

Anesthetic management of a child with corrected transposition of great vessels undergoing non-cardiac surgery

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ABSTRACT

We describe the successful anesthetic management of a 14-year-old child, a corrected case of transposition of great vessels in childhood and presently with residual atrial septal defect, peripheral cyanosis, and neurological deficit of lower limb presented for tendoachillis lengthening.

Key words: Atrial septal defect, general anaesthesia, transposition of great vessels

INTRODUCTION

Long-term survival rates in corrected congenital heart diseases (CHD) have improved because of advances in interventional cardiology and cardiac surgery. As a result, survival of patients with even the most complex cardiac lesion is now a reality.^[1,2] Therefore, the number of patients with CHD coming for non-cardiac procedures is also increasing. We describe the anesthetic management of a child with corrected transposition of great arteries (TGA) undergoing tendoachillis lengthening.

CASE REPORT

A 14-year-old girl weighing 30 kg presented with deformity of right foot following trauma and gait abnormality for 3 years. During childhood she suffered frequent from

respiratory tract infections. Further assessment revealed her to have TGA for which she underwent pulmonary artery banding twice followed by a double switch procedure in childhood. Currently, she was on tablets, ramipril 2.5 mg and hydrochlorothiazide 12.5 mg for afterload reduction.

Pre-anesthetic check-up showed stable vitals except for mild peripheral cyanosis with SpO₂ 90% on room air. Cardiovascular evaluation revealed sternotomy scar, apex beat on right 5th intercostal space lateral to midclavicular line. No raised jugular venous pressure or parasternal heave was evident. Heart sounds were heard on the right chest and there was no murmur. She had a good effort tolerance.

Laboratory investigations including haematocrit and electrolytes were normal. Electrocardiogram (ECG) showed heart rate 84 per minute, T wave inversion in V1, V2, and V3. Chest X-ray revealed dextrocardia. 2-D echocardiogram showed dextrocardia, situs inversus, atrioventricular-ventriculoatrial concordance, mild atrioventricular valve regurgitation on both left and right side. A 2.5 mm size ostium secundum atrial septal defect with bidirectional shunt, normal biventricular systolic function, and intact interventricular septum was found. Arterial blood gas on room air revealed pH 7.48, PaCO₂ 26 mmHg, PaO₂ 59 mmHg, and HCO₃ 19 mEq/L. Tab ramipril was

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continued and hydrochlorthiazide were skipped in the morning during surgery. Once the child was on operating table, baseline monitoring established (NIBP, SpO₂, ECG on right side). Intravenous (IV) access 20 G canula left hand and left radial artery cannulated with 22 G canula and hep-locked with precautions not to inject/avoid air-bubbles. Infective endocarditis prophylaxis given with IV ampicillin 1.5 G and gentamycin 40 mg. Induction involved pre-oxygenation, fentanyl 50 µg, etomidate 8 mg, and sevoflurane 2-2.5% in O₂. A proseal LMA (PLMA) size 2.5 was inserted following atracurium 15 mg. Controlled ventilation was initiated with tidal volume 250 mL, respiratory rate 13/min, and anesthesia maintained with sevoflurane 1.5-2%, air: O₂ mixture with FiO₂ 40%. The procedure involved repair of tendoachillis tendon under tourniquet. Throughout the procedure (50 min) patient remained stable, maintaining SpO₂ 94-96%. The patient received 375 mL crystalloids. At the end of the procedure, the neuromuscular blockade was antagonized with neostigmine 1.5 mg and glycopyrrolate 0.3 mg. PLMA was removed once the patient was awake. The postoperative course was uneventful.

DISCUSSION

It is important to review whether the CHD surgery has been definitive or palliative as the cardiac physiology returns to near normal following a definitive repair. Corrected CHD are often asymptomatic even with residual defect which may be unmasked by stress of surgery and anesthesia. Congenital deformity of airway, spine, or anorectal malformation may co-exist. Exercise tolerance is perhaps the most informative and simplest method for estimating cardiac reserve in patients with CHD. Important anesthetic concerns include pediatric age group, presence of residual defects, problems that can occur after repair of CHD such as dysrhythmias, sinus node dysfunction, pulmonary hypertension, bidirectional shunt, paradoxical air embolism, infective endocarditis, and current medications. Our patient received preoperative infective endocarditis prophylaxis because of the residual defect.^[3]

TGA accounts for 4% of all CHD. Atrial switch and arterial switch (Jatene procedure) are the known corrective surgical procedures.^[2] Our patient underwent arterial switch. Advantages of this over atrial switch are anatomical correction of discordant ventriculoarterial connections, reduced incidence of rhythm disturbances, prevention of the development of right ventricular failure.^[4] However, neo-aortic root dilation, coronary stenosis, and occlusion of coronary artery are reported complications associated with this procedure.^[5] Important goal is to preserve the balance of existing shunt by manipulating systemic and pulmonary vascular resistance (PVR) relative to each other. In left to right shunt, a degree of peripheral vasodilatation

with mild hypotension is well tolerated. Shunting is increased if PVR is increased by hypoxia, hypercarbia, or light plane of anesthesia. Other hemodynamic goals are maintaining preload, normal heart rate, and contractility.^[6]

Propofol was avoided for induction in view of ramipril. Induction dose of propofol alone produces 25-40% reduction in systolic, mean, and diastolic blood pressure independent of the presence of cardiovascular disease.^[7,8] Decrease in pressure is more when patient is on ACE inhibitors.^[9] Etomidate was used for induction although it will not attenuate the laryngeal reflexes as effectively as propofol. To facilitate introduction of laryngeal mask airway atracurium was used. Use of relaxants is beneficial in patients in whom cardiovascular stability is needed.^[10,11] Tracheal intubation was not considered to avoid hemodynamic responses. Nitrous oxide was not used because of the dynamic nature of the shunt under anesthesia and due to the presence of peripheral cyanosis.

Literature shows that patients with corrected TGV can undergo general anesthesia safely without invasive monitoring.^[12] "perioperative care should be individualized based on the presence of comorbidities, type of repair, residual cardiac disease, severity of planned surgery, and experience of the provider".^[12]

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