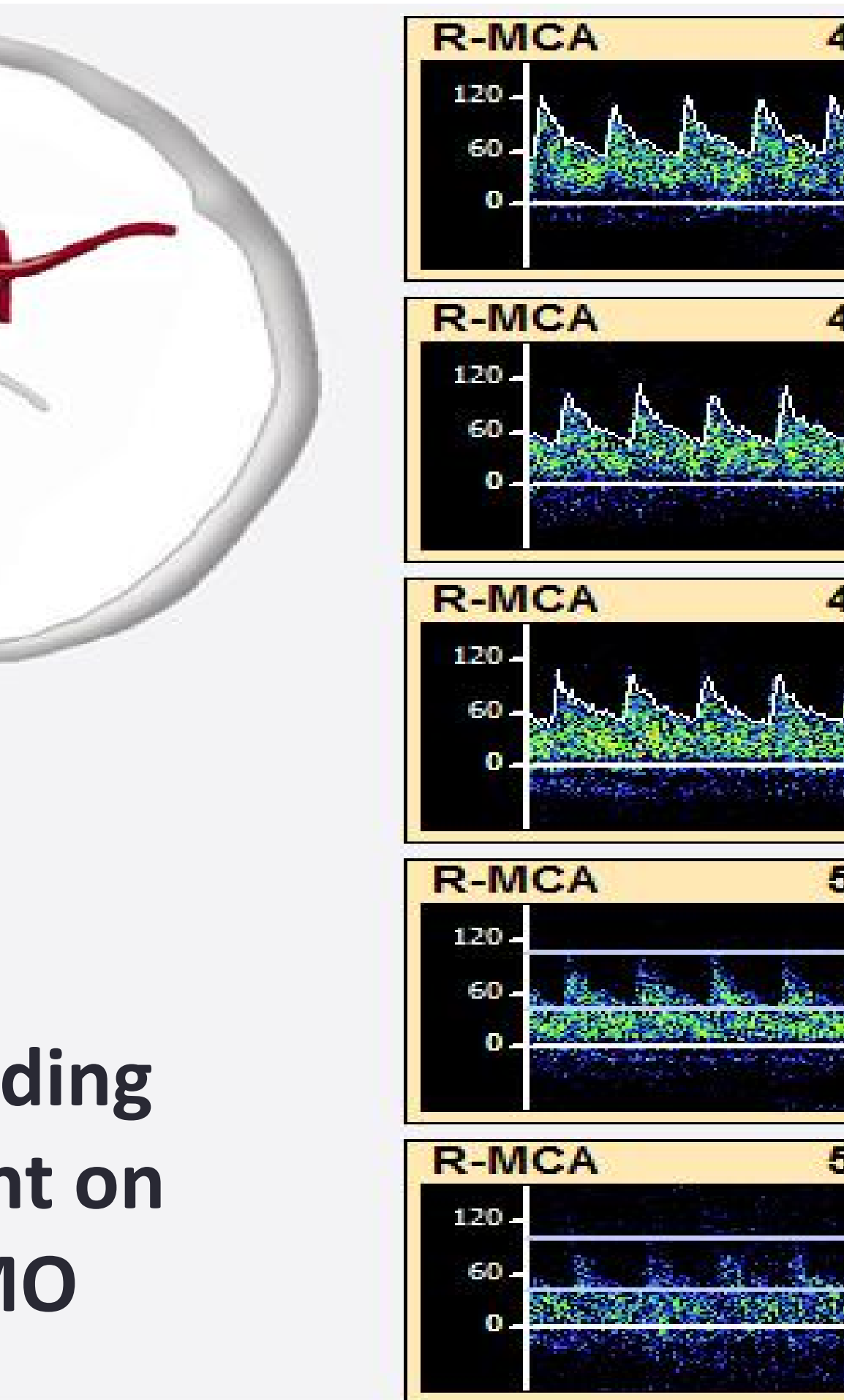
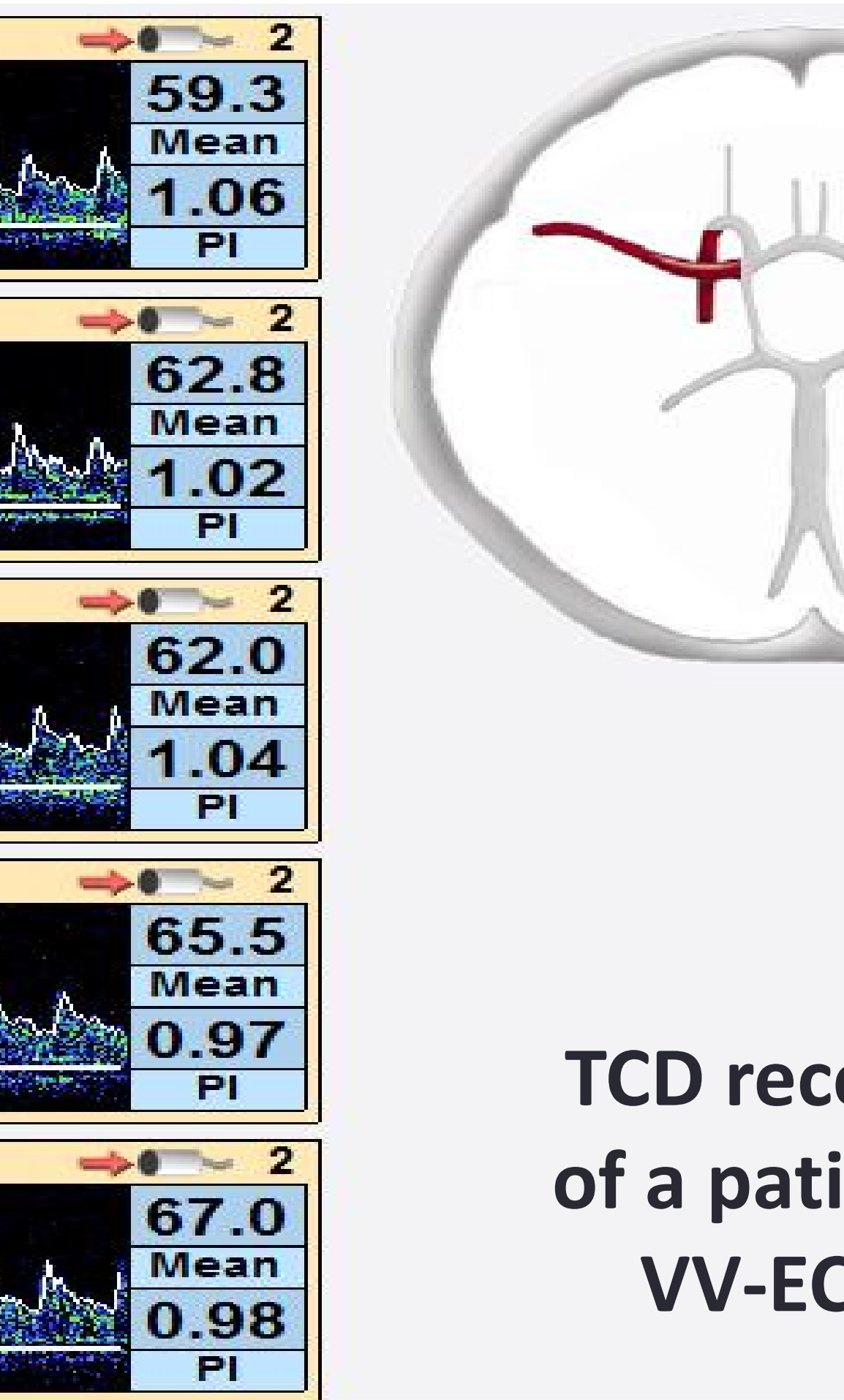
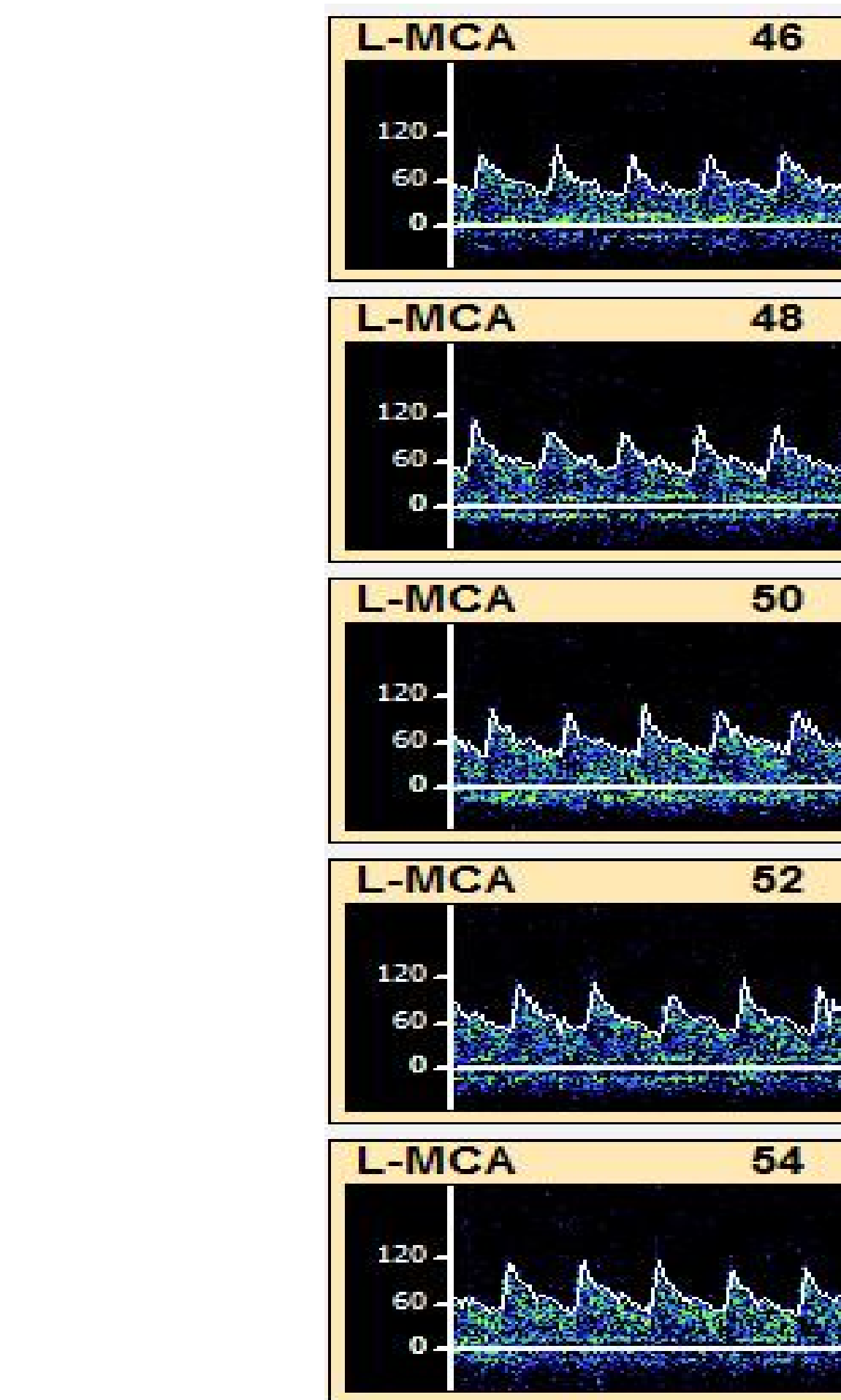
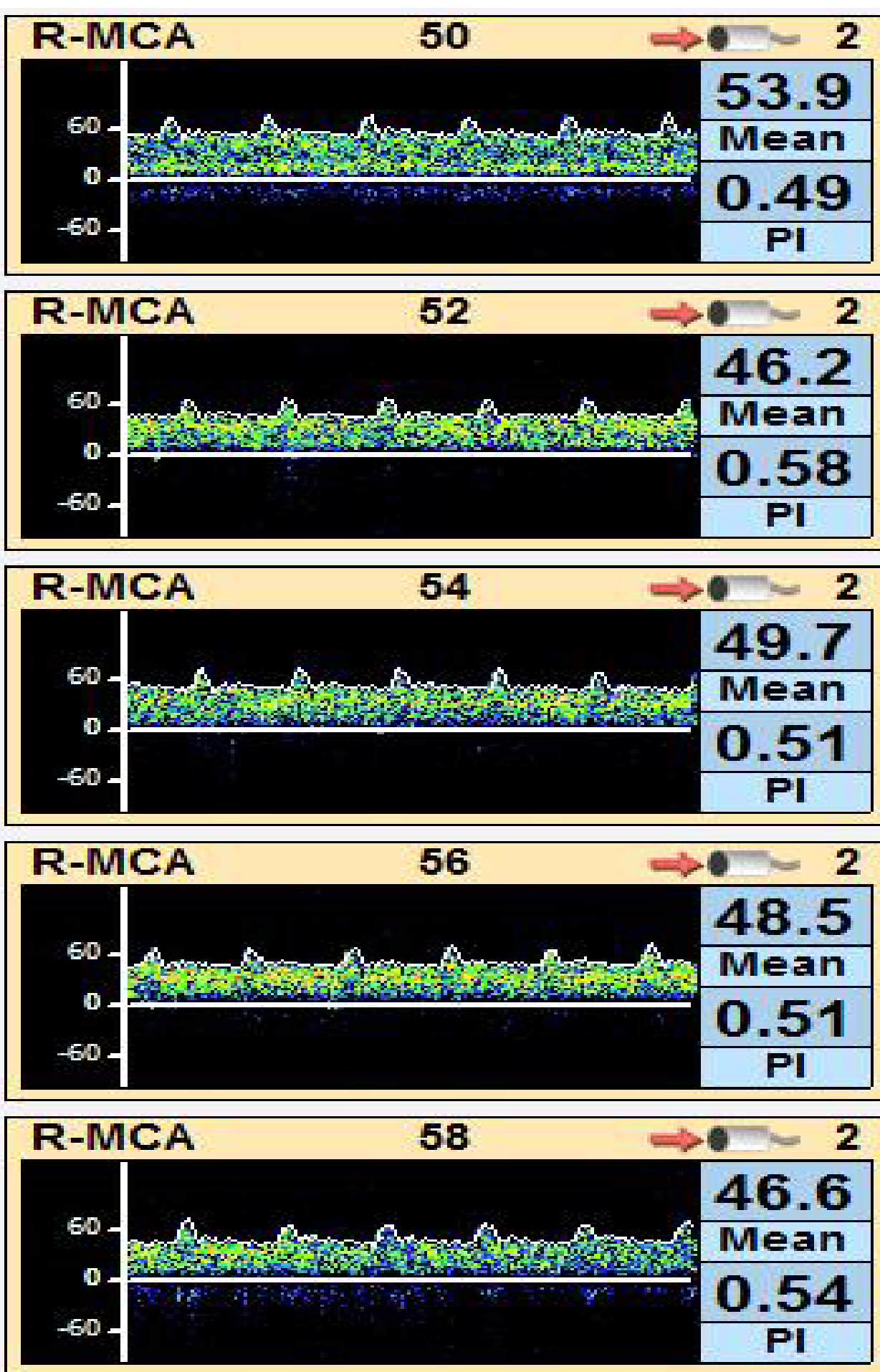
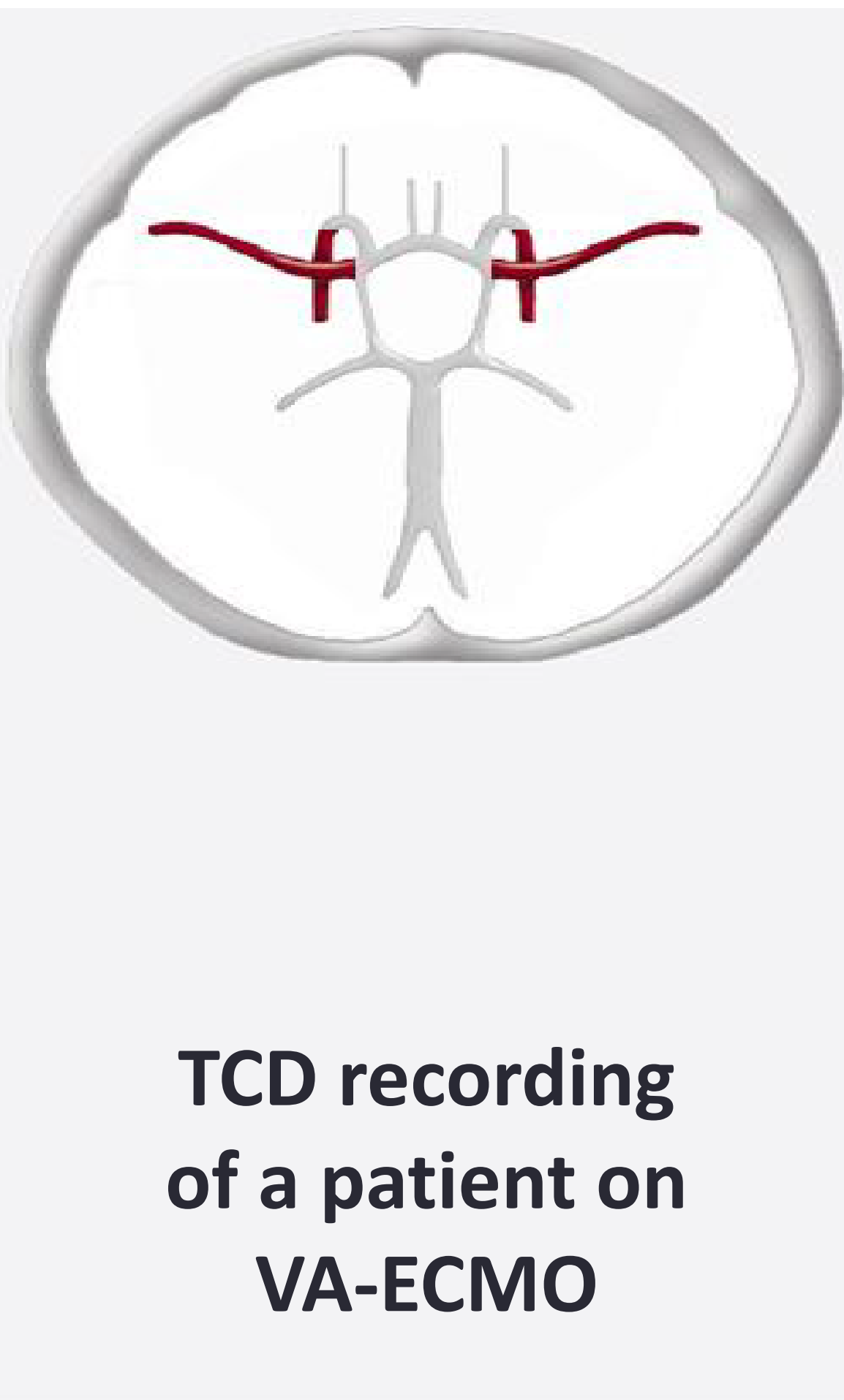
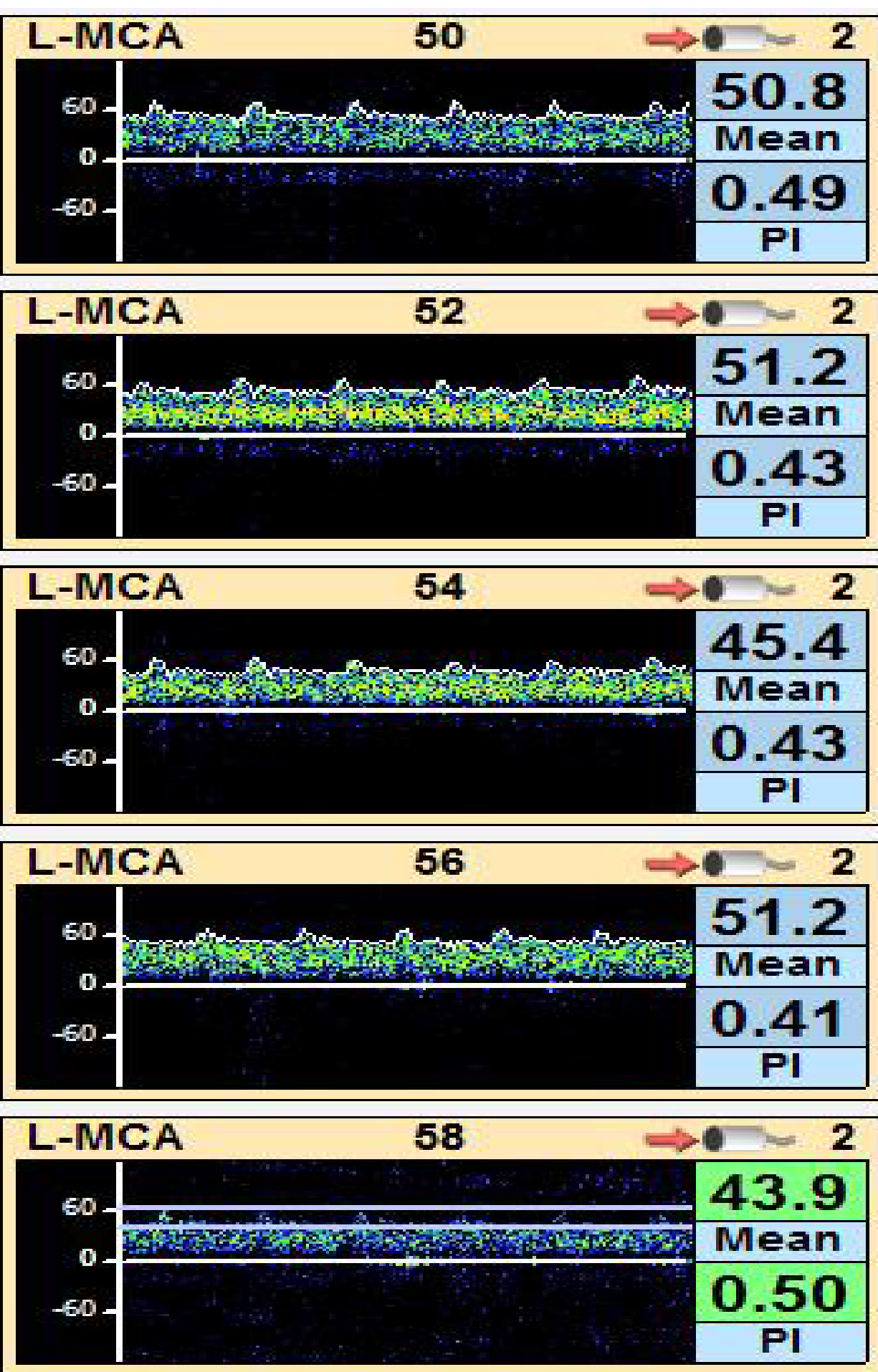
DISCUSSION

We observed slightly higher mean flow velocities but similar pulsatility indices in patients on VV-ECMO compared to VA ECMO. Stroke was the most common neurological complication observed in our cohort and was more commonly seen in VA ECMO as compared to VV-ECMO. This difference can possibly be explained by the lack of pressure autoregulation in VA ECMO. Further studies are needed to explore this hypothesis. The overall mortality rate was similar to what has previously been reported in the literature.

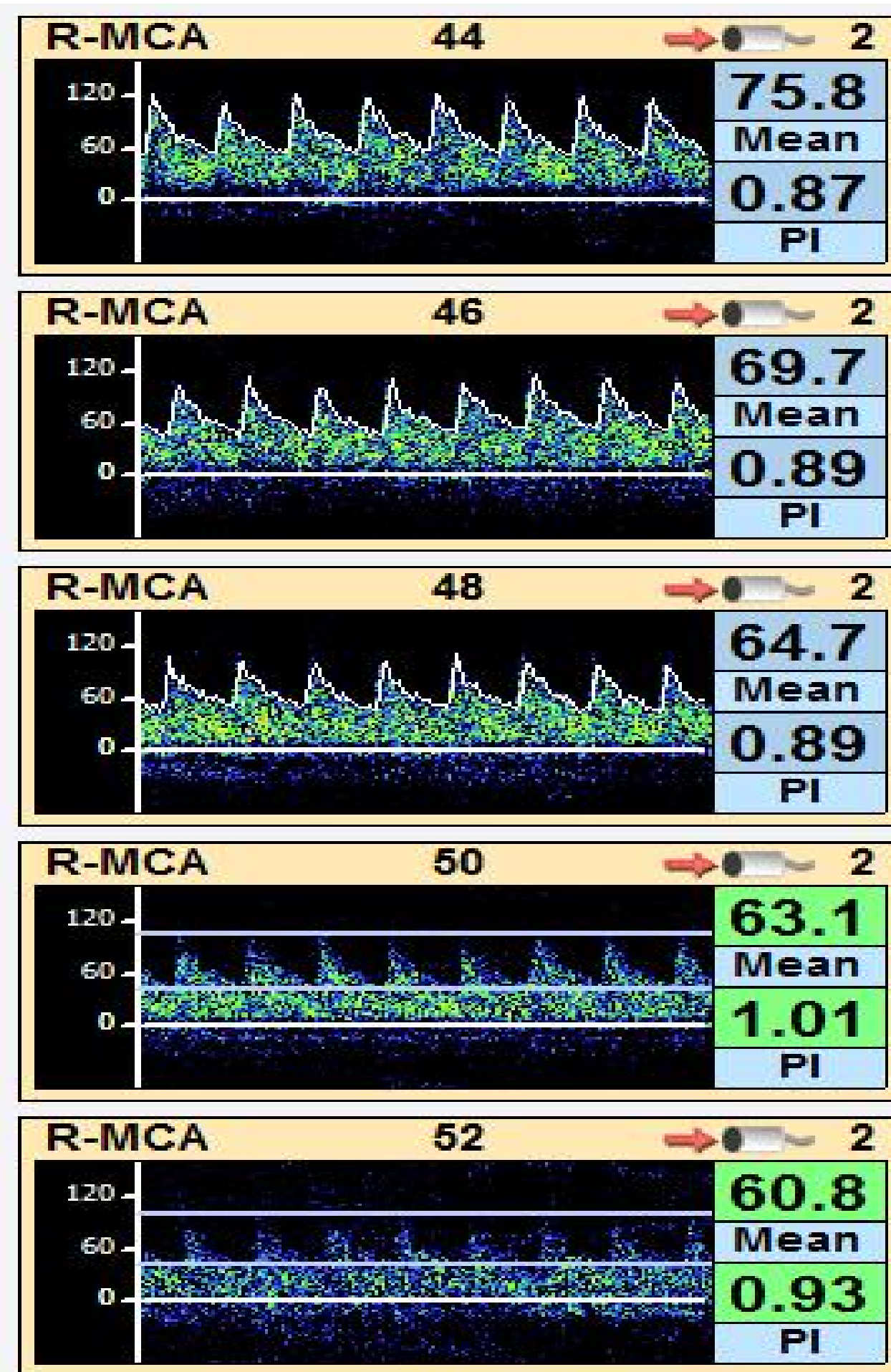
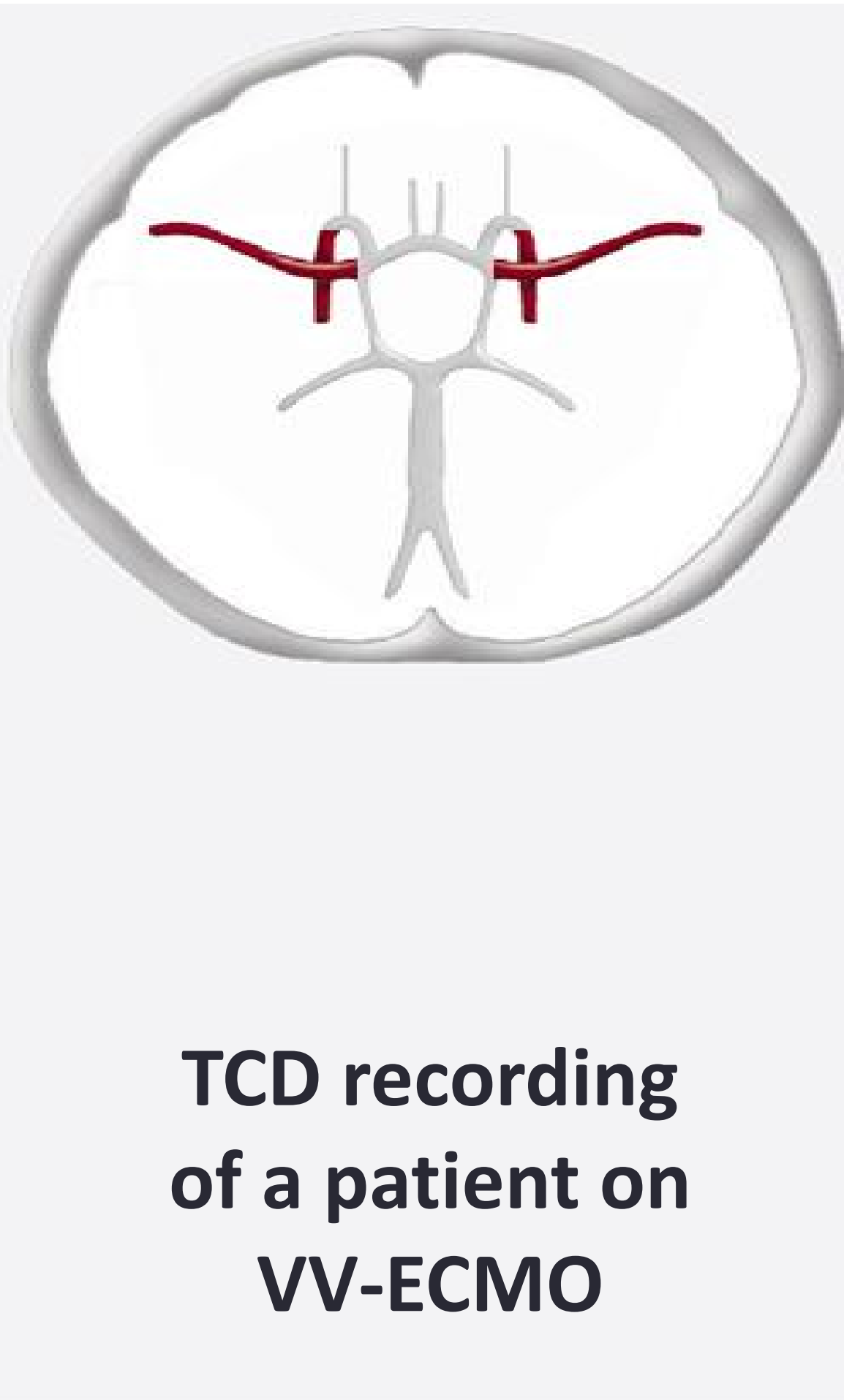
CONCLUSION

We found lower mean flow velocities for patients on VA ECMO as compared to VV ECMO. The rate of ischemic stroke was higher in patients on VA ECMO.

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TCD recording of a patient on VA-ECMO



TCD recording of a patient on VV-ECMO