**Comparison of Two Fluid-Management Strategies in Acute Lung Injury**


**Introduction**
In patients with pulmonary edema a major clinical problem exists: should we maintain cardiac output by a liberal fluid strategy and thereby conserving organ function or should we restrict fluid administration to minimize pulmonary edema however thereby possible compromise cardiac output and subsequently organ function but limit the duration of mechanical ventilation? In this study the investigators compared these two fluid-strategies in a prospective randomised clinical trial.

**Study**
1 001 out of 11 512 patients were divided in two groups (“conservative strategy” and “liberal strategy”) and randomly received a central venous line or pulmonary artery catheter to assess intravascular pressures. Both groups were treated for seven days according to a strict fluid-protocol. In case of sufficient blood pressure (MAP>60 mmHg), urine output (≥ 0.5 ml/kg/u) and an effective circulation (CI>2.5 l/min/m²) the target for the conservative group was CVP<4/PAOP<8 mmHg and CVP=10-14/PAOP=14-18 mmHg for the liberal group, respectively. The protocol resulted in a mean (±SE) cumulative fluid balance of -136±491ml after 7 days for the conservative group and +992±502 ml for the liberal group (P<0.001). Although there was no difference between the two strategies regarding mortality at day 60 (conservative group 25.5%, liberal group 28.4%; P=0.30), the investigators found that the conservative strategy resulted in significant more ICU-free days after 7 days (0.9±0.1 vs. 0.6±0.1; P<0.001) and 28 days (13.4±0.1 vs. 11.2±0.4; P<0.001), more ventilator-free days after 28 days (14.6±0.5 vs. 12.3±0.5; P<0.001) and a better oxygenation index and Lung Injury Score. There were no main significant differences between the groups concerning organ failure after 28 days, besides a slightly better performance in the conservative group concerning CNS failure free days (18.8±0.5 vs. 17.2±0.5; P=0.03).

**Discussion**
From this study we CANNOT conclude that a restrictive fluid therapy in patients with early ARDS is safe and shortens time on the ventilator! You may ask yourself: “Why not?”

First of all we have to recognize the patient population studied (see the above discussion). In addition, patients that already received a pulmonary artery catheter (PAC) before screening for this study (so in the early phase of admission) were excluded (in total 21% of the excluded patients had a PAC). As patients receiving a PAC are usually sicker and have a higher incidence of heart failure than these patients could have a major impact on the results when included in a restrictive fluid therapy protocol. Also, a large number of patients were excluded from the study because the responsible physician refused participation of his/her patient in the study (21% of the patients screened) or because they had chronic lung disease (14%) or a high risk of death within 6 months (11%).

So, a restrictive fluid therapy is first of all safe ONLY in patients in whom you do not to decide to use a PAC in the initial resuscitation phase and who have no chronic lung disease or in whom you think restrictive fluid therapy is not appropriate for whatever reason.

Second, patients were included in the study more than 40h after admission to the ICU. So initial fluid resuscitation phase had past quit some time ago. Especially for patients with circulatory failure and or sepsis, the initial resuscitation usually requires significant amounts of IV fluids. As a comparison: The total amount of fluids infused in the first 72 hours following admission in the early goal directed therapy study by Rivers et al. was 15 liters in both the control and protocol group.

So, a restrictive fluid therapy is ONLY safe following adequate fluid resuscitation and hemodynamic stabilisation for a period of about 40 hours. After this, restrictive fluid therapy in the patient population as defined above.

Finally, why was so much fluid administered in the liberal group? The differences in 7-day fluid balance between restrictive and liberal was most pronounced in the patients in shock at baseline (2.9L vs 10.1L). The answer is not given in the publication, so we have to speculate. As the conservative group had a slightly lower mean arterial pressure, stroke volume and cardiac index whereas mixed venous oxygen saturation was similar (indicating higher oxygen consumption in the liberal group) additional fluids were probably administered to improve arterial pressure and cardiac index and to maintain the balance between oxygen demand and oxygen supply by normalizing mixed venous oxygen saturation. There exists considerable doubt whether a strategy like this improves outcome following the initial resuscitation phase. This study shows that even in patients with shock and ARDS, restrictive fluid administration can be safe. Therefore, in critically ill patients with ARDS following your first liberal fluid resuscitation: be liberal when needed, be restrictive when possible!

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