



Flow-based fluid management shortens operating time and reduces intensive care usage compared to conventional pressure-based fluid management in patients undergoing cardiac surgery

Shi C, Morse LS, Downing LK, Chi L, Jessen ME. *Optimizing intra-operative volume management during coronary bypass surgery. 2000: A347.* Presented at American Society of Anesthesiology meeting 2000

Clinical Application: Intra-operative

This randomised controlled clinical trial looked at the impact of oesophageal Doppler-guided fluid administration in patients having coronary artery bypass graft surgery (CABG). The “conventional care” group were given fluid based on data derived from the invasive, pressure-based pulmonary artery catheter (PAC).

Protocol Outline

124 cardiac surgery (CABG) patients were randomly allocated to either the conventional care group (Con group), with fluid management determined with reference to haemodynamic parameters derived from a PAC or fluid management based on a corrected flow time target (FTc >0.36 secs) measured by oesophageal Doppler monitoring (ODM group). Patients were given crystalloid or colloid or blood products at the anaesthetist’s discretion. The key variables measured in the study were intra-operative fluid administration, times to completion of surgery, removal of breathing support and time spent in intensive care (ICU).

Results

Both groups were well matched, but the ODM group had poorer performing hearts, based on left ventricular ejection fraction, compared to the Con group (47% vs. 52%, $p < 0.05$).

Both groups of patients received similar total volumes of fluid intra-operatively, although the researchers did not provide a breakdown of the amounts of crystalloid, colloid or blood products given between the two groups. The ODM group required less vasopressor support during their time on the heart bypass machine than the Con group.

Time on the bypass machine was similar for both groups but overall time in the operating room was significantly shorter in the ODM group (301±42 mins vs. 334±79 mins, $p < 0.01$). Similarly, time to removal of breathing support was significantly shorter in the ODM group (891±313 mins vs. 1280±1337 mins, $p < 0.03$). Time in ICU was significantly shorter in the ODM group (1620±543 mins vs. 2321±1568 mins, $p < 0.01$).

Commentary

This trial demonstrates the superiority of a flow-based (ODM) approach to fluid management over one reliant on pressure measurement.

The body compensates for a reduction in circulating blood volume (hypovolaemia) by shutting down blood supply to the lesser organ systems in order to maintain flow to the key systems and to keep blood pressure at an optimum level. Blood pressure is therefore a late and poor indicator of changes in volume status. Conversely, blood flow, as measured directly by ODM, responds rapidly and is a sensitive indicator of changes in circulating volume status.

As this trial shows, using the CardioQ™ oesophageal Doppler monitor (ODM) for targeted volume management (TVM) – delivering the right amount of the right fluid at the right time – improves circulatory performance and improves outcomes in major surgery.



This is a summary of the referenced clinical trial and should not be used for citation.

Please refer to the source material for research purposes.



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