

GENERAL ANESTHESIA FOR GIANT TUMOR RESECTION AND FACIAL RECONSTRUCTION IN A PATIENT WITH ATRIAL FIBRILLATION, HYPERTENSION, HEART VALVE DISEASES (CASE REPORT)

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ABSTRACT

General anesthesia for giant tumor resection and facial reconstruction in the elderly patients with atrial fibrillation, hypertension, and comorbidity valvular heart disease presents a major challenge for both anesthesiologists and surgeons in terms of the prevention and management of complications that may occur before, during, and after surgery.

A 74-year-old cachexia female suffered from a giant facial tumor compressing on the right eye, right nose, narrowing the left nasal cavity, growing into the palpe. She had atrial fibrillation, hypertension, comorbidity valvular heart disease. Before the surgery, she was received intravenous nutrition, maintained treatment of atrial fibrillation, hypertension, corrected electrolyte disturbances. She was scheduled to make complete resection of the tumor, skin flap reconstruction under endotracheal general anesthesia. She has inserted an endotracheal tube through a fiberoptic bronchoscope under sedation and analgesia. The hypotensive anesthesia was made by a combination of inhalational and intravenous anesthetics, analgesics, and esmolol intravenous infusion to manage intraoperative blood pressure.

Appropriate patient selection, optimal preoperative patient preparation, selection of appropriate anesthesia methods, close coordination with surgeons and cardiologists, careful monitoring, and timely management of intraoperative complications are decisive factors for successful surgical anesthesia in patients.

Keywords: *General anesthesia, giant facial tumor surgery, atrial fibrillation, hypertension, valvular heart diseases*

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1. INTRODUCTION

General anesthesia for giant tumor resection and facial reconstruction in the elderly patient with atrial fibrillation, hypertension, and comorbidity valvular heart disease presents a major challenge for both anesthesiologists and surgeons in terms of the prevention and management of complications that may occur before, during, and after surgery.

2. CASE PRESENTATION

A 74-year-old cachexy female with 30kg body weight and 1m50 tall suffered from a giant facial tumor compressing on the right eye, right nose, narrowing the left nasal cavity, growing into the palate (Figure 1). CT Scan before and after contrast injection showed a large mass of (115 x 88 x 133)mm, occupying almost the entire right side of the middle facial layer, the facial artery and the right maxillary artery supplying blood to the tumor. MRI showed that the right maxillary ethmoid area had a soft mass signal with size 120 x 90mm. Results of electrocardiogram and echocardiography showed atrial fibrillation with ventricular rate 82 bpm, mild mitral valve regurgitation, mild aortic valve regurgitation, moderate tricuspid valve regurgitation, no pulmonary arterial hypertension, and normal left ventricular systolic function. She was admitted to the Center for Aesthetic and Reconstructive Plastic Surgery at the Le Huu Trac National Burn Hospital on December 3rd, 2020 with arrhythmia of 82 bpm, non-invasive blood pressure 150/60mmHg, no clinical heart failure. Preoperative test results were

normal except for leukocytes 12.4G/L, prob-type natriuretic peptide (proBNP) 847pg/mL, N-terminal-pro b-type natriuretic peptide (NT-proBNP) 1607pg/mL. She was treated for atrial fibrillation, hypertension, corrected electrolyte disturbances, and received intravenous nutrition.

The anesthesiologist examined her on January 8th, 2021 and found that she was alert, in a cachexia state, without edema, without chest pain, without dyspnea, breathing spontaneously (mainly through the mouth, partly through the nose) SpO₂ 98%; body temperature 37^oC, irregular heart rate 84 bpm, non-invasive blood pressure 118/65mmHg, no abnormal heart and lung sounds, Mallampati IV. She was scheduled for surgery on January 11th, 2021 with complete resection of the tumor, skin flap reconstruction under endotracheal general anesthesia.

At 08h15 on January 11th, 2021 the patient was transferred to the operating room in a state of consciousness, SpO₂ 99%, heart rate of 96 bpm on electrocardiography (ECG), atrial fibrillation, complete arrhythmia, non-invasive blood pressure 150/85mmHg. She was inserted peripheral intravenous infusion line with a 20-gauge catheter to infuse Ringer Lactate solution and to inject intravenously Fentanyl 30mcg. Then she has inserted a left subclavian venous catheter and invasive arterial blood pressure in the left femoral artery under local anesthesia with Lidocaine 40mg 1%.

At 08h40, she was given an intravenous injection of Midazolam 1mg, a loading dose of Esmolol 30mg. The glottis and trachea were locally anesthetized by

injection of Lidocaine 40mg 2% through the cricothyroid membrane. An endotracheal tube with an inner diameter of 6.0mm was inserted into the trachea through a fiberoptic bronchoscope with Lidocaine 60mg 1% injected into a bronchoscope port. Then, she was given intravenous injections of Rocuronium 20mg, Propofol 60mg, Sufentanil 10mcg and maintained anesthesia according to the hypotensive anesthesia protocol with Sevoflurane 1 - 1.5 vol.%, Sufentanil intravenous infusion by electric syringe pump 0.15mcg/kg/h, Esmolol intravenous infusion by electric syringe pump 10 - 50mcg/kg/min.

Intraoperative volume control ventilation (VCV) was used with set-up parameters as follows tidal volume 300 ml, frequency 14/min, inspiratory/expiratory time ratio (I:E) 1:2, positive end-expiratory pressure (PEEP) 5cmH₂O, inspiratory oxygen fraction (FiO₂) 50%, fresh gas flow (FGF) 2l/min. Electrodes were attached to the electrical shock machine so that cardioversion shock therapy can be given.

At 09h10, the surgeons started to make skin incisions. During general anesthesia and surgery course, atrial flutter still appeared frequently on ECG, ventricular response fluctuated 67 - 137 bpm, invasive blood pressure fluctuated 69/34 - 112/51mmHg, invasive mean pressure fluctuated 41 - 76mmHg, SpO₂ maintained 100%, end-tidal carbon dioxide (EtCO₂) fluctuated 31 - 33mmHg, central venous pressure (CVP) fluctuated 6 - 15cmH₂O.

Furthermore, blood gas values e.g., pH, PaCO₂, HCO₃⁻ were acceptable (Table 1). The surgery ended at 13h05 on the same day and the surgical duration was 235 minutes. At the end of the surgery, she did not awake and was maintained mechanical ventilation under intravenous infusion of Midazolam 0.5mcg/kg/min and Fentanyl 0.01mcg/kg/min to gain SpO₂ 100%. The ECG showed atrial fibrillation, complete arrhythmia with a ventricular rate of 116 bpm. The invasive blood pressure was 96/45mmHg, and CVP was 12cmH₂O. Intraoperative blood loss and urine output volumes were 900ml and 60ml/h, respectively. Seven hundred milliliter plasma and seven hundred milliliters packed red blood cells were infused during the surgery. She was transferred to the intensive care unit (ICU) at National Burn Hospital at 13h35 on the same day, continued synchronized intermittent mandatory ventilation (SIMV) with tidal volume 300ml, the fraction of inspired oxygen (FiO₂) 45%, frequency 14/min, PEEP 3cmH₂O. At the ICU, she was intravenously injected with antibiotics and corticosteroids, intravenously infused 350ml packed red blood cells, 200ml of 25% Albumin, Esmolol.

At 14h00 January 12th, 2021 her condition was awake, no postoperative bleeding, good spontaneous breathing, SpO₂ 100% with oxygen 3L/min, breathing frequency 20/min, tachycardia 107 bpm on ECG, invasive blood pressure 137/52mmHg.

Table 1. Blood gas results

	Immediately after the intubation (before the skin incision)	Immediately after the tumor removal and hemostasis	After completing the infusion of 350ml packed red blood cells	At the end of the surgery	Immediately before the extubation
pH	7.43	7.42	7.29	7.3	7.41
pCO ₂	30mmHg	30mmHg	36mmHg	40mmHg	40mmHg
K ⁺	3mmol/L	4.3mmol/L	5mmol/L	4.8mmol/L	3.3mmol/L
Glucose	5.4mmol/L	5.8mmol/L	12.9mmol/L	9.9mmol/L	4mmol/L
Lactate	1mmol/L	1.2mmol/L	3.9mmol/L	3.4mmol/L	1.4mmol/L
BE	-2.8mmol/L	-1.6mmol/L,	-8.5mmol/L	-5.3mmol/L	0.7mmol/L,
HCO ₃ ⁻	22.0mmol /L	23.8mmol/L	18.4mmol/L	24.9mmol/L	25.5mmol/L
Hb		64g/L	88g/L		

She was endotracheal extubated (Figure 2) and transferred to the Center for Aesthetic and Reconstructive Plastic Surgery on January 14th, 2021. She was

discharged from the hospital on January 29th, 2021 and the pathological diagnosis was low-grade epithelial-myoeipithelial carcinoma.

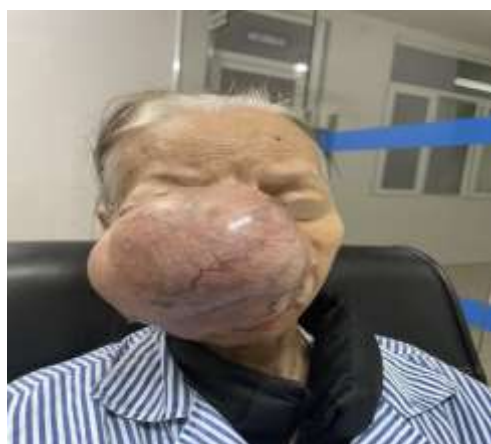


Figure 1. The patient before the surgery



Figure 2. The patient after the surgery

3. DISCUSSION

In the cachexia elderly case, the indication for endotracheal general anesthesia was mandatory for a giant facial

tumor resection because there were many risks, e.g., atrial fibrillation, tricuspid valve regurgitation, mitral valve regurgitation, aortic valve regurgitation, hypertension, the complex tumor location, the lengthy

surgical duration. The selection of measures for airway and hemodynamic management, treatment of cardiac arrhythmias during surgery was made by coordination between the team of anesthesiologists, intensivists, and cardiologists to propose a suitable plan.

Head and neck cancer patients often had cardiovascular and respiratory diseases and poor nutritional status. Major head and neck surgery were classified as medium-risk surgery with a 30-day risk of cardiovascular events of 1 - 5% [1]. Cardiovascular biomarkers, e.g., BNP and proBNP were useful for screening heart failure and 30-day mortality independent prognostic factors due to heart diseases. Preoperative malnutrition correlated independently with poor wound healing, infection, and postoperative complication increase [1].

The patient was diagnosed with low-grade epithelial-myoepithelial carcinoma and she was given combined intravenous nutrition before the surgery, but the BMI was still as low as 13.3. In addition, she had a valvular disease, hypertension, atrial fibrillation, proBNP 847pg/mL, NT-proBNP 1607pg/mL and was treated for hypertension, atrial fibrillation before the surgery, so echocardiography before the surgery showed the pulmonary artery pressure did not increase, the left ventricular systolic function was normal. Furthermore, she did not have any clinical symptoms of heart failure.

The benefits of the surgery must be weighed against the risks, and the anesthesiologist has an important role to decide on the plan.

The patient has been identified as having difficulty endotracheal intubation

due to Mallampati IV [2]. She was unable to receive mask ventilation after general induction due to the large tumor on the right side of the face invading the nose and the palate. The endotracheal intubation approach on awakening was advantageous in maintaining a clear airway, exchanging gases, and avoiding regurgitation of aspiration pneumonia during the intubation. We chose to insert the endotracheal tube through the fiberoptic bronchoscope. Before the intubation, the patient has intravenously injected Esmolol 30mg, Fentanyl 30mcg, and Midazolam 1mg due to an increase in blood pressure of 173/64mmHg, made local anesthesia of the Pharynx and Larynx with Lidocaine. During the intubation, she was fully awake and maintained suitably spontaneous breathing. An endotracheal tube with an inner diameter of 6.0mm was suitable for the patient weighing only 30kg.

Major surgery on the head and face causes a lot of bleeding because of the large vascular distribution of this area, moreover, the surgery is often lengthy. Therefore, the use of hypotensive anesthesia for major head and facial surgery reduces intraoperative blood loss, blood transfusion requirements, complications of massive blood transfusion, and improves surgical conditions.

During hypotensive anesthesia, baseline mean arterial pressure (MAP) is reduced by up to 30% [3], [4], systolic blood pressure is reduced to approximately 80 - 90mmHg, and MAP is reduced to approximately 50 - 65mmHg [5]. The use of hypotensive anesthesia is associated with the risk of decreased perfusion of vital organs [6], [7]. Patients with high blood pressure are also at high risk of

hypotension. If hypotensive anesthesia is used in a hypertensive patient, the patient must be closely monitored and treated with extreme caution because of the risk of rapid and profound reductions in blood pressure due to the effects of antihypertensive. There are two methods of hypotensive anesthesia. The first one is a combination of deep anesthesia and high doses of analgesia. The second one is the use of antihypertensive drugs in patients under standard anesthesia [8].

The patient had an underlying medical condition of high blood pressure, atrial fibrillation, and heart valve diseases, so we used the standard anesthesia strategy in combination with the antihypertensive drug esmolol to achieve moderate blood pressure to limit bleeding during surgery. After completion of endotracheal intubation and anesthesia induction with propofol, she was made anesthesia maintenance with Sevoflurane, Sufentanil, and Esmolon. Esmolon is a beta-adrenoceptor antagonist with an antihypertensive effect due to decreased cardiac output [8]. The patient was used esmolol for the brief duration of tracheal intubation for an adrenergic blockade and anesthesia maintenance because Esmolol is easily titrated to respond and adverse effects are rapidly managed by the termination of the infusion [9]. With the above-mentioned hypotensive anesthesia method, invasive blood pressure fluctuated from 69/34mmHg to 112/51mmHg and mean blood pressure (MAP) fluctuated from 41mmHg to 76mmHg during the surgery. Hypotension was defined as either MAP decreased of more than 40% and MAP < 70 mmHg, or MAP < 60mmHg alone [10]. When MAP < 60mmHg, ephedrine at a dose of 5 mg/time was intravenously injected to raise blood

pressure [4]. Ephedrine is the first-line treatment of intraoperative hypotension during general anesthesia [10]. Ephedrine is a sympathomimetic, acting on alpha and beta-adrenergic receptors and causing an increase in blood pressure due to increased cardiac output and peripheral vasoconstriction.

During the surgery, atrial fibrillation (AF) persisted despite esmolol intravenous infusion. Atrial fibrillation is the most common arrhythmia. The incidence of atrial fibrillation increases from 1% over age 60, 7.2% over age 65, and 10% over age 75 [11]. Rapid ventricular rate with the onset of hemodynamic disturbance is a medical emergency requiring electrical cardioversion. The aim of managing patients with symptomatic and life-threatening AF is to restore sinus rhythm and hemodynamic stability [11]. She was intraoperatively infused esmolol and sufentanil to control rapid ventricular rate as well as maintain hypotensive anesthesia. Furthermore, electrodes were attached to the electrical shock machine so that cardioversion shock therapy can be administered.

4. CONCLUSIONS

General anesthesia for giant facial tumor resection in the cachexia elderly patient with atrial fibrillation, hypertension, and heart valve disease is difficult with both anesthesiologists and surgeons. Appropriate patient selection, optimal preoperative patient preparation, selection of appropriate anesthesia methods, close coordination with surgeons and cardiologists, careful monitoring, and timely management of intraoperative complications are decisive factors for successful surgical anesthesia in patients.

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