Publication Brief

Effects of Norepinephrine on Dynamic versus Static Variables of Fluid Responsiveness during Hemorrhage and after Resuscitation in a Pediatric Model

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BACKGROUND
- The accuracy and reliability of central venous pressure (CVP), traditionally used to estimate preload and intravascular volume status, is challenged in recent studies.
- New volumetric indicators: pulse pressure variation (PPV), stroke volume variation (SVV), total end diastolic volume index (TEDVI), active circulating volume index (ACVI) and central blood volume index (CBVI) predict fluid responsiveness and, thus, to accurately predict a patient’s volume status.

OBJECTIVE
To investigate the changes in PPV, SVV, TEDV, ACVI and CBV in a juvenile horse hemorrhagic shock model.

STUDY
- Six anesthetized and ventilated juvenile horses (1 to 4 months of age) were studied during the following:
  1) Baseline normovolemia; 2) Hemorrhage: blood withdrawal to 40 mmHg (MAP); 3) Norepinephrine infusion: to MAP ± 10% of baseline; 4) Resuscitation by retransfusion of withdrawn blood.
- Pulse contour analysis (LithCO plus) monitored PPV and SVV.
- Ultrasound Dilution (UD) (COstatus®) measured TEDVI, ACVI, CBVI.
- Data analyzed by one-way A-nova analysis and Fisher t test (p significant <0.05).

RESULTS
- TEDVI and ACVI % changes during Hemorrhage and Resuscitation stages agreed with % of blood volume removed/infused. Bias and limits of agreement (LOA) 4% (-21.4, 29.3) and -10.6 (-29.5 8.2%) respectively.
- CO and TEDV demonstrated good agreement to MPVS and end diastolic volume (EDV) throughout study.

<table>
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<tr>
<th>STAGES</th>
<th>HEMODYNAMIC PARAMETERS: PONIES (n=6) 1-4 MONTHS OLD</th>
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<tbody>
<tr>
<td>BASELINE</td>
<td>PPV significantly changed</td>
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<tr>
<td>HEMORRHAGE</td>
<td>significant change</td>
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<tr>
<td>NOREPINEPHRINE</td>
<td>significant change</td>
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<td>RESUSCITATION</td>
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STUDY’S CONCLUSIONS
- In this juvenile animal model, SVV, TEDVI and ACVI were superior to CBVI, PPV and CVP in accurately reflecting hemorrhagic state.
- CBVI showed high variability and seemed to be inconsistent on the identification of the volume status.

COSTATUS® OBSERVATIONS
- In this juvenile animal model, SVV, TEDVI and ACVI were superior to CBVI, PPV and CVP in accurately reflecting hemorrhagic state.
- CBVI showed high variability and seemed to be inconsistent on the identification of the volume status.

REFERENCES