

Compression of the left subclavian artery caused by a transesophageal echocardiography probe in an infant with a right-sided aortic arch —A case report—

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Intraoperative transesophageal echocardiography (TEE) has become an important monitoring device for patients undergoing cardiac or noncardiac surgery. Complications associated with TEE are unusual, but the potential for TEE probe compression of the posterior vascular structures has been reported in baby patients. We present here a case of compression of the left subclavian artery in an infant with a right-sided aortic arch after insertion of a TEE probe. (*Anesth Pain Med* 2013; 8: 196-198)

Key Words: Complications, Transesophageal echocardiography.

The use of transesophageal echocardiogram (TEE) has recently become more prevalent during monitoring of cardiac surgeries and surgeries involving possible severe hemodynamic change [1]. Although complications associated with TEE are very rare, they can occur during or after insertion of a probe [2-4]. In the present case, a TEE probe used on an infant with tetralogy of Fallot (TOF) and a right-sided aortic arch caused compression of the left subclavian artery.

CASE REPORT

An 1-year-old, 77 cm, 9.8 kg male patient presented for TOF total corrective surgery. Computed tomography thoracic aortic angiography was performed as a preoperative test. The aortography revealed that the right-sided aortic arch with the left brachiocephalic trunk was aberrant in the aortic arch (Fig.

Received: January 15, 2013.

Revised: February 1, 2013.

Accepted: March 14, 2013.

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1). The left subclavian artery, branching from the left brachiocephalic trunk was aberrant between the esophagus and vertebral body but was not severe compressed by collapsed esophagus and vertebral body (Fig. 2). Both radial artery pulses were palpated well, and no difference in blood pressure was observed between the two upper extremities. No symptoms of dysphagia or respiratory difficulty were noted, and the patient was moved to the operating room.

Ketamine and rocuronium were administered intravenously to induce anesthesia, and endotracheal intubation was performed. Anesthesia was maintained using desflurane. A 24-gauge catheter (Introcan[®], B. Braun AG, Melsungen, Germany) was inserted into the left radial artery, and continuous monitoring of the arterial pressure was initiated. Next, a 22-gauge catheter



Fig. 1. Computed tomography thoracic aorta angiography. A right-sided aortic arch and descending aorta are shown. The left brachiocephalic trunk (arrow) was aberrant in the aortic arch.



Fig. 2. Computed tomography angiography of the aortic arch. The left subclavian artery (c) was aberrant between the esophagus (b) and vertebral body (d), and not compressed by collapsed esophagus and vertebral body. (a) Trachea.

(Introcath[®], B. Braun AG, Melsungen, Germany) was inserted into the right femoral artery to enable accurate blood pressure monitoring. A central catheter was inserted into the right internal jugular vein to continuously monitor central venous pressure.

Radial artery pressure was monitored along with the continuous monitoring of femoral artery pressure. Hemodynamic conditions following anesthesia induction were stable, and a 10.9 × 8.4 mm pediatric TEE probe (9T probe, GE Vingmed Ultrasound, Horten, Norway) was inserted into the esophagus. Immediately after inserting the TEE probe, the left radial artery pressure waveforms decreased significantly, whereas right femoral artery pressure remained stable. Also, there were no signs or symptoms suggesting the possible compression of trachea or bronchus, such as increased inspiratory airway pressure. The TEE probe was slowly removed from the esophagus, and the dampened left radial waveform recovered. We observed a recovery of arterial pressure dampening after slowly advancing and retracting the probe twice (Fig. 3).

Based on these findings, it was suspected that the TEE probe compressed the aberrant left subclavian artery; therefore, the TEE probe was removed and intraoperative transthoracic echocardiography (TTE) was performed as an alternative method by pediatric cardiologist. The postoperative course was uneventful.

DISCUSSION

We experienced compression of the left subclavian artery caused by a TEE probe in an infant who had a right-sided aortic arch. The present case had a left subclavian artery that was aberrant in the left brachiocephalic trunk, as the left



Fig. 3. Dampening of arterial wave forms caused by the transesophageal echocardiography (TEE) probe. Arrows indicate the beginning and end of TEE probe insertion.

subclavian artery passed between the esophagus and a vertebral body.

A right-sided aortic arch is a relatively common anomaly. Three major types of right aortic arch occur, including with mirror-image branching of the major arteries, with aberrant left subclavian artery, and with left subclavian artery no longer connected. A right-sided arch with an aberrant left subclavian artery occurs more frequently than the mirror image type. This anomaly rarely produces symptoms and is usually an incidental finding on a radiograph. Symptoms of esophageal or tracheal compression may develop in older individuals with ectasia and tortuosity of the great vessels [5].

TEE is a valuable tool for intraoperative management of children with congenital heart disease undergoing cardiac surgery [6] and improves patient care and safe [7,8]. Although a number of theoretical risks, such as mechanical injury by probe insertion and manipulation, mucosal pressure necrosis, or compression of the bronchus and the aorta by the probe, are associated with performing intraoperative TEE, complications are very rare [9-11].

Although adult TEE probes have been used successfully in patients as small as 14.7 kg [12], some authors recommend using a pediatric TEE probe for all patients weighing < 20 kg [8,12]. It seems to be reasonable to use pediatric TEE probe in this patient, but we experienced a compression of the left subclavian artery caused by a TEE probe in an infant with a right-sided aortic arch. The reproducibility of the perfusion decrease of the left arm following insertion of the TEE probe suggests that the left subclavian artery was compressed by mechanical pressure of the TEE probe. In this case report, it is important to emphasize that longterm compression of subclavian artery can lead to ischemic damage and necrosis to the left arm. When TEE is used for diagnosis during relatively short period, in most cases, compression of the artery does not lead to severe adverse events [13]. But as in the present case, used for monitoring during surgery, if compression of the artery is not detected and released early, the probe may cause vascular compression for a long period of time and can cause

ischemia and necrosis of upper extremity. Therefore, if aberrant arteries cross the between esophagus and other structures, it is necessary to compare blood pressure of both upper extremities to continuously monitor the radial artery pressure or to continuously monitor by pulse oximetry after probe insertion.

In patients with contraindications to TEE – such as perforated viscous, esophageal pathology, active bleeding or recent surgery of upper gastrointestinal tract, or in situations in which attempted TEE probe placement is harmful, like in this case report, intraoperative TTE or epicardial echocardiography can be a useful alternative for evaluating intracardiac air, cardiovascular performance, or success of corrective procedure [14].

In conclusion, we presented a case of compression of the left subclavian artery caused by a TEE probe in an infant with a right-sided aortic arch. We suggest that these probes must be used carefully considering the monitoring method and TTE or epicardial echocardiography can be a useful alternative.

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