BACKGROUND

- Venous congestion is an under-appreciated contributor to mortality in critically ill patients and is difficult to quantify.
- Right heart catheterization (RHC) is the gold standard for assessing venous congestion.
- RHC is invasive, costly, and is not universally available.
- The VExUS Score is a novel noninvasive means of determining venous congestion using ultrasound measurement of the inferior vena cava (IVC) and of the hepatic vein, portal vein, and intra-renal venous Doppler waveforms.
- While VExUS was validated retrospectively against RHC, it was not validated prospectively.
- We performed a prospective analysis of VExUS against RHC measurements: right atrial pressure (RAP), mean pulmonary artery pressure (mPAP), and pulmonary capillary wedge pressure (PCWP).

METHODS

- 81 patients undergoing RHC for a wide variety of indications at Denver Health Medical Center underwent VExUS examination.
- Investigators were blinded to RHC data during VExUS scoring.
- We manually abstracted past medical history, demographic information, and echocardiogram data from patient charts.
- Multivariable linear regression was used to assess the relationship between VExUS and RHC measurements.
- Investigators were blinded to RHC data during VExUS scoring.
- Venous congestion score patient using the grading criteria provided.

RESULTS

- After controlling for age, sex, and Charlson Comorbidity Index, there was a linear association between VExUS Score and Right Atrial Pressure (RAP), Pulmonary Capillary Wedge Pressure (PCWP), and Mean Pulmonary Artery Pressure (mPAP).
- After controlling for age, sex, and common comorbidities, we observed a significant positive association between RAP and VExUS score (P < 0.001, R2 = 0.68).
- VExUS had a favorable AUC for prediction of a RAP ≥ 12 mmHg (0.99, 95% CI 0.96-1) compared to IVC diameter (0.79, 95% CI 0.65-0.92).

REFERENCES & ACKNOWLEDGEMENTS

- Additional references citations available upon request.
- None of the investigators have conflicts of interest related to this research.

CONCLUSIONS

- For assessing venous congestion:
  - VExUS is a promising noninvasive tool for accurately assessing venous congestion.
  - A safer and more accessible alternative to right heart catheterization.

FUTURE DIRECTIONS

- There are ongoing studies on inter-rater reliability, inter-user reproducibility, handheld vs. traditional ultrasound, & physiological changes from dialysis.
- Additional areas of interest include evaluating:
  - VExUS-guided diuresis in heart failure & fluid resuscitation in sepsis
  - Bench Science: Proteomics of Volume Overload
  - Many, many more!