

Title: EFFECT OF TWO INHALATION ANESTHETICS ON HEMODYNAMICS, CORONARY FLOW, AND MYOCARDIAL METABOLISM IN PATIENTS WITH LEFT MAIN CORONARY LESION

Authors: GV Kirvassilis, MD; DD Pulley, MD; K Kater RN, MSN; R Genton, MD; N. Keleremos MD; DG Lappas, MD

Affiliation: Departments of Anesthesiology and Medicine, Washington University School of Medicine, St Louis, MO

Introduction: Inhalation anesthetics are commonly administered as adjuncts to high dose narcotics in patients undergoing myocardial revascularization operations (CABG). Several studies have documented the myocardial depressant effect of both isoflurane (ISO) and halothane (HAL). Ensuing hypotension can compromise myocardial blood flow to regions distal to coronary stenosis. Thus, there has been concern over the safety of using these anesthetics, especially in patients with left main (LM) coronary artery stenotic lesion or LM equivalent (LME). The purpose of this study was to assess the effect of ISO and HAL on hemodynamics, myocardial blood flow and metabolism in patients with these lesions.

Methods: The protocol was approved by the Human Studies Committee and written informed consent was obtained from all patients (pts). A total of 20 pts with LM or LME coronary anatomy were studied and randomly assigned to receive ISO or HAL after fentanyl (50 mcg/kg) induction. All pts had EF >40%, were maintained on their preoperative medication and were premedicated. Radial artery, pulmonary artery and coronary sinus (CS) catheters were inserted prior to anesthesia. CS catheter was advanced to the great cardiac vein (GCV) under fluoroscopy. Intraoperative transesophageal echocardiography (TEE) was performed and a 7-lead ECG was obtained. Hemodynamics, CS and GCV blood flows, as well as blood samples for O₂ content and lactates were obtained at 4 events: postinduction (control-event 1), and 15 min (event 2), 30 min (event 3) and 60 min (event 4) on ISO or HAL. The inhaled anesthetic was started

after intubation and was maintained at inspiratory concentration of 0.5 MAC. Heart rate was kept constant by atrial pacing. Arterial pressure was maintained with volume and phenylephrine as required. Myocardial ischemia was defined as the development of new wall motion abnormalities on TEE, myocardial lactate release (LR) and/or new ECG ischemic changes. One way analysis of variance was used to compare parameters between the groups and chi square test to compare the incidence of ischemia between the two groups.

Results: There were no significant hemodynamic differences between the two groups at any of the events. Progressively, ventricular filling pressures and cardiac output decreased, while vascular resistance did not change significantly. CS and GCV blood flows, as well as O₂ extraction decreased progressively during the administration of ISO and HAL. Heart rate and arterial pressure were kept within control levels. In the HAL group 2 pts had LR and TEE ischemic changes at control, which improved gradually. New metabolic, echocardiographic and/or ECG ischemic episodes were detected at event 2 (n=1) and at event 4 (n=6) in seven pts. In 2 of the 7 ischemic episodes ECG and TEE changes, and LR were observed, while hemodynamic changes were minor. Lactate release was detected in one pt in each group, at event 2 with HAL and at event 4 with ISO. New wall motion abnormalities (TEE) were observed at event 4 in 3 pts with HAL and in 2 pts with ISO.

Discussion: Under the conditions of the study, myocardial ischemia can occur during the administration of either inhalation anesthetic in patients with LM or LME coronary artery stenotic lesion. Abnormal wall motion abnormalities, as detected by TEE, were present in 5 of the 7 ischemic episodes, whereas ECG abnormalities and lactate release were present in fewer episodes. The incidence of ischemia between the two groups did not differ. The data suggest that intraoperative ischemic episodes in these patients can occur and, frequently, are due to factors other than hypotension and tachycardia.

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Title: BILATERAL SINGLE LUNG TRANSPLANTATION: ANESTHETIC MANAGEMENT AND INTRAOPERATIVE CONSIDERATIONS

Authors: AN Triantafyllou, MD; PM Heerdt, MD, PhD; TJ Herbst, MD; C Pond, MD; GJ Despotis, MD

Affiliation: Department of Anesthesiology and The Lung Transplant Group, Washington University School of Medicine, St. Louis, MO

Double lung transplantation (DLT) for end-stage pulmonary fibrosis was first performed in 1986. Despite initial encouraging results the en block DLT is associated with a high rate of morbidity and mortality. The surgical procedure is complex and is associated with high incidence of tracheal anastomotic dehiscence and perioperative myocardial dysfunction. Long term follow-up also revealed that the procedure is associated with cardiac denervation. To overcome these complications, a more simplified surgical approach has been developed in our medical center. Bilateral single-lung transplantation (BSLT) is performed through a transverse thoracosternotomy and each lung is implanted separately.

Methods: Since last November, 7 patients (pts) underwent BSLT.¹ Three pts had emphysema, 2 pts cystic fibrosis, and 1 pt had developed bronchiolitis obliterans, after a DLT 14 months ago. The pts ranged in age from 31 to 52 yrs and were 5 females and 2 males. Average weight was 54.8 kg. Mean PA pressure was 36±8 mmHg and mean RVEF was 42±5%. All lines were placed prior to induction of anesthesia, under light sedation with midazolam. Epidural catheter was placed in 6 pts for postoperative pain control. Pulse oximeter, 2 lead-ECG, oximetry pulmonary artery catheter (RVEF/SVO₂), arterial line and transesophageal echo were used for intraoperative monitoring. Sodium thiopental (2 mg/kg), fentanyl (20 mcg/kg), isoflurane and muscle relaxant were administered for anesthesia. Pts were ventilated with 100% O₂ with TV and respiratory rate adjusted for each individual case. Two pts required HFV. All pts were intubated with a left sided double lumen tube. All procedures were performed with cardiopulmonary bypass (CPB) readily available. CPB was employed in 2 pts for implantation of both lungs, and in 4 pts for implantation of left lung only. The decision for using bypass

was made primarily on SaO₂ value dropping below the baseline, for each individual patient or evidence of RV dysfunction by TEE or hemodynamic changes, not responding to available therapeutic options. Ischemic times averaged from 3:10h to 6h for the right lung and from 5h to 9:25h for the left lung.

Results

There were no perioperative deaths. Pts were ventilated for 3 to 6 days postoperatively. One pt (redo) had a tracheostomy and remained ventilated for 14 days. All pts were discharged and at this time are alive. Table 1 shows preoperative and postoperative PFT's.

Summary

Our data suggest that BSLT can be successful in carefully selected pts with end-stage pulmonary disease and compare favorably with those of DLT. Advantages of this new surgical approach include utilization of bilateral bronchial anastomosis, which appears to have better long term durability than tracheal anastomosis, and intact innervation of the heart.

References

1. Patterson GA, Cooper JD, Goldman B, et al. Technique of successful clinical double lung transplantation. *Ann Thorac Surg*, 4:626-633, 1988.
2. Pasque MK, Cooper JD, Kaiser LR, Haydock DA, Triantafyllou A, Trulock EP. An improved technique for bilateral lung transplantation. *Annals Thorac Surg*, (In press).

PFT's

Patient	Pre		Post	
	FVC	FEV ₁	FVC	FEV ₁
1	1.45	0.52	2.64	2.64
2	1.77	0.54	4.07	4.06
3	1.56	0.36	1.83	1.47
4	1.43	0.46	2.88	2.75
5	2.07	0.64	4.00	3.35
6	1.54	1.39	1.48	1.44
7	0.46	0.28	n/a	n/a