Induction of Supraventricular Tachycardia by Intraoperative Transesophageal Echocardiography

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Introduction: The use of intraoperative transesophageal echocardiography (TEE) in infants and children undergoing repair of congenital heart defects has increased. TEE has been useful in guiding the repair and in detecting residual lesions. However, its use is not free of complications (Table). In this report, an infant developed multiple episodes of supraventricular tachycardia (SVT) during TEE evaluation.

Case Report: This 10 day/old, 3.2kg male infant was taking to the operating room for repair of truncus arteriosus. Prenatal diagnoses consisted of a large ventricular septal defect and abnormal great vessels suggesting double outlet right ventricle. After birth, further cardiac ultrasound evaluation and cardiac MRI confirmed the diagnosis of truncus arteriosus and interrupted aortic arch. There was interruption of a right-sided aortic arch (Type B) and ductal supply to the descending aorta, with the right subclavian artery arising from the distal aortic arch, and the left subclavian artery "isolated" arising from the main pulmonary trunk; the two carotid arteries were supplied from a single ascending vessel that diverged from the arterial trunk just above the truncal valve. The branch pulmonary arteries arose from opposite sides of the large pulmonary portion of the trunk. There was a large conoventricular septal defect, with a tricommissural truncal valve with no stenosis or regurgitation. The thymus gland was absent.

As the aortic arch was not initially thought to be supplied by ductal tissue, he was observed off prostaglandin infusion in the cardiac intensive care unit. Then he developed sings of poor perfusion a few days later and responded to prostaglandin infusion. He had transient elevation in the liver function tests and creatinine following this event, as well as abdominal distension. These normalized over the next few days and he never developed evidence of colitis on broad spectrum antibiotics.

On arrival to the operating room, he was on prostaglandin and dopamine infusions. The vital signs were stable and he was in sinus rhythm with no evidence of preexcitation. He was mechanically ventilated in room air. A right femoral double lumen venous line and a right radial arterial catheter had been previously placed in the intensive care unit. After placing ASA standard monitors, anesthesia was induced with fentanyl and pancuronium. The right internal jugular vein was cannulated under ultrasound guidance with a 4Fr double lumen 5cm long catheter without any complications. Anesthesia was maintained with boluses of fentanyl, isoflurane and pancuronium. Aprotinin was utilized as per surgeon.

The TEE probe was easily inserted afterwards and no respiratory compromise was noted. However, SVT was easily induced during the ultrasound evaluation. The first episode of SVT occurred prior to skin incision and was treated successfully with 0.1mg/kg of intravenous adenosine. There was a slight decreased in blood pressure with each episode of SVT. Three more episodes of SVT were induced during the ultrasound assessment and before establishment of cardiopulmonary bypass. Each one responded to adenosine.

The patient was heparinized and placed on cardiopulmonary bypass via a 3mm Gore-Tex shunt sutured onto the left carotid artery and a ductal aortic cannula. The venous drainage was from the right atrium. The repair consisted of autologous reconstruction of ascending aorta and aortic arch, placement of right ventricle to pulmonary artery conduit, left pulmonary artery plasty, suture ligation of left subclavian artery, VSD patch closure and fenestrated ASD closure. The patient was weaned from cardiopulmonary

bypass with ease. Post repair TEE demonstrated an adequate repair. He developed SVT during TEE examination with no hemodynamic compromise that responded to DC cardioversion.

The patient was transferred to the intensive care unit with stable hemodynamics and with an open chest that was closed two days later. No episodes of SVT were noted in the intensive care unit or before discharge from the hospital.

Discussion: In this infant, SVT was induced during intraoperative TEE evaluation. This infant had the substrate to develop SVT (a reentry or enhanced automaticity mechanism). It is possible that the TEE probe provoked a premature atrial or ventricular contraction that was capable of inducing SVT and/or caused distension of the left atrial cavity that led to the development of a reentrant circuit. Prompt recognition and treatment of SVT in the described infant, mostly likely prevented the development of intraoperative hemodynamic compromise.