SPECIAL ARTICLE

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Practice Guidelines for Pulmonary Artery Catheterization

An Updated Report by the American Society of Anesthesiologists Task Force on Pulmonary Artery Catheterization
TREND DATA

“C”  CCO/CCI
“S”  SvO₂
“E”  EDV/EDVI
“Semi” - CONTINUOUS THERMODILUTION

Pre-determined warming of a thermal filament placed into the RV. The system is able to evaluate all the minimal temperature changes in the pulmonary artery.

The value obtained represents the mean of all data recorded in the time evaluated (at least 2 min).
Continuous and intermittent cardiac output measurement: pulmonary artery catheter versus aortic transpulmonary technique

G. Della Rocca*, M. G. Costa, L. Pompei, C. Coccia and P. Pietropaoli

<table>
<thead>
<tr>
<th></th>
<th>bias (l min⁻¹)</th>
<th>95% Limits of Agreement</th>
<th>r²</th>
</tr>
</thead>
<tbody>
<tr>
<td>COart vs COpa</td>
<td>0.15</td>
<td>-1.59 to 1.89</td>
<td>0.86●</td>
</tr>
<tr>
<td>PCCO vs COpa</td>
<td>0.04</td>
<td>-1.65 to 1.73</td>
<td>0.86●</td>
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<tr>
<td>CCO vs COpa</td>
<td>0.02</td>
<td>-1.46 to 1.50</td>
<td>0.88●</td>
</tr>
<tr>
<td>PCCO vs CCO</td>
<td>-0.03</td>
<td>-1.78 to 1.72</td>
<td>0.85●</td>
</tr>
</tbody>
</table>
CARDIAC OUTPUT

HIGH

SvO2

HIGH

SEPSIS
EXCESSIVE
BLOOD FLOW
(hypervolemia,
excessive vasoactive therapy)

ANEMIA
HYPOXEMIA
HIGH VO2

inadequate
cardiac output?

LOW

HYPOXEMIA
HIGH VO2

adequate
cardiac output?

LOW

SvO2

HIGH

LOW V02
(anesthesia,
hypothermia,...)

LOW OUTPUT
SYNDROME
(hypovolemia,
heart failure,
pulm. embolism...)

LOW

LOAD
The catheter quantifies the RVEF, and then derives the RVEDV.

The interval of time (Dt) between the consecutive beats on the decay thermal curve is evaluated.

Based on the principle of the energy conservation (thermal energy within the blood in the PA) close measures of temperature are analyzed (T1, T2, T3) to obtain a differential between the points that represents the EF.
THERMODILUTION PROBLEMS

Mr. Right Ventricle

EF depends on the RV afterload (only in part on the RV contractility)

EF can not be measured in case of tachyarrhythmias (including AF)
Dimensional schematic of proposed model of RV wrapped around "bullet-shaped" left ventricle

“ELIPSOIDAL SHAPE around the LV”

$LV$, Left ventricle; $RV$, right ventricle; $RVOT$, right ventricular outflow tract.
Cheatam, Int J Int Care, 2000
Which is the best RVEDVI?

- Diebel 1992 and Durham 1995 identified the upper limit (130-140 ml/m²): for volumes higher than, the pt doesn’t respond to higher RVEDVI.
- But, the best RVEDVI depends also on the contractility or better on the RVEF.
- ↓ is the contractility, ↑ is the target of RVEDVI.

N. B. the normal Right VEF is < 50%.