

Dizziness Result From Anomalous Origin of Left Common Carotid Artery

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ABSTRACT

Background: The anomalous origin of the left common carotid artery from the pulmonary artery is extremely scarce. At present, there are few relevant research and medical treatment data. This case is intended to provide relevant information and share treatment experiences.

Case information: A 6-year-old child was diagnosed with patent ductus arteriosus and underwent surgery five years ago with occasional dizziness. After examination, it was found that the abnormality of her left common carotid artery originated from the pulmonary artery, and the patient underwent arterial ligation with the monitoring of cerebral oxygen consumption by near-infrared spectroscopy after careful pre-operative evaluation. At present, it has been two years after the operation, and the patient is in good condition and has received regular follow-up.

Conclusion: For patients with an abnormal left common carotid artery from the pulmonary artery, after careful pre-operative evaluation such as cerebral angiography, under the monitoring of cerebral oxygen consumption by near-infrared spectroscopy, ligation of the proximal end of the artery of abnormal origin is safe and feasible.

INTRODUCTION

This article reports a 6-year-old child with an abnormal left common carotid artery that originated from the pulmonary artery, which is related to patent ductus arteriosus. This child developed vertigo due to abnormal blood flow.

Informed consent was obtained from the patient's parents.

CASE REPORT

A 6-year-old child, who was diagnosed with patent ductus arteriosus and underwent transcatheter closure five years ago, presented with occasional dizziness following the operation. The patient denied palpitation, shortness of breath, cough,

headache, and decreased tolerance for physical exercise. On physical examination, the distinctive finding was a pansystolic murmur detected most frequently at the left midsternal border. Transthoracic echocardiography demonstrated that the left common carotid artery was linked to the pulmonary artery and flowed into it (Figure 1A). (Figure 1) Chest computed tomography (CT) revealed a slight increase in bilateral lung markings (Figure 1B). Subsequent CT angiography confirmed that the left common carotid artery originated from the pulmonary artery, and the left subclavian artery originated from the descending part of the aortic arch. The basilar artery, bilateral anterior and middle cerebral arteries, as well as the size and shape of grade 1 and 2 branches were all normal. (Figure 2) A subsequent cerebral angiography revealed that the left common carotid artery was non-visualized, and the left subclavian artery opened normally. The right vertebral artery was a superior blood supply of posterior circulation, the left posterior communicating artery compensated the blood replenish to the left internal carotid artery, and blood flowed back to the left common carotid artery to the pulmonary artery. Through the anterior communicating artery, the right internal carotid artery compensated for the left middle cerebral and left internal carotid arteries. (Figure 3)

The patient's proximal left carotid artery was surgically ligated, and the patient's cerebral near-infrared spectroscopy and bilateral pupil changes were monitored throughout the procedure. After surgical ligation, a repeat CT angiography demonstrated a satisfactory outcome. (Figure 4) The patient left the hospital three days after the operation. For two years following surgical ligation of the left common carotid artery, the patient was not dizzy.

DISCUSSION

A common carotid artery has been reported to originate from the pulmonary artery; however, this is highly uncommon. Among the eight patients previously reported, one had atrial septal defect [Fong 1987], one had ventricular septal defect [Cohen 2019], two had tetralogy of Fallot [Huang 1996; Kaushik 2005], three had no congenital heart disease [Fouilloux 2013; Hurley 2008; Tozzi 1989], and only one had CHARGE syndrome [Osakwe 2016]. We report a scarce case of transcatheter closure of patent ductus arteriosus for five years with occasional dizziness lasting two months. The case was determined to be left carotid artery anomaly originating from the pulmonary artery, using the patient's medical history, echocardiography, and cerebral

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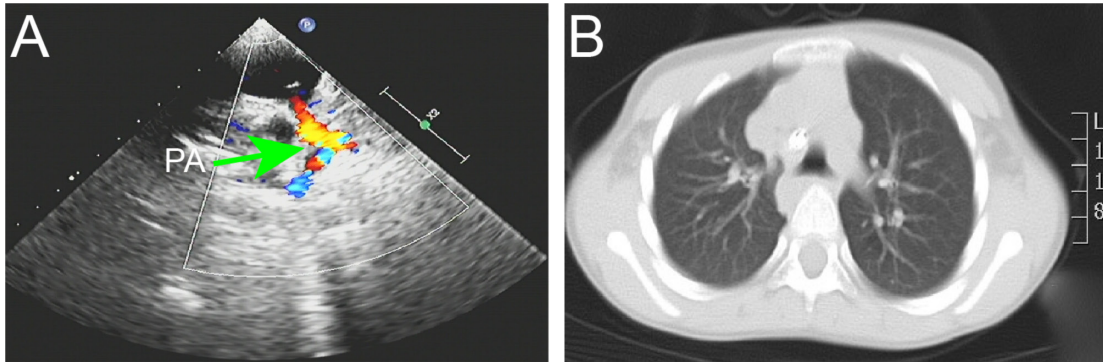


Figure 1. A) Transthoracic echocardiography revealed the abnormal flow direction in pulmonary artery. B) Chest CT demonstrated that bilateral lung markings slightly increased.

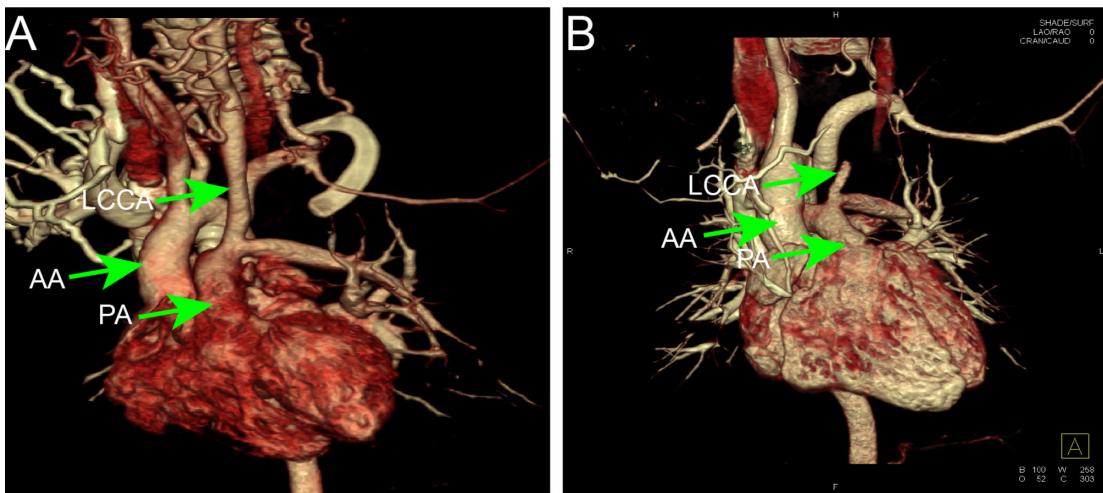


Figure 2. Three-dimensional CT reconstruction confirmed that the left common carotid artery originated from the pulmonary artery.



Figure 3. Cerebral angiography indicated the left common carotid artery was non-visualized, through the anterior communicating artery, and the right internal carotid artery compensated for the left middle cerebral and left internal carotid arteries.

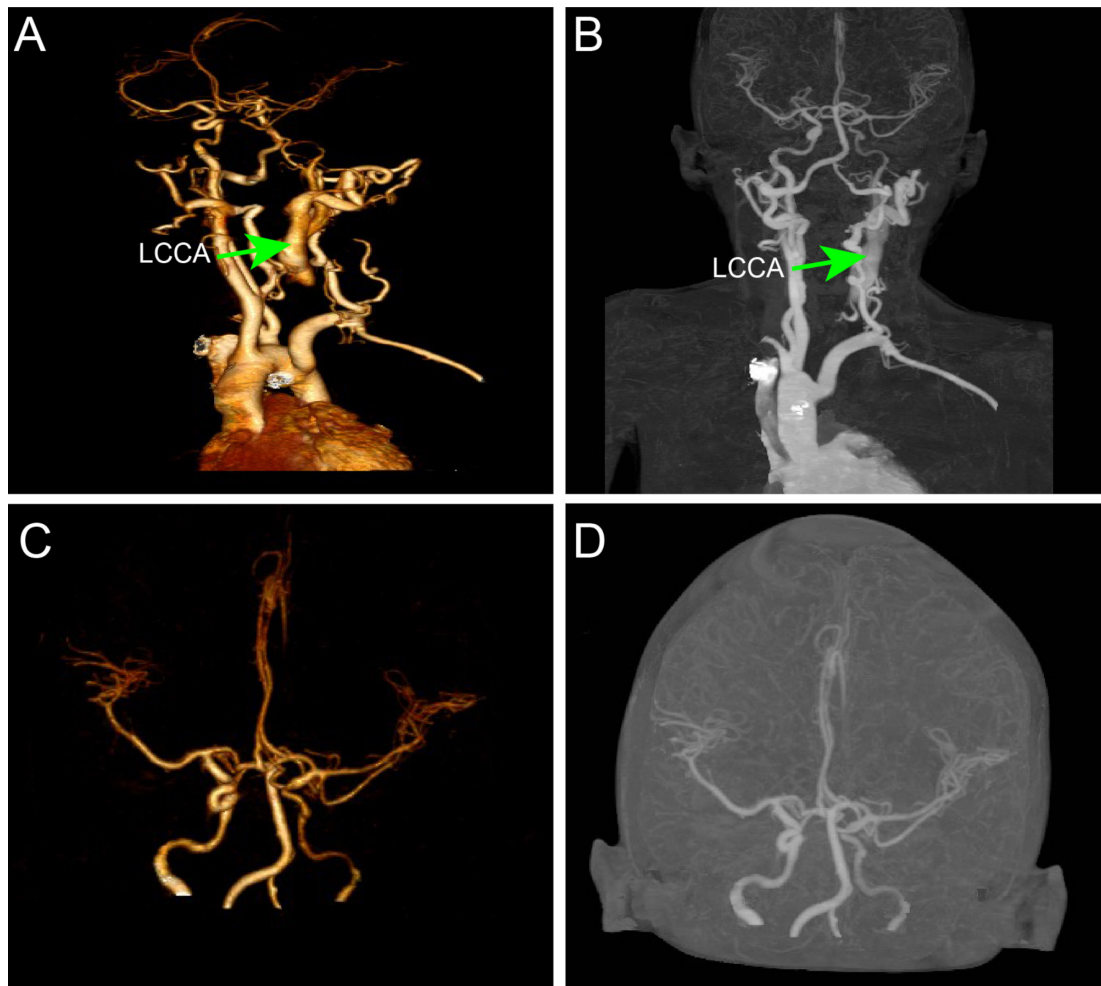


Figure 4. CT angiography after surgical ligation revealed a satisfactory outcome.

angiography. Due to the lesser pressure of pulmonary circulation, the blood flow in this vessel flows in the opposite direction, resulting in a “steal” of arterial replenish from the cerebral circulation [Fouilloux 2013]. Since dizziness disappeared after surgical ligation, cerebral angiography showed that dizziness was caused by arterial blood flow into the pulmonary circulation.

Under normal conditions, the left common carotid artery should act as an autonomic artery arch, supplying blood to the left cerebral hemisphere. The patient’s left common carotid artery anomaly originated from the pulmonary artery. Due to the pulmonary circulation’s lower pressure, cerebral blood flowed to the pulmonary artery, resulting in a drop in cerebral blood flow and an increase in pulmonary blood flow. This may result in a steal of arterial supply, pulmonary hypertension, and finally, congestive heart failure. As a result, it is critical to detect and prevent this type of anomaly early. In this case, we carefully separated the left common carotid artery, monitored cerebral oxygen consumption with near-infrared spectroscopy, attempted to block the proximal common carotid artery

before ligation, and observed that no abnormal change in cerebral oxygen saturation or bilateral pupil occurred. The left common carotid artery was ligated. The patient was discharged and currently is in good health in following up. We obtained the following experience as a result of this case: First, when the patient is found to have patent ductus arteriosus, we must determine other cardiac malformations and aortic arch malformations. Besides, the preliminary screening of aortic arch malformations is not difficult, and Doppler ultrasound can accomplish the above purpose. In addition, after a thorough preoperative evaluation, including cerebral angiography, to determine the integrity of the Willis ring and whether there are any other cerebrovascular abnormalities, it is feasible to ligate the proximal left common carotid artery while monitoring cerebral oxygen consumption with near-infrared spectroscopy. Surgery ligation minimized the extent of arterial manipulation necessary during surgery, reversed the trend of arterial blood flow entering the pulmonary circulation, improved cerebral perfusion, and avoided the occurrence of pulmonary hypertension.

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