Articles of Interest

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**APROTININ**

Activation of fibrinolysis in the pericardial cavity after cardiopulmonary bypass.

The authors demonstrate higher fibrinolytic activity from the pericardial cavity compared to systemic circulation. Local fibrinolysis within the pericardial cavity effects postoperative blood loss. Topical application of aprotinin within the chest cavity reduces fibrinolytic activity and postoperative chest drainage by 33%.

Variability of plasma aprotinin concentrations in pediatric patients undergoing cardiac surgery.

**BIOCOMPATIBILITY**

Blood-air interface during cardiopulmonary bypass.

Minimizing blood—air interface reduces inflammatory response during cardiopulmonary bypass. Despite the low study sample, lower levels of interleukin-6 and elastase were demonstrated in the closed venous reservoir patients and avoidance of cardiomyotomy suction with cell saver.

Emerging technologies in biocompatible surface modifying additives: quest for physiologic cardiopulmonary bypass.

The impact of heparin-coated cardiopulmonary bypass circuits on pulmonary function and the release of inflammatory mediators.

PMEA coating of pump circuit and oxygenator may attenuate the early systemic inflammatory response in cardiopulmonary bypass surgery.

**BLOOD CONSERVATION**

The influence of allogeneic red blood cell transfusion compared with 100% oxygen ventilation on systemic oxygen transport and skeletal muscle oxygen tension after cardiac surgery.

Jehovah’s witnesses requiring complex urgent cardiothoracic surgery.

Urgent cardiac surgery in Jehovah’s Witnesses poses significant challenges to blood conservation efforts. The authors review their experience and describe management of cardiopulmonary bypass, operative techniques and pharmacologic support of hemostasis.

**CEREBRAL PROTECTION**

Use of a pH-stat strategy during retrograde cerebral perfusion improves cerebral perfusion and tissue oxygenation.

The effect of the dynamic air bubble trap on cerebral microemboli and S100 beta.


Cerebral hyperthermia during rewarming may cause neurocognitive dysfunction. The authors describe their results with a control group (nasopharyngeal temperature of 37 degrees C) or surface-warming group (NP = 35 degrees C; 36.8 degrees C over 4 hours) to minimize the incidence of cerebral hyperthermia but also prevent post-operative hypothermia. Using a jugular bulb thermistor, cerebral temperatures were measured and confirmed the efficacy of this “limited rewarming” strategy.


Common temperature monitoring sites used during cardiac surgery often underestimate the true cerebral temperature and may pose a risk of cerebral hyperthermia and subsequent cerebral injury. During rewarming, arterial inflow temperature was higher than jugular bulb and nasopharyngeal temperatures but that trend reversed during normothermia where JB was higher than AI or NP.


Insulin-dependent diabetic patients demonstrated impaired CO2 reactivity measured by transcranial doppler. Phenylephrine infusions impaired cerebrovascular autoregulation and worsened jugular venous oxygen saturations in hyperglycemic patients.


EXTRACORPOREAL LIFE SUPPORT


HEMATOLOGY


Bivalirudin, a direct thrombin inhibitor, provides anticoagulation effect for cardiac patients with heparin-induced thrombocytopenia. Hemorrhage after cardiopulmonary bypass may be reversed by a combination of ultrafiltration/hemodialysis, recombinant factor VIIa, and fresh frozen plasma and cryoprecipitate. No thrombotic complications occurred and bleeding was controlled.


INTRA-AORTIC BALLOON PUMP

Usefulness of preoperative intraaortic balloon pump therapy during off-pump coronary artery bypass grafting in high-risk patients.

MYOCARDIAL PROTECTION

Apoptosis: Pathophysiology and therapeutic implications for the cardiac surgeon.

This review examines the pathogenesis of cardiomyocyte apoptosis and its relationship to ischemic or inflammatory myocardial dysfunction. Early surgical repair, afterload reduction, beta-blockade, phosphodiesterase inhibitors and early insertion of IAPP or ventricular assist are suggested as clinical methods to prevent or reduce the incidence of apoptosis. Future innovations include ischemic preconditioning and use of antiapoptotic medication such as the caspase inhibitors, antioxidants, calcium-channel blockers, the insulin-like growth factor-1, and the poly-adenosine diphosphate-ribose-synthetase inhibitors.

Apoptosis-related mitochondrial dysfunction in the early postoperative neonatal lamb heart.

Cardioprotective properties of sevoflurane in patients undergoing coronary surgery with cardiopulmonary bypass are related to the modalities of its administration.

PATHOPHYSIOLOGY

Coronary surgery without cardiotomy suction and autotransfusion reduces the postoperative systemic inflammatory response.

Reinfusion of cardiotomy suction and shed mediastinal blood contributes to the inflammatory reaction after cardiac surgery. Blood levels of tumor necrosis factor-alpha, interleukin-6 and complement factor C3a were significantly higher in the cardiotomy suction group.

Reducing hemostatic activation during cardiopulmonary bypass: a combined approach.

A combined strategy of using heparin-coated circuits, epsilon-aminocaproic acid, and closed cardiotomy lowers thrombin-antithrombin complex, tissue plasminogen activator, d-dimer and fibrinopeptide A levels. Combining these techniques reduces blood activation and fibrinolytic response to cardiopulmonary bypass.

Inflammatory response to cardiac surgery: cardiopulmonary bypass versus non-cardiopulmonary bypass surgery.

Cardiopulmonary bypass has been an integral part of cardiac surgery for over 50 years. Despite ongoing research, the systemic inflammatory response syndrome (SIRS) imposes serious morbidity and mortality to cardiac surgical patients. Recent developments in coronary revascularization employing cardiac stabilization devices have refocused and increased scrutiny on the association of SIRS and CPB. The authors review the pathophysiology of SIRS, techniques to minimize the inflammatory response and “balances” the clinical evidence between on-pump and off-pump surgery.

Sevoflurane-induced malignant hyperthermia during cardiopulmonary bypass and moderate hypothermia.

Maintenance of normoglycemia during cardiac surgery.

Injury in organs after cardiopulmonary bypass: a comparative experimental morphological study between a centrifugal and a new pulsatile pump.

Effect of leukocyte depletion on endothelial cell activation and transendothelial migration of leukocytes during cardiopulmonary bypass.

PERFUSION TECHNIQUE

Axillary artery cannulation: routine use in ascending aorta and aortic arch replacement.


TRANSPLANTATION

Evolving donor acceptance criteria and extending recipient demographics have not impacted outcomes in a heart transplant program. Donor, recipient and operative factors were studied to identify predictors of operative results and patient morbidity and mortality. Female donors, donor cardiac arrest and cardiopulmonary bypass time (> 2 hours) were associated with increased intra-aortic balloon use. Biatrial technique, avoidance of cardioplegia, prolonged cardiopulmonary bypass and aortic cross-clamp times prolonged intensive care utilization. Thirty-day mortality remained unchanged.