GDT during repair of unruptured AAA

Full citation	**Bisgaard J, Gilsaa T, Ronholm E, and Toft P (2013) Optimising stroke volume and oxygen delivery in abdominal aortic surgery: a randomised controlled trial. Acta anaesthesiologica Scandinavica 57, 178-88**
Study details	Study type: randomised controlled trial Location(s): Denmark Aim(s): to evaluate the effect of perioperative goal-directed therapy (GDT) on the incidence of complications and length of stay after elective open repair of AAA Study dates: June 2008 to July 2010 Follow-up: 30 days Sources of funding: This study was funded by the local research fund, the Toyota fund and the Research Initiative of the Danish Society of Anaesthesiology and Intensive Care Medicine
Participants	Population: patients with AAA undergoing elective open repair Sample size: 64; 70.3% (45/64) male Inclusion criteria: adults with AAA who were scheduled for elective open repair were included Exclusion criteria: end-stage renal failure, receiving lithium therapy, or body weight less than 40 kg Baseline characteristics: • Mean age: GDT group, 68 years; control group, 68 years • Sex: GDT group, 81.2% male; control group, 59.3% male • Mean aneurysm size: not reported • History of myocardial infarction, coronary artery bypass grafting or percutaneous coronary intervention: GDT group, 43.8%; control group, 18.8%
Intervention	GDT: an epidural catheter was inserted at the low thoracic or high lumbar level. Patients received aliquots of hydroxyethyl starch as colloid when hypovolaemia was suspected. Fluid challenges, using hydroxyethyl starch aliquots, were performed until the patient's stroke volume index (SVI) rose by 10% or higher for more than 20 minutes. This was repeated whenever the SVI decreased. Intravenous vasopressors were administered intraoperatively in fractionated doses to maintain a desired blood pressure. Dobutamine was not used intraoperatively but was administered during the postoperative period to maximise to maximise cardiac output.
Comparison	Control group (fluid therapy based on standard haemodynamic parameters)

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Outcomes measures	Mortality, postoperative complications (myocardial ischaemia, septic shock, pneumonia, wound infections, acute coronary syndrome, cardiac arrhythmia, pulmonary oedema, acute kidney injury, gastrointestinal bleeding, volume of blood products used (red blood cell concentrate, frozen plasma, and platelet transfusions), reoperation, readmission to ICU, need for mechanical ventilation, need for acute dialysis
Risk of bias assessment (using the Cochrane risk of bias tool)	1. Random sequence generation (selection bias): Low risk – patients were allocated to GDT or control group by computer generated random sequence on the day of surgery. 2. Allocation concealment (selection bias): Unclear risk – authors did not state whether efforts were made to conceal group allocations 3. Blinding of participants and personnel (performance bias): Low risk – both participants and personnel were blinded to treatment. allocations. “The surgical, anaesthetic and ICU clinical teams were blinded to all cardiac output values by coverage of the screen throughout the study period.” 4. Blinding of outcome assessment (detection bias): Low risk – complications and length of stay were registered by a study group member without knowledge of study group allocation. 5. Incomplete outcome data (attrition bias): Low risk – all participants were accounted for with losses to follow-up adequately reported. 6. Selective reporting (reporting bias): Low risk – most of the study protocol was outlined in the manuscript and all relevant outcomes were reported. 7. Other bias: Low risk – none identified Overall risk of bias: Low Directness: Directly applicable

Full citation	**Bonazzi M, Gentile F, Biasi G M, Migliavacca S, Esposti D, Cipolla M, Marsicano M, Prampolini F, Ornaghi M, Sternjakob S, and Tshomba Y (2002) Impact of perioperative haemodynamic monitoring on cardiac morbidity after major vascular surgery in low risk patients. A randomised pilot trial. European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery 23, 445-51**
Study details	Study type: randomised controlled trial Location(s): Italy Aim(s): to evaluate whether perioperative haemodynamic optimisation influences outcomes of infrarenal AAA repair Study dates: April 1996 to March 2000 Follow-up: not reported Sources of funding: not reported
Participants	Population: patients with AAA undergoing elective open repair Sample size: 100; sex-specific proportions were not reported Inclusion criteria: patients less than 75 years old, without angina and arrhythmias without alterations of ventricular repolarisation on a resting electrocardiogram, without evidence of left ventricular wall motion abnormalities on preoperative transthoracic echocardiography at rest and with an ejection fraction ≥50% were included Exclusion criteria: presence of advanced chronic renal failure, severe Chronic Obstructive Pulmonary Disease requiring postoperative ventilator support, or concomitant aortoiliac obstructive disease Baseline characteristics: • Mean age: GDT group, 67 years; control group, 68 years • Sex: proportions not reported • Mean aneurysm size: not reported • Diabetes: GDT group, 5%; control group, 7% • Hypertension: GDT group, 16%; control group, 15% • Renal failure: GDT group, 3%; control group, 4%
Intervention	GDT: the radial artery of the patient's non-dominant hand was cannulated and a pulmonary artery catheter was inserted through the basilic vein under fluoroscopic guidance. Cardiac output optimisation was performed to achieve the following parameters: cardiac index >3.0 l/min/sqm, pulmonary wedge pressure >10 and <18 mmHg, systemic vascular resistance <1450 dyne/sec/cm^{-5}, oxygen delivery >600 ml/min/sqm.
Comparison	Control group: other than monitoring central venous pressure and invasive arterial pressure during surgery no haemodynamic monitoring was performed
Outcomes measures	In-hospital mortality, cardiovascular morbidity (non-fatal myocardial infarction, arrhythmias, congestive heart failure), postoperative renal failure, length of stay

Full citation	**Bonazzi M, Gentile F, Biasi G M, Migliavacca S, Esposti D, Cipolla M, Marsicano M, Prampolini F, Ornaghi M, Sternjakob S, and Tshomba Y (2002) Impact of perioperative haemodynamic monitoring on cardiac morbidity after major vascular surgery in low risk patients. A randomised pilot trial. European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery 23, 445-51**
Risk of bias assessment (using the Cochrane risk of bias tool)	1. Random sequence generation (selection bias): Low risk – a computer-generated random number was obtained by phone-call to the Statistical Centre of the hospital on the day before surgery. 2. Allocation concealment (selection bias): Unclear risk – authors did not state whether efforts were made to conceal group allocations. 3. Blinding of participants and personnel (performance bias): Low risk – it is unclear whether participants or personnel were blinded to treatment allocations; however, this is was unlikely to affect results as objective outcomes were assessed. 4. Blinding of outcome assessment (detection bias): Unclear risk – it is unclear whether outcome assessors were blinded to treatment allocations. 5. Incomplete outcome data (attrition bias): Low risk – all participants were accounted for and there were no losses to follow-up. 6. Selective reporting (reporting bias): Low risk – most of the study protocol was outlined in the manuscript and all relevant outcomes were reported. 7. Other bias: Low risk – none identified Overall risk of bias: Low Directness: directly applicable

Full citation	**Funk Duane J, HayGlass Kent T, Koulack Joshua, Harding Greg, Boyd April, and Brinkman Ryan (2015) A randomized controlled trial on the effects of goal-directed therapy on the inflammatory response open abdominal aortic aneurysm repair. Critical care (London, and England) 19, 247**
Study details	Study type: randomised controlled trial Location(s): Canada Aim(s): to determine if GDT is associated with lower levels of inflammatory markers Study dates: not reported Follow-up: not reported Sources of funding:
Participants	Population: patients with AAA undergoing elective open repair Sample size: 40; 67.5% (27/40) male Inclusion criteria: patients over 18 years who were scheduled to undergo elective open AAA repair were included Exclusion criteria: over 80 years old, weight greater than 120 kg, known or suspected aortic insufficiency, renal dysfunction, active congestive heart failure, or atrial fibrillation Baseline characteristics: • Mean age: GDT group, 70 years; control group, 67 years • Sex: GDT group, 60% male; control group, 75% male • Mean aneurysm size: not reported • Diabetes: GDT group, 15%; control group, 10% • Hypertension: GDT group, 70%; control group, 65% • Hyperlipidaemia: GDT group, 60%; control group, 50% • COPD: GDT group, 55%; control group, 35% • Ischaemic heart disease: GDT group, 40%; control group, 40% • Myocardial infarction: GDT group, 40%; control group, 35%
Intervention	GDT: an epidural catheter was inserted at the thoracic level and patients received a background crystalloid infusion of 3 cm^3/kg ideal body weight of lactated Ringers solution. Hydroxyethyl starch solution was used to maintain the stroke volume variation (SVV) below 13 %. Inotropic therapy was started when the SVV was less than 13 % and cardiac index (CI) was less than 2.2 l/minute per m^2. Phenylephrine was used if SVV was less than 13 %, the CI was more than 2.2 l/minute per m^2 and mean arterial pressure was less than 60 mmHg.
Comparison	Control group: anaesthetists did not have CI or SVV information available as this information was covered by an opaque card
Outcomes measures	Mortality, complications (myocardial infarction, pneumonia, respiratory failure, sepsis, rhabdomyolysis, acute kidney injury, dysrhythmia, bleeding, ischaemic guy, and delirium) ICU admission, length of stay
Risk of bias assessment	• Did the trial address a clearly focused issue? Yes

Full citation	**Funk Duane J, HayGlass Kent T, Koulack Joshua, Harding Greg, Boyd April, and Brinkman Ryan (2015) A randomized controlled trial on the effects of goal-directed therapy on the inflammatory response open abdominal aortic aneurysm repair. Critical care (London, and England) 19, 247**
(using the Cochrane risk of bias tool)	1. Random sequence generation (selection bias): Unclear risk – authors state that participants were randomised by way of a sealed envelope but no details are provided as to how randomisation was performed. 2. Allocation concealment (selection bias): Unclear risk – authors did not state whether efforts were made to conceal group allocations. 3. Blinding of participants and personnel (performance bias): Low risk – authors stated that patients and personnel were blinded to treatment allocations. 4. Blinding of outcome assessment (detection bias): Low risk – authors highlighted that a blinded assessor determined the occurrence of postoperative outcomes and statistical analysis was performed independently. 5. Incomplete outcome data (attrition bias): Low risk – all participants were accounted for and there were no losses to follow-up. 6. Selective reporting (reporting bias): Low risk – all appropriate outcomes were adequately reported. 7. Other bias: Low risk – none identified Overall risk of bias: moderate Unclear – authors state that participants were randomised by way of a sealed envelope but no details are provided as to how randomisation was performedYes – authors highlight that a blinded assessor determined the occurrence of postoperative complicationsDirectness: directly applicable