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Case report

Anesthesia for an elderly female with a rare congenital heart disease – A case report

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Abstract The long term survival of patients with Eisenmenger syndrome will make challenge for anesthetics; the risk during anesthesia of Eisenmenger syndrome may be increased. Combination of anesthetic considerations of Eisenmenger syndrome and anesthetic management of elderly patients must be considered.

We present a case of female patient 78 year old with long standing Eisenmenger syndrome. Her ECHO cardiography showed ejection fraction 57%, dextrocardia, large VSD 1.4 cm with right to left shunt with systolic pressure gradient 70 mmHg, moderate to severe TR, moderate MR, dilated and hypertrophied RV with preserved systolic function, hugely dilated right atrium, and severe pulmonary hypertension with pulmonary artery systolic pressure 125 mmHg.

The patient had future neck femur, arthroplasty under hemi spinal anesthesia. After one month she presented to us with dislocated joint, and hemiarthroplasty under hemispinal anesthesia was done again.

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1. Introduction

Only 15–25% of congenital heart disease patients survive into adulthood [1]. Approximately 90% of these children survive to adulthood due to Advances in prenatal diagnosis, and interventional cardiology; pediatric cardiac surgery, anesthesia, and critical care have resulted in survival of patients.

Eisenmenger syndrome (or **ES**, **Eisenmenger's reaction** or **tardive cyanosis**) is defined as the process in which a left to right shunt caused by a congenital heart defect in the fetal heart causes increased flow through the pulmonary vasculature, causing pulmonary hypertension [2] which in turn causes increased pressures in the right side of the heart and reversal of the shunt into a right. Eisenmenger syndrome is a cyanotic heart defect characterized by a long-standing intracardiac shunt caused by ventricular septal defect, atrial septal defect.

The long term survival of patients with **Eisenmenger** syndrome will make challenge for anesthetics; the risk during anesthesia of **Eisenmenger** syndrome may be increased. Combination of anesthetic considerations of Eisenmenger syndrome and anesthetic management of elderly patients must be considered.

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Common causes of heart failure in Eisenmenger syndrome are coronary artery disease including a previous myocardial infarction (heart attack), high blood pressure, atrial fibrillation, valvular heart disease, excess alcohol use, infection, and cardiomyopathy of an unknown cause [3,4].

Geriatric patients have decreased beta-adrenergic responsiveness and they experience an increased incidence of conduction abnormalities, bradyarrhythmias and hypertension. Fibrotic infiltration of cardiac conduction pathways makes the elderly patient vulnerable to conduction delay and to atrial and ventricular ectopy [5].

Complications of Eisenmenger syndrome are fainting spell, thromboembolism, and hypovolemia. Elderly patients also have an increased reliance on Frank-Starling mechanism for cardiac output. It is therefore important to consider fluid administration carefully. In the non compliant older heart, small changes in venous return will produce large changes in ventricular preload and cardiac output. Due to diastolic dysfunction and decreased vascular compliance, the elderly patient compensates poorly for hypovolemia. Similarly, exaggerated transfusion is also poorly tolerated [6].

In Eisenmenger syndrome there is pulmonary hypertension lung congestion and increased risk of pneumonia.

In elderly non cardiac patients there are increased risk of COPD, pneumonia, and sleep apnea which are very common among the elderly. Closing volume increases with age, and FEV1 declines 8–10% per decade due to reduced pulmonary compliance. PaO₂ decreases progressively with age because of V/Q mismatch and anatomical shunt. All these pathophysiological changes may increase respiratory complications of Eisenmenger syndrome [7,8].

As regards Pathophysiology of the renal function due to aging, renal blood flow and kidney mass decrease with age. Serum creatinine level remains stable due to a reduction in muscle tissue. Impairment of sodium handling, concentrating ability and diluting capacity predisposes elderly patients to dehydration and fluid overload. Reduced renal blood flow and decreased nephron mass increase the risk of acute renal failure in the postoperative period. Eisenmenger syndrome has renal problems, which may increase risk of renal impairment when accompanied with the pathophysiological changes in elderly patients [7,8].

Dosage requirements for local and general anesthetics are reduced. Administration of a given volume of epidural anesthetic results in a more cephalic spread, having though a shorter duration of sensory and motor block. Elderly patients take more time to recover from general anesthesia especially if they were disoriented perioperatively; however, there is a risk of thromboembolism and stroke in Eisenmenger syndrome and Geriatric patients experience varying degrees of delirium. They are sensitive to centrally acting anticholinergic agents. The incidence of delirium is less with regional anesthesia, provided that there is no additional sedation [9–11].

The circulating level of albumin which is the main plasma binding protein for acidic drugs decreases with age. On the other hand, the level of α -1 acid glycoprotein the binding protein for basic drugs increases. The effect of aging on pharmacokinetic depends upon the drug used.

The decrease in total body water leads to a reduction in the central compartment and increased serum concentrations after a bolus administration of a drug. On the other hand, the

increase in body fat results in a greater volume of distribution, thus prolonging drug action.

Drug metabolism could probably be altered by the aging effect on hepatic or renal function.

The elderly are more sensitive to anesthetic agents and generally require smaller doses for the same clinical effect, and drug action is usually prolonged. A person with Eisenmenger syndrome is paradoxically subject to the possibility of both uncontrolled bleeding due to damaged capillaries and high pressure, and random clots due to hyper viscosity and stasis of blood. Coughing hemoptysis and bleeding may lead to iron deficiency, anemia, coagulation defects which may interfere with regional anesthesia [9–11].

Anesthetic management of an elderly **Eisenmenger** syndrome should include participation of anesthesiologists, cardiologists, intensivists, and surgeons.

Aim of the anesthetic technique should include avoidance of increase of pulmonary pressure, avoidance of volume overload, light anesthesia and patchy regional anesthesia, which can lead to increase the systemic vascular resistance, maintenance of euvolemia and care of the renal function, management of tachyarrhythmia, or bradyarrhythmia, venous line care of any air bubbles, bleeding tendency and intraoperative bleeding, coagulopathy and regional block, infection, and the endocarditis antibiotics prophylaxis, positioning (prone, Trendelenburg), oxygenation and prevention of hypoxia in these already cyanotic patients [11].

When an elderly patient with long standing Eisenmenger syndrome needs an emergency anesthesia for hemiarthroplasty the anesthetic management becomes a challenge. Anesthetic consideration must include anesthesia for pulmonary hypertension, heart failure, ischemic heart disease, dysrhythmias, hypertension, endocarditis, cardiomyopathy, bleeding, thromboembolism, chest infection, and kidney problems. It is more complicated when failure of operation occurred and another operation was needed within one month as in our present case [12].

Case of female patient 78 year old with long standing Eisenmenger syndrome had future neck femur, arthroplasty under hemi spinal anesthesia after one month recurrence of fractures, and hemiarthroplasty under hemi spinal anesthesia again.

1.1. Preoperative preparation

1.1.1. History

A 78 year old female was admitted with fracture left neck of femur for hemiarthroplasty operation. The patient is known case of congenital heart disease. No history of dyspnea, orthopnea, paroxysmal nocturnal dyspnea, syncope, chest pain or stroke. There is history of lower limb edema treated with furosemide 20 mg once daily and tablet digoxin 0.25 μ g daily.

1.1.2. Physical examination

On examination blood pressure was 120/60, heart rate was 100 irregular, and congested neck veins were up to the angle of the mandible. There are central cyanosis, and bilateral clubbing of upper and lower limb with no lower limb edema. Chest examination is free. Cardiac examination revealed Dextrocardia, and harsh pansystolic murmur over the right parasternal area. Another pansystolic murmur over the apex of the heart propagating to the right axilla was auscultated.

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