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Long-term outcomes of patients at risks for Fontan operation: role of temporary fenestration

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Topic(s):
Cardiovascular Surgery – Congenital Heart Disease

Citation:
Purpose: Whereas fenestration at Fontan operation was reported to be effective for smooth initiation to Fontan circulation, subsequently developed aortopulmonary collateral arteries under the presence of remaining hypoxia were a matter of concern. So as our institutional policy, it is closed as much and early as possible (temporary fenestration). This study aimed to reveal long-term outcomes for patients at risk who underwent Fontan operation with temporary fenestration.

Methods: Of 107 patients undergoing Fontan operation from 1995 to 2004, 79 patients (73.8%) were free from any risks (NR group) and 28 patients (26.2%) had risks for Fontan operation (R group). Hypoplastic left heart syndrome, heterotaxy syndrome with obstructive total anomalous of pulmonary venous connection, and individual cases with high preoperative pulmonary artery pressure (PAP), systemic ventricular end diastolic pressure (SVEDP) or low ejection fraction (SVEF) were defined as a risk for Fontan completion. Age at Fontan operation was older in R group (6.6 vs 2.3 years-old, p=0.0004). Preoperative PAP (12.8 vs 11.3 mmHg, p=0.03) and SVEDP (8.8 vs 7.1 mmHg, p=0.02) were higher and SVEF (53.7 vs 60.0%, p=0.002) was lower in R group. Pulmonary vascular resistance (PVR) was not different. Fenestration was created in all patients in R group, then it was closed at the mean duration of 2.9 years after Fontan operation.

Results: Freedom from death or protein-losing enteropathy rate at 5, 10, and 15 years after Fontan operation were 97, 96, and 93% in NR group and 96, 93, and 86% in R group (log-rank: p = 0.20). Fifty-one patients (64.6%) in NR group and 17 patients (60.7%) in R group underwent serial catheter examinations at 5, 10, and 15 years after Fontan operation and exercise capacity testing at 15 years after Fontan operation (Figure). In R group, arterial oxygen saturation was lower and PVR was higher even after close of fenestration (Figure). In addition, 12 patients (71%) in R group developed significant veno-venous collaterals, which were defined by more than 3mm in diameter of collateral veins or a condition where pulmonary veins were contrasted in venography. On the contrary, cardiac index (CI), SVEDP, and PAP were not different and no significant difference on peak oxygen uptake and anaerobic threshold were observed between in 2 groups.

Conclusions: Although the mild cyanosis remained due to the development of veno-venous collaterals after the closure of temporary fenestration, CI, SVEDP and PAP well maintained in patients at risk for Fontan operation. These results might to lead acceptable life prognosis and freedom from protein-losing enteropathy rate for patients at risk for Fontan operation.
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