

## Increasing Demand for Hospitalization in Adults with Congenital Heart Disease

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Negishi et al.<sup>1</sup> reported unexpected hospitalization (UEH) in adults with congenital heart disease (CHD) in a single center (National Cerebral Cardiovascular Center, Suita, Japan).

They included patients  $\geq 18$  years with CHD who were hospitalized at this facility from January 2005 to December 2009. The causes of UEH were arrhythmia, heart failure, infectious disease, hemorrhage or thrombosis, neurological abnormality, and other causes. They investigated the duration of hospitalization for patients who survived to discharge from the hospital, the incidence of death, presence/absence of a heart transplant or heart/lung transplant, and the incidence of a second UEH. They also calculated post-discharge survival and post-discharge event-free survival rates. An event was considered either death or a second UEH, regardless of cause.

Overall, 886 patients with CHD underwent 1371 hospitalizations; of these, 145 patients were unexpectedly hospitalized 239 times (17%). The median age at UEH was 27 years old and younger people (18–29 years of age) comprised 58% of all subjects. Underlying heart diseases included repaired Tetralogy of Fallot (21%), single

ventricular physiology after the Fontan operation (17%), and Eisenmenger syndrome (12%).

Arrhythmia (40%) was the most common cause of UEH followed by heart failure (20%), infectious disease (13%), and hemorrhage or thrombosis (13%). There were four hospital deaths, and 48 patients required readmission. In total, 13 patients died. The rate of event avoidance was 77% for 1 year and 58% for 3 years. Administration of an anticoagulant was the only prognostic factor in the univariate analysis.

The rate of UEH was low in this Japanese report, compared with that of reports from Europe.<sup>2</sup> The relatively low UEH rate may have been a reflection of the many scheduled hospitalizations for regular hemodynamic evaluations by cardiac catheterization at this facility.

The most common UEH was related to arrhythmia. This result agrees with a European study.<sup>2</sup>

The cause of readmission was often arrhythmia relapse. In addition to drug therapy, electrophysiological and catheter ablation studies, as well as interventions for hemodynamic abnormalities should be actively considered to avoid hospital readmission due to arrhythmia.

Similar to acquired heart disease, transplantation is a means to treat refractory heart failure in adult patients with CHD. Transplantation is expected to become increasingly more prevalent as a treatment choice for heart failure in adult patients with CHD. Seddio et al.<sup>3</sup> reported that heart transplantation for patients with CHD can be performed with acceptable results, with an overall survival rate of 67% at 10 years in 85 patients. Previous procedures, including the Fontan operation, do not reduce survival rate. Mortality is related to preoperative patient condition.

No heart transplantation or heart/lung transplantation was performed during the study period in this Japanese study, which may have been due to the donor shortage in Japan. However, as most patients who undergo the Fontan operation are expected to live longer, there will be more patients developing heart failure. Thus, we

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must be prepared for the increase in the number of heart failure cases in adults with CHD in the near future.

It is difficult to perform heart transplantation in an adult with CHD because of the complex CHD anatomy and multiple previous open heart surgeries. This surgery requires many surgeons trained in congenital heart surgery, adult cardiac surgery, and heart transplantation, as well as retrieval teams who are aware of the need to procure extra tissue for reconstructing the great vessels.

Each year the population of adults with CHD grows in number and age. Wren and O'Sullivan<sup>4</sup> reported 400% growth in the number of clinics for adults with CHD in the past 10 years. With the high and annually increasing hospital admissions rate, the demand for expert cardiologists to treat adult patients with CHD is increasing. Therefore, cooperation of an adult CHD specialist-based medical team, including echocardiologists, interventionists, electrophysiolo-

gists, radiologists, cardiac surgeons, and obstetricians is essential to prepare for patients with complex heart disease in the future.

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