Preoperative evaluation of total anomalous pulmonary venous connection in children with low-dose dual-source MDCT angiography

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Objective: To determine the diagnostic accuracy of low-dose dual source 256-detector multidetector computed tomographic (MDCT) angiography in children with total anomalous pulmonary venous connection (TAPVC).

Material and methods: MDCT angiography images of 43 patients [23 female (53%), mean age: 9 months (4 days-7.1 years)] with TAPVC confirmed by surgery were retrospectively reviewed. In all patients, MDCT examinations were performed using a dual-source 256-MDCT scanner (Definition Flash, Siemens Healthcare) with high pitch protocol. The types of TAPVC, the presence of obstruction and associated cardiovascular anomalies were investigated. According to accompanied cardiovascular anomalies, patients were subdivided into two groups as isolated and complex type. Isolated type was diagnosed if the patient had associated atrial septal defect (ASD) and/or patent ductus arteriosus (PDA) and complex TAPVC was diagnosed if the patient had other cardiovascular anomalies besides ASD and/or PDA.

Results: In 43 patients, 22 of them (51%) were supracardiac, 10 (23%) were cardiac, 6 (14%) were infracardiac, and 5 (12%) were mixed types. Obstruction was detected in 7 (16%) patients. 17 patients (40%) were isolated and 26 patients (60%) were complex type. The patients with complex TAPVR had one or more of accompanied anomalies including atrioventricular septal defect (n=7), ventricular septal defect (n=7), persistan left superior vena cava (n=7), pulmonary stenosis (n=7), right atrial isomerism (n=5), double outlet right ventricle (n=5), right aortic arch (n=5), transposition of the great arteries (n=4), tubular hypoplasia of the aortic arch (n=3), aortic coarctation (n=3), pulmonary artery hypoplasia (n=3), right pulmonary artery agenesis (n=1), cor-triatrium sinister (n=1), left ventricle agenesis (n=1), pulmonary atresia (n=1), hepatic interruption and anomalously drainage of inferior vena cava into left atrium (n=1), and an accessory left hepatic vein anomalously draining into left atrium (n=1). The diagnostic agreements between MDCT and surgical results were %100 in isolated and complex group. The overall mean effective radiation dose was 0.66 mSv (range, 0.15-1.11 mSv), and it was 0.52 mSv (range, 0.12-0.72) in the patients younger than 1 year old.

Conclusion: Dual-source 256-detector MDCT angiography is a reliable imaging modality allowing comprehensive anatomic imaging of TAPVC in neonates and children with lower radiation doses.