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**Prevalence and Clinical Characteristics of High Cardiac Output Failure in Patients after the Fontan Operation**

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Background: Hepatic disease, such as liver cirrhosis, is a post Fontan complication and may reduce systemic artery resistance (Rs) and lead to heart failure (HF) with high cardiac output (HHF).

Methods and Results: This study was to examine the prevalence of HHF post Fontan and clarify its clinical profiles in Fontan patients. We defined HHF based on the hemodynamics of 32 excellent long-term survivors and examined the prevalence throughout a follow up of 389 survivors. We also clarified HHF with clinical variables (study 2). The prevalence from 1 to 25 years after the operation ranged from 2.9 to 8.9%, equivalent to that of 2.9 to 6.9% in patients with low cardiac output (LHF). Of the 33 late deaths, 5 (15%) and 6 (18%) patients died of LHF and HHF, respectively. In study 2, pulmonary arteriovenous fistulae and high hepatic vein wedge pressure (HWP) independently predicted HHF ( $p < 0.05$  to  $0.0001$ ). Rs was independently determined by hemoglobin levels and HWP, which was independently determined by central venous pressure and  $\gamma$  glutamyltransferase levels ( $p < 0.05$  to  $0.0001$ ). There was no difference in exercise capacity between the two HF groups. During follow-up, 53 patients experienced clinical events and the hazard ratio of HHF was equivalent to that of LHF ( $p = 0.42$ ) and 3.9 times higher than the non HF groups ( $p = 0.0027$ ).

Conclusions: Prevalence and prognosis of HHF patients were equivalent to those of LHF and the pathophysiology was associated with non cardiac organ abnormalities, including hepatic disease. Hemodynamics guided management strategies, including a focus on Rs, may be mandatory to improve long-term outcome of Fontan survivors.