

Introduction

- The Hypotension Prediction Index is a machine learning derived algorithm that predicts intraoperative hypotension.
- The algorithm provides two additional hemodynamic parameters, EaDyn and dP/dt, that characterize the physiological changes and may provide guidance regarding the most efficacious treatments.
- dP/dt correlates with ventricular contractility from peripheral artery waveforms
- EaDyn (dynamic arterial elastance) is the ratio of pulse pressure variation and stroke volume variation (PPV/SVV), correlating with peripheral vascular resistance

Objective

To characterize the responses of EaDyn and dP/dt to boluses of phenylephrine and ephedrine.

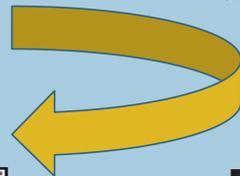
Methods



Single center study at UCDMC including cardiac and general surgery patients.



Arterial waveforms tracked via Edwards LifeSciences IQ sensor. Pressor administration timed by changes in blood pressure.



Baseline analysis performed at time of drug administration, compared with 2 -5 minutes after onset of change. Normality assessed with D'Agostino Pearson test.



HPI parameters downloaded from Edwards LifeSciences monitors.

Vasopressor Bolus Effects on Dynamic Arterial Elastance (EaDyn) and Contractility (dP/dt)

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EaDyn response to bolus administration of ephedrine and phenylephrine is not significant, while dP/dt increases in response to boluses of both vasopressors.

Results

- 101 surgical patients recruited; on controlled mechanical ventilation and with arterial line placement
- 205 doses of phenylephrine; mean: 2.73 doses/patient, median: 2 doses/patient
- 101 doses of ephedrine; mean: 1.98 doses/patient, median: 2 doses/patient

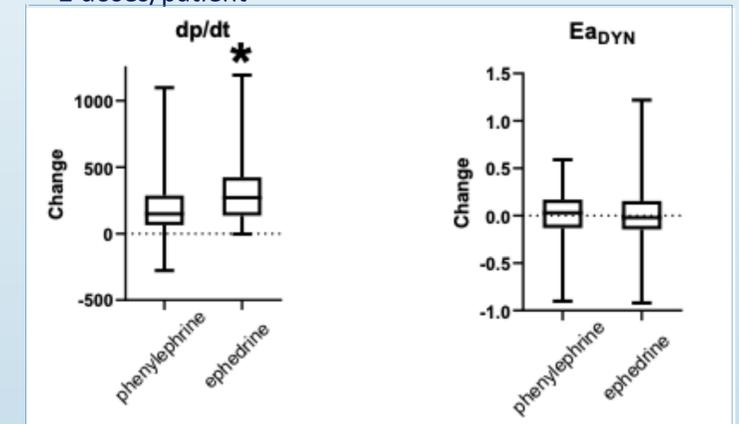


Figure 1: Comparing absolute value changes in dP/dt and EaDyn in response to phenylephrine and ephedrine boluses.

Discussion

- To date, this is the largest sample of surgical patients analyzed for vasopressor mediated responses in EaDyn and dP/dt.
- For comparable increases in MAP, phenylephrine and ephedrine result in increased cardiac output (CO), decreased SVV, increased dP/dt and no change in EaDyn.
- Ephedrine demonstrates statistically significant greater increases in CO and dP/dt than phenylephrine.
- Minimum and maximum values need further examination to ensure confidence in accuracy and to rule out any outlier data.

References

1. de Courson H, Boyer P, Grobost R, Lanchon R, Sesay M, Nouette-Gaulain K, Futier E, Biais M. Changes in dynamic arterial elastance induced by volume expansion and vasopressor in the operating room: a prospective bicentre study. *Ann Intensive Care*. 2019 Oct 11;9(1):117. doi: 10.1186/s13613-019-0588-6. PMID: 31602588; PMCID: PMC6787125.
2. Moon YJ, Kim SH, Park YS, Kim JM, Hwang GS. Quantitative Analysis of an Intraoperative Digitalized Esophageal Heart Sound Signal to Speculate on Perturbed Cardiovascular Function. *J Clin Med*. 2019 May 20;8(5):715. doi: 10.3390/jcm8050715. PMID: 31137509; PMCID: PMC6572513.

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