

SEVERE HYPOXIA DUE TO EARLY DEVELOPMENT OF THE COLLATERAL SYSTEMIC VEIN AFTER BIDIRECTIONAL GLENN SHUNT OPERATION: REPORT OF ONE CASE

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Introduction: In spite of a scrutinize angiogram study of the superior vena cava and brachiocephalic vein before bidirectional Glenn shunt (BDG) operation, some major collateral systemic veins (CSV) can still be developing in months to years, and cause a steal-off effect of the blood flow from the Glenn shunt to the systemic veins that return to the RA. Patients usually displayed a progressive deterioration in cyanosis and hypoxia. Occasionally, the CSV may develop at an early postoperative day and complicates the postoperative course.

Case report: A 9-month-old, 5.6 kg infant girl of complex congenital heart disease, including dextrocardia, double outlet of right ventricle { S D I } , mitral atresia, LV hypoplasia, VSD, moderate tricuspid regurgitation and s/p PA banding at 2 months of age, was admitted for pre-Glenn cardiac catheterization study. Both the RSVC and the LSVC angiograms showed no significant collateral veins (Fig 1a, 1b). The mean PA pressure was 19 mmHg. The diameters of the RPA and the LPA were 7.0 and 7.5 mm, respectively, and the Nakada PA index was 335. Therefore, a bilateral BDG shunt operation, accompanied with an MPA interruption and a

tricuspid valve reconstruction procedures, was undertaken the next day. She returned to ICU with a temporally opened sternum. The SaO₂, arterial pressure and mean SVC pressure were generally kept around 88%, 100/52 and 18 mmHg, respectively. However, her SaO₂ began to drop to around 70% since 8th op. day. A chest CT scan performed at the 13th op. day revealed a large azygos vein, about 6.6 mm in diameter, and stole off the RSVC blood flow downwardly into the IVC (Fig. 2). Her SaO₂ even deteriorated to 45% and had to be rescued with extracorporeal membranous oxygenator (ECMO) at the 18th postop. day. Cardiac catheterization for coil embolization of the azygo vein was then undertaken.

Result: Entering from a route of the LSVC, the left Glenn shunt, the central PA, the right Glenn shunt, and the RSVC, the azygos vein was entered by a 0.035 Terrumo wire. Thereupon, a snare catheter, advancing from a route of the left femoral vein, the left iliac vein, and the IVC, also entered upwardly into the abdominal portion of the azygos vein. The Terrumo wire was captured there to form a V-V rail (Fig. 3a). Afterwards, a JR catheter could be advanced from the LSVC to the subdiaphragmatic portion of the azygos vein. A 10cm-8mm Gianturcol coil was then used to obstruct the azygos vein completely (Fig. 3b). ECMO was removed 2 days later. Her SaO₂ remained steadily to well above 80%.

Discussion: Even a negative pre-Glenn cardiac catheterization study can not exclude the possibility of an early development of some major collateral systemic veins, which can be occurred as early as 2 weeks after operation and complicated with a severe degree of O₂ desaturation.