BLOOD VOLUME ANALYSIS MAY GUIDE TREATMENT IN CARDIAC AMYLOIDOSIS BY ADDING INFORMATION ABOUT TOTAL BLOOD AND PLASMA VOLUME

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INTRODUCTION

- Blood volume analysis (BVA) is a quantitative tool for estimation of intravascular volume, with improved predictive value over JVP, edema, or BNP levels.
- It has shown advantages in guiding therapy for heart failure.
- Cardiac amyloidosis (CA) is an infiltrative process with expansion of extracellular volume evident on cardiac MRI, but this is difficult to assess longitudinally.
- This may be possible using BVA, which may then help guide therapy. The utility of BVA in CA is not well established.

HYPOTHESIS

- Patients with HFpEF who are diagnosed with CA have varying phenotypes.
- Restrictive physiology makes estimation of their plasma volume difficult to predict, even with invasive cardiac pressures.
- BVA can provide an estimate of blood volume parameters, including total blood volume (TBV), plasma volume (PV), RBC volume (RBCV), normalized hematocrit (nHct) and transudation slope.
- This can help guide therapy and provide better symptomatic relief in patients with CA.

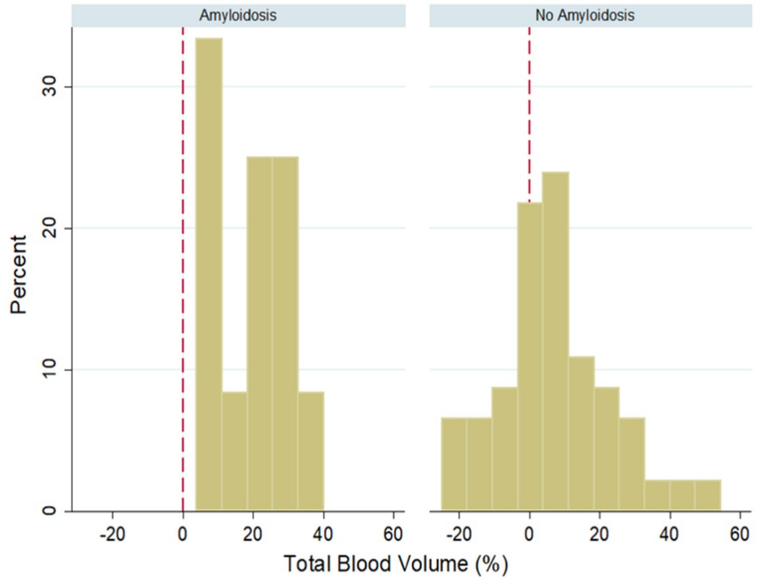
METHODS

- All patients who underwent BVA (n=58) at our institution were included, including 12 with CA and 46 with heart failure without CA.
- IRB approval was obtained, data were collected by retrospective chart review, and compared with statistical analysis as appropriate.

Blood Volume Analysis in Cardiac Amyloidosis

	Cardiac Amyloidosis (n = 12)	No Amyloidosis (n = 46)	P-value
TBV (%)	+19.7 ± 10	+7.1 ± 16	0.012
PV (%)	+31.2 ± 12	+12.1 ± 24	0.013
RBCV (%)	-1.4 ± 21	-0.5 ± 21	0.90
High TBV	92%	41%	0.002
High RBCV	25%	35%	0.52
nHct (%)	46 ± 7	43 ± 9	0.25

Abbreviations: TBV: Total Blood Volume, PV = Plasma Volume, RBCV = RBC Volume, nHct = Normalized Hematocrit



RESULTS

- Patients with CA were older (76.6 ± 5 vs. 57.0 ± 18 years, p < 0.01), were all male (100% vs. 59%, p = 0.007), and were less likely to be obese (25% vs. 70%, p = 0.005).
- The CA group showed higher TBV (+19.7% ± 10 vs. +7.1% ± 16, p = 0.012). This was driven primarily by PV, which was higher in patients with CA (+31.2% ± 12 vs. +12.1% ± 24, p = 0.013).
- There was no significant difference in RBCV (-1.4 ± 21 vs. -0.5 ± 21, p = 0.90). There was no significant difference in transudation slope between the two groups (0.32 ± 0.16 vs. 0.25 ± 0.14, p = 0.14).
- Using standardized cutoffs, patients with CA were more likely to have high TBV (92% vs. 41%, p = 0.002), but no significant difference in rates of elevated RBCV (25% vs. 35%, p = 0.52).
- nHct was also similar between the two groups (46 ± 7 vs. 43 ± 9, p = 0.25) and correlated strongly with RBCV (r = 0.72, p < 0.001)

SUMMARY / CONCLUSION

- BVA can be useful to determine the phenotype of CA and assist with diagnosis in patients with expanded plasma volume.
- TBV and PV were higher in patients with CA compared to those without, with no significant difference in RBCV or nHct.
- This can help guide therapy, including dosing of diuretics, leading to better optimization of volume and functional status. Further validation of the use of BVA in CA is needed to guide optimal therapy.