Publication Brief

Quantitative Response of Blood Volumes in a Juvenile Hemorrhagic Shock Model

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BACKGROUND

• Assessment of volume status in post-operative patients is important to guide fluid therapy.
• Existing methods (central venous pressure, mean arterial blood pressure) have limited value.
• New minimally invasive COstatus® (Transonic Systems Inc.) can measure blood volumes.

OBJECTIVE

To evaluate the changes in blood volumes: Central Blood Volume Index (CBVI), Total End Diastolic Volume Index (TEDVI, and Active Circulating Volume Index (ACVI) in a juvenile animal hemorrhage shock model.

STUDY

• CBVI, TEDVI, ACVI, CVP, MAP were measured in 7 healthy ponies (4–8 months of age; 80 ± 20 kg) during four different experimental stages:
  1) Normovolemia (Baseline phase);
  2) After blood withdrawal to 40 mmHg (MAP) (Hemorrhage phase);
  3) after norepinephrine infusion to MAP ± 10% of baseline (Norepinephrine phase);
  4) After retransfusion of shed blood (Resuscitation phase).
• For each measurement, at least two injections were performed randomly over the respiratory cycle; values were averaged.
• CBVI, TEDVI, ACVI measurements were performed after a period of stabilization in each stage.

RESULTS

STUDY’S CONCLUSIONS

• In ponies, TEDVI and ACVI accurately reflected hemorrhage and were good indicators of percentage change of total blood volume. CVP did not. CBVI was inconsistent in reflecting volume status.
• Norepinephrine infusion induced did not alter TEDVI or ACVI.
• Norepinephrine infusion induced significant CVP changes, reflecting potentially deceptive fluid status.

COSTATUS® OBSERVATIONS

• Excellent multi-institution study of COstatus® volume parameters in large animal model.

REFERENCES


<table>
<thead>
<tr>
<th>EXPERIMENTAL STAGES</th>
<th>HEMODYNAMIC PARAMETERS: PONIES (n=7) 80 ± 20 KG</th>
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<tbody>
<tr>
<td>1) BASELINE PHASE</td>
<td>CBVI ml/kg CVP mmHg TEDVI ml/kg ACVI ml/kg</td>
</tr>
<tr>
<td>2) DURING HEMORRHAGE</td>
<td>no significant change significantly lower significantly lower significantly lower</td>
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<tr>
<td>3) NOREPIINEPHRINE INFUSION</td>
<td>no significant change restored to baseline remained low remained low</td>
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<tr>
<td>4) RESUSCITATION</td>
<td>no significant change baseline increased significantly to baseline increased significantly to baseline</td>
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LabCOstatus

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