Fluid therapy in cardiac surgery - the colloid story

Helle Laugesen

Overlæge

Dept. Cardiovascular anaesthesia

Aalborg University hospital

History

• 1832 first intravenous infusion Robert Lewin – cholera pandemic
• Alkalinized saline
  • "the quantity necessary probably depend on the quantity lost"

• Sidney Ringer 1885
• Albumin blood fractioning 1941

Ernst Starling 1896

Hydroxyethyl starch HES

• Introduced 1974
• 1990 recommended for massive bleeding in trauma
• Risc of infectious complications to blood transfusion?

Albumin is dangerous

Human albumin administration in critically ill patients: systematic review of randomised controlled trials

Cochrane Injuries Group Albumin Reviewers

HES 1990-2009

- Extended use in surgical and ICU patients
- Reports of increased risk of kidney failure -- starches of high molecular weight substitution

SAFE study

- RCT 6997 ICU patients
- Albumin 4% vs normal saline
- Fluid administered 1:1:4

SAFE study

<table>
<thead>
<tr>
<th>Patients</th>
<th>Albumin Group</th>
<th>Saline Group</th>
<th>Relative Risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>795/543</td>
<td>790/457</td>
<td>0.99 (0.81-1.20)</td>
</tr>
<tr>
<td>Trauma</td>
<td></td>
<td></td>
<td>0.99 (0.81-1.20)</td>
</tr>
<tr>
<td>Yes</td>
<td>205/142</td>
<td>204/134</td>
<td>1.09 (0.84-1.43)</td>
</tr>
<tr>
<td>No</td>
<td>550/401</td>
<td>586/323</td>
<td>1.09 (0.84-1.43)</td>
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<tr>
<td>Severe sep</td>
<td></td>
<td></td>
<td>0.95 (0.66-1.36)</td>
</tr>
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<tr>
<td>ARDS</td>
<td></td>
<td></td>
<td>1.09 (0.84-1.43)</td>
</tr>
</tbody>
</table>

Colloids a long and twisted story

- Fraud and misconduct
- Hidden data
- Publication bias
- Lack of RCT yet
- Millions exposed

What to think? RCT

6S trial scandinavian multicenter trial
804 pt ringers acetate vs HES 130/0.42

What to do? RCT

- Chest trial australian and NZ
- 7000 pt general ICU normal saline vs HES 130/0.40

Original Article

Hydroxyethyl Starch 130/0.42 versus Ringer’s Acetate in Severe Sepsis
Anders Peren, M.D., Ph.D., Nicolai Haase, M.D.

Original Article

Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care
John A. Myburgh, M.D., Ph.D., Simon Finfer, M.D., Rinaldo Bellomo, M.D.
Colloids versus crystalloids for fluid resuscitation - critically ill

- No evidence from RCT that resuscitation with colloids reduces the risk of death compared to crystalloids in trauma, burns or following surgery.
- The use of HES might increase mortality
- More expensive
- Hard to justify use in clinical practice

HES and kidney function

- 42 studies
- 11,399 patients
- RR of renal replacement therapy 1.31 (1.16-1.49)

The evidence suggests

- HES increases the need for RBC transfusion, RRT and death compared to crystalloids
- The role of albumin and gelatine remains controversial
- Crystalloids should be the fluid of choice in ICU and surgical patients

Eliminating HES from hospitals

- Monitoring clinical outcome hoping to
- Reduce number of RBC transfusions (92-225)
- Fewer patients on RRT (15-135)
- Reduce number of deaths (5-45)

Budget impact of removing haes from all hospital in London Ontario

- Reduce number of RBC transfusions
- Fewer patients on RRT
- Reduce number of deaths
Fluid debate continues

Colloids!! Christalloids!!

Capillary wall anno 2013