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Tetralogy of Fallot with Left Common Carotid Artery Arising from the Main Pulmonary Artery: A Rare Combination

E-PAGE ORIGINAL IMAGE

A 13-year-old female patient presented with a 2 month history of precordial bulge, without cyanosis, syncope, developmental delay, or family history of genetic disorders. Echocardiography showed right ventricular outflow tract obstruction, severe pulmonary stenosis (Figure 1A), a ventricular septal defect, and overriding of the aorta (Figure 1B), confirming the diagnosis of tetralogy of Fallot (TOF). In addition, echocardiography revealed a right-sided aortic arch (RAA) and an anomalous vascular structure connecting to the main pulmonary artery (MPA). Color Doppler imaging demonstrated continuous blood flow within this vessel (Figure 1C). Further computed tomography angiography with 3D reconstruction revealed the RAA and anomalous origin of the left common carotid artery (LCCA) from the MPA, with proximal segment tortuosity (Figure 1D and E). Consequently, a comprehensive cerebral evaluation was conducted for the patient, and time-of-flight magnetic resonance angiography of the brain showed well-developed intracranial segments of the

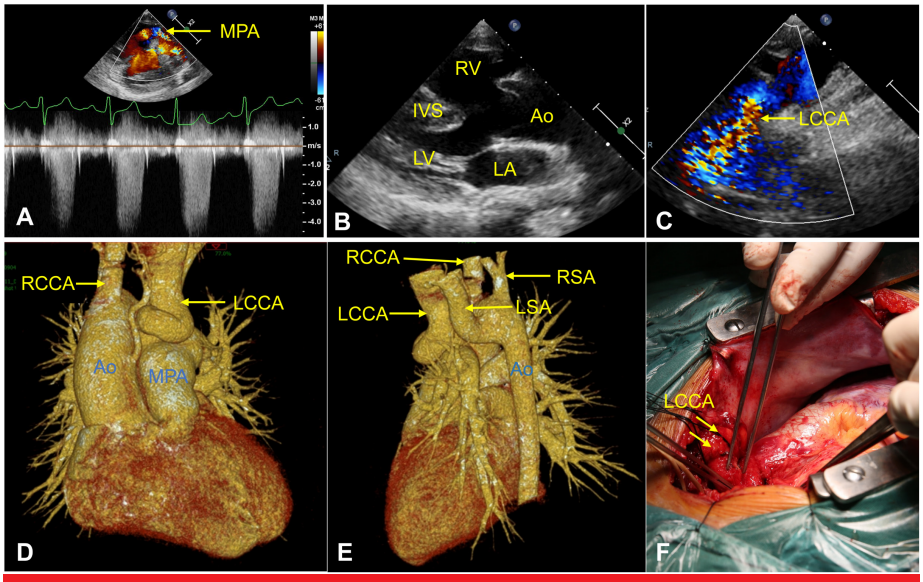

Figure 1. (A) Echocardiography showing severe pulmonary stenosis. (B) Echocardiography revealing ventricular septal defect and overriding of the aorta. (C) Color Doppler imaging demonstrating continuous blood flow within this vessel connecting to the main pulmonary artery. (D, E) Computed tomography angiography with 3D reconstruction reveals the anomalous origin of the left common carotid artery (LCCA) from the main pulmonary artery (MPA) and the right-sided aortic arch gives rise sequentially to the RCCA, RSA, LSA. (F) Intraoperative photograph showing the anomalous origin of the LCCA from the MPA. MPA, main pulmonary artery; LV, left ventricle; LA, left atrium; RV, right ventricle; IVS, Interventricular Septum; AO, aorta; LCCA, left common carotid artery; RCCA, right common carotid artery; RSA, right subclavian arteries; LSA, left subclavian arteries.

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bilateral vertebral arteries, basilar artery, and right posterior communicating artery. Subsequently, the patient underwent TOF corrective surgery with concomitant ligation of the aberrant LCCA (Figure 1F). The patient's oxygen saturation increased from 92% preoperatively to 100% postoperatively, and the patient was discharged 20 days after surgery and showed good recovery at the 6-month follow-up.

Anomalous origin of the LCCA from the MPA associated with TOF is an exceptionally rare combination of congenital abnormalities. Although this anomaly has been reported in association with 22q11.2 deletion syndrome or charge association,[1] genetic testing was not pursued in this patient owing to poor economic condition in her family. Imaging to confirm adequate brain blood supply is essential when determining the suitability of carotid ligation. Therefore, multimodality imaging plays an essential role in both definitive diagnosis and surgical planning for such anomalies.

Informed Consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

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