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PATIENT CASE REPORT. CATEGORY: ADULT

THORACOABDOMINAL ANEURYSM REPAIR

Clinical background and situation:

A 62-year-old woman was scheduled for a thoracoabdominal aneurysm repair. She had previously had emergency surgery because of a type A dissection for which a supracoronary aortic replacement was performed three years earlier. Two years later, due to progressive aortic valve insufficiency, the aortic valve was replaced and a repair of the aortic root was performed.

An aneurysm of the descending thoracic-abdominal aorta developed after a type B aortic dissection. It was decided to repair the aneurysm with institution of cardiopulmonary bypass (CPB) and deep hypothermic cardiac arrest (DHCA). A double-lumen endotracheal tube would be needed for single-lung ventilation of the right lung. The left lung would be collapsed for maximal exposure of the surgical field.

Anesthesia process and result:

The patient was placed under standard monitoring according to ASA guidelines in the induction room. Before the induction of anesthesia, a lumbar CSF drainage was placed at the L3-L4 level. Induction of anesthesia was then performed with bolus i.v. midazolam, sufentanil and pancuronium. Anesthesia was maintained with continuous i.v. infusion of propofol and sufentanil. After this induction, the patient was endotracheally intubated with a 37 Fr double-lumen tube.

The ventilator settings (MAQUET FLOW-i) are reported in Table 1. After intubation, a second arterial line was placed for comparison of invasive blood pressures in the upper and lower parts of the body during the surgical part of the operation. Two central venous lines were also placed, one for rapid infusion, the other one for infusion of inotropic drugs if indicated. Cerebral regional oxygenation was initiated in the OR and monitored during the surgical procedure.

After the start of the operation, single-lung ventilation of the right lung was instituted and continued (MAQUET FLOW-i) throughout the rest of the procedure. To regulate pulmonary inspiratory pressures, pressure controlled ventilation was chosen. There were no ventilatory problems during the procedure. Mechanical ventilation was continued during CPB and DHCA to keep the right lung open, referred to in the literature as the open lung concept[1] (see Table 1 for respiratory variables and results of blood gas analyses).

After the aneurysm had been surgically repaired, the patient came off CPB successfully. Because of DHCA and hemostasis, massive transfusion was needed. A total of 12 liters of packed red cells and fresh frozen plasma were transfused, as were platelets. After successful hemostasis was achieved, the patient was transferred to the ICU for further metabolic stabilization and weaning off the mechanical ventilator.

	PiP (cmH_2O)	PEEP (cmH_2O)	MV (l/min)	RR (/min)	Vte (ml)	FiO_2	pH	pCO_2 (kPa)	pO_2 (kPa)	HCO_3- (kPa)	BE	$EtCO_2$ (kPa)
Two-lung ventilation	18	6	7	16	430	0.4	7.41	5.5	22	26.2	2	4.8
Single-lung ventilation	21	6	6	20	314	0.69	7.36	5.3	24.4	21.9	-3	4.0
Post CPB (two-lung ventilation)	31	7	7.5	15	500	0.57	7.01	10.9	18.2	19.8	-14	6.0

Table 1. Ventilator settings and arterial blood gases.

Postoperative course:

After a few days, the patient was extubated. However, the postoperative course was complicated by a thoracic hematoma, for which re-operation was needed. Following this second operation, the patient developed pneumonia together with respiratory insufficiency and sputum stasis, and re-intubation was therefore necessary. During the ICU stay, a tracheotomy was performed because of the need for prolonged mechanical ventilation in combination with frequent tracheal suctioning of sputum.

Finally, the patient was successfully weaned off the ventilator after three weeks in the ICU. There were no other complications in the postoperative period.

Summary:

Complicated cardiac case anesthetized and ventilated with FLOW-i. Single and two-lung ventilation was used unproblematic during CPB and DHCA.

Reference:

1. Miranda DR, Gommers D, Papadakos PJ, etc. Mechanical ventilation affects pulmonary inflammation in cardiac surgery patients: the role of the open-lung concept. *J Cardiothorac Vasc Anesth.* 2007 Apr;21(2):279-84.

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Case contributed by Dr. Hans Ubben, Erasmus Medical Center, Rotterdam The Netherlands.

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