Intraoperative device closure of multidefect under transoesophageal echocardiographic guidance in an infant

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A 6-month-old female of 6 kg presenting with tachypnea, tachycardia, refractory heart failure, and pneumonia was referred to our centre for treatment. Complete echocardiography confirmed a perimembranous ventricular septal defect (VSD) associated with a secundum atrial septal defect (ASD) and a patent ductus arteriosus (PDA), sized of $\approx 5.4$, 9.0, and 4.6 mm in diameter, respectively.

An off-pump device closure of VSD, ASD, and PDA was performed under transoesophageal echocardiographic guidance. A newly designed delivery system, consisting only of a short delivery sheath and a delivery cable, was used in the procedure (Panel A). A 7 mm-sized concentric VSD occluder, a 10 mm ASD occluder, and a 6–8 mm ductal occluder were selected and pulled directly into the delivery sheath for use.

A 3 cm lower mini-sternotomy incision was made and the pericardium was cradled. The delivery sheath loaded with the device was inserted into the right ventricle and the right atrium, respectively. Device closure of the VSD and the ASD was performed through the perventricular and the peratrial approach (Panels B and C, arrow = VSD occluder, open arrowhead = ASD occluder). Then, the delivery sheath was inserted into the main pulmonary artery and advanced superiorly through the PDA into the descending aorta to deploy the ductal occluder (Panel D, solid arrowhead = PDA occluder).

Chest radiography and echocardiography showed that each device was in a proper position during a 6-month follow-up period (Panels E and F). The intraoperative device closure technique has the advantages of no age limit, simple process of device deployment, no need of a guidewire, and no exposure to radiation.

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