Modified Ultrafiltration in Adults: A Pilot

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Maine Medical Center
Disclosures

• No relevant conflicts related to this presentation
ARS #1
Use of modified ultrafiltration (MUF) is indicated or blood conservation and reducing postoperative blood loss in adult cardiac operations

• 1. True
• 2. False
ARS #2

Modified ultrafiltration (MUF) is used at my center as a blood conservation strategy for adult cardiac operations.

• 1. True
• 2. False
SATURDAY - OCTOBER 9, 2010

Title: The More the Merrier - Results of the ICEBP-STS-SCA Collaboration
Moderators: Donald S. Likosky PhD and Robert A. Baker PhD CCP(Aust)

Session Objectives: To share and discuss the evolution and progress of the ICEBP collaboration with other professional societies. In this session, we will share the strengths and weaknesses of guideline writing.

8:00 am - 8:45 am
Can Guidelines Influence Care?
Survey Paper co-published in JECT and AA
Kenneth G. Shann CCP and Dwayne Jones CPC CCP RN

8:45 am - 9:30 am
2010 Update to the Society of Thoracic Surgeons Blood Conservation Guidelines - Gaining Comment from the Perfusion Profession
Victor Ferraris MD PhD

9:30 am - 10:00 am
Coffee Break
“Preoperative identification of high-risk patients (advanced age, preoperative anemia, small body size, ...) should be performed, and all available preoperative and perioperative measures of blood conservation should be undertaken in this group as they account for the majority of blood products transfused.

( Class I Level of evidence A)

• “Use of modified ultrafiltration (MUF) is indicated or blood conservation and reducing postoperative blood loss in adult cardiac operations using CPB.

• (Class I Level of evidence A).”
The Use of Modified Ultrafiltration to Reduce Morbidity After Cardiopulmonary Bypass: Proposal for a Pilot Study

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Institution Maine Medical Center, Portland ME

Introduction and Significance

Hemodilution occurs in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB). Patients that present for surgery with anemia or low red cell mass are at higher risk for blood transfusions, organ failure, or excessive postoperative bleeding. Mitigating postoperative hemodilution (blood diluted with an electrolyte solution) in cardiac surgical patients at the completion of cardiopulmonary bypass (CPB) has implications regarding the coagulation system and post-operative coagulopathies and bleeding [1,8]. Furthermore, CPB is known to stimulate the systemic inflammatory response syndrome (SIRS) by activating cellular and humoral factors, including cytokines, which have significant effects on susceptible organs resulting in organ dysfunction and contributing significantly to post-operative morbidity. [2,3,8]

Modified ultrafiltration (MUF) is a method of ultrafiltration of the patients' intravascular volume as well as the residual CPB circuit blood remaining after the completion of CPB [4,6,8]. The procedure is designed to filter excessive water.
Inclusion Criteria:

- Adult cardiac surgery patients ≥18 yrs
- Body surface area less than or equal to 1.7 meters squared.
- All adult cardiac surgery procedures (valve, coronary revascularization, aortic)
Primary Endpoint

Post-operative chest catheter drainage
(4, 6, 8 and 24 hours)
Boodhwanni- Meta-Analysis
10 RCT 1004 pts.

Weighted Mean difference (95% CI)

<table>
<thead>
<tr>
<th>Study</th>
<th>Weighted Mean difference (95% CI)</th>
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<tbody>
<tr>
<td>Zerr (1986)</td>
<td>-55.10 (-229.28,119.08)</td>
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<tr>
<td>Babka (1997)</td>
<td>-11.00 (-95.19,73.19)</td>
</tr>
<tr>
<td>Tasani (1999)</td>
<td>8.00 (-119.23,135.23)</td>
</tr>
<tr>
<td>Blanchard (2000)</td>
<td>-50.00 (-171.07,71.07)</td>
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<tr>
<td>Luciani (2001)</td>
<td>-57.10 (-121.51,7.31)</td>
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<tr>
<td>Kiziltope (2001)</td>
<td>-217.80 (-352.05,-83.55)</td>
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<tr>
<td>Leyh (2001)</td>
<td>63.00 (-67.81,193.81)</td>
</tr>
<tr>
<td>Leyh (2001)</td>
<td>-172.00 (-279.67,-64.33)</td>
</tr>
<tr>
<td>Abdallah (2003)</td>
<td>-109.10 (-150.79,-67.41)</td>
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<tr>
<td>Overall (95% CI)</td>
<td>-59.65 (-118.29,-21.01)</td>
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Pooled effect blood loss

Demographic Measures and Secondary Outcomes

- Procedure
- Age
- Sex
- HT and Wt (daily Wt)
- Pump time
- OR I & O (anes, perf)
- ICU I & O
- Blood Products
- Blood product use
- TEG parameters
- Extubation Time
- Bleeding Complications
- AKI rate
- A-A gradient
Patients

- Male/Female = 0/10
- BSA = 1.57m² (1.37-1.71m²)
- Age = 69 (52-83)
Procedures

- 2 -CABG
- 2 -CABG + AVR
- 2 -CABG + AVR + MVR
- 2 -AVR + Conduit
- 1 -MVR
- 1 -MVR + PVR

Pump time 140 (±/-39) min
<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Pre-MUF</th>
<th>Post-MUF</th>
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<tbody>
<tr>
<td>HCT</td>
<td>33</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>MUF</td>
<td>28-42</td>
<td>18-26</td>
<td>18-32</td>
</tr>
</tbody>
</table>

MUF Volume removed: 1247ml (1000-1400)
## Primary Outcome

### Chest Drainage

<table>
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<tr>
<th>4hr</th>
<th>6hr</th>
<th>8hr</th>
<th>24hr</th>
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<tbody>
<tr>
<td>355</td>
<td>405</td>
<td>445</td>
<td>695</td>
</tr>
</tbody>
</table>

Note: Median 24hr CT rate for our center: 595ml
ARS
Given the CT drainage results Bob Should...

A. Adopt use of MUF
B. Stop using MUF on adults
C. Continue the pilot
ARS
I am encouraged to explore use of MUF in adults at my center

• 1 Yes
• 2 No
• 3 Maybe
Anesthesia
How do we improve quality?

Generalizable Scientific Evidence + Context → Best Possible Care

- Published Guidelines
- RCTs
- Observational studies
- Case-control studies
- Case Series

Measurement of your system
Enumerative Statistics

Intelligent Action!
Science- tells us what we can do.

Standards and Guidelines- tell us what we should do

Registries- tell us what we actually do.