Intraoperative Transesophageal Echocardiography Using a Miniaturized Transducer in a Neonate Undergoing Norwood Procedure for Hypoplastic Left Heart Syndrome

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A 7-day–old neonate (weight, 2.7 kg; height, 48 cm) with hypoplastic left heart syndrome was referred to our institution for a Norwood stage I palliation procedure. In the small neonate, conventional transesophageal echocardiographic probe insertion and manipulation can induce hemodynamic instability or respiratory compromise. Therefore, the usual weight range for neonates and infants who can be safely imaged in the operating department with the use of currently available echocardiographic probes is >3 kg.

Recently, a new phased-array intracardiac echocardiographic catheter (AcuNav, Acuson-Siemens Corp, Mountain View, Calif) has been developed and has been tested for transesophageal imaging in humans1 and animals.2 The dimensions of this catheter (3.3-mm diameter) allow for safe hemodynamic and respiratory imaging.

In the present report, we used this 3.3-mm diameter catheter intraoperatively before and after cardiopulmonary bypass. The transducer has a 64-element phased array oriented in a longitudinal plan with multiple frequencies from 5.5 to 10 MHz with maximal tissue penetration of 12 cm and was connected to a commercially available echocardiograph (CV 70, Acuson-Siemens Corp, Mountain View, Calif). After lubrication, the catheter was carefully inserted (15 seconds) after induction of anesthesia and nasotracheal intubation (Figure 1) with no difficulty and no hemodynamic or respiratory consequences. Before cardiopulmonary bypass, single right atrium, right ventricle, aorta, and main pulmonary artery were easily visualized (Movie I and II in the online-only Data Supplement), and we observed a good contractility of the right ventricle (Movie III in the online-only Data Supplement). After cardiopulmonary bypass discontinuation, mild neoaortic valve regurgitation was noticed (Movie IV in the online-only Data Supplement). Blalock-Taussig shunt was easily visualized (Movie V in the online-only Data Supplement), and Doppler recording of its flow was recorded (Figure 2).

These images demonstrate the valuable diagnostic utility of transesophageal echocardiography with the use of an intracardiac echocardiographic catheter in small neonates as an alternative to conventional transesophageal echocardiography with its associated hemodynamic and respiratory potential complications.

Disclosures

None.

References


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The online-only Data Supplement, which includes Movies I through V, is available with this article at http://circ.ahajournals.org/cgi/content/full/117/5/702/DC1.

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Figure 1. Nasoesophageal insertion of the miniaturized transducer. The catheter (3.3-mm diameter) was inserted through the right nasal orifice after nasotracheal intubation through the left nasal orifice in this 2.7-kg neonate.

Figure 2. Continuous-wave Doppler recording of the Blalock-Taussig shunt.
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