

## **Timing of Fontan completion in children with isomerism: the impact of age, weight, and pre-Fontan arterial oxygen saturation**

Rohit S. Loomba, MD, Peter C. Frommelt, MD, Robert H. Anderson, MD, James Tweddell, MD

### **Introduction**

Isomerism, or heterotaxy, impacts morbidity and mortality after various stages of univentricular palliation. Timing of Fontan completion in these patients based on preoperative factors has not been investigated previously. The aim of this study was to determine the impact of preoperative factors on various outcomes including length of hospital stay and duration of chest tubes as these factors can increase risk of adverse emotional outcomes in patients and families as well as increase hospitalization cost.

### **Methods**

A cross-sectional study was conducted. Patients with isomerism having undergone Fontan at the Children's Hospital of Wisconsin between 1998 and 2014 were identified. Preoperative, operative, and postoperative data was collected on these patients. Linear regression analysis was conducted to determine preoperative characteristics associated with various postoperative outcomes. Receiver operator curve analysis was also performed to determine the sensitivity and specificity of age and pre-Fontan arterial oxygen saturation in predicting increased length of hospitalization and increased duration of chest tubes.

### **Results**

A total of 27 patients underwent Fontan completion during the study period. Of these 17 (63%) had right isomerism while the remainder had left isomerism. Younger age and lower pre-Fontan arterial oxygen saturation were associated with increased length of hospitalization. An arterial oxygen saturation of 84.5% had a specificity of 44% for predicting of hospital length of stay greater than the mean while an arterial oxygen saturation of 82.5% had a specificity of 78%. An age of 2.5 years was 85% specific for predicting hospital length of stay greater than the mean while an age of 3.5 years was 40% specific.

Younger age, lower pre-Fontan arterial oxygen saturation, interrupted inferior caval vein, and worse pre-Fontan atrioventricular valve regurgitation were associated with increased duration of chest tubes. An arterial oxygen saturation of 84.5% had a specificity of 39% for predicting chest tube duration greater than the mean while an oxygen saturation of 82.5% had a specificity of 67%. An age of 2.5 years was 90% specific for predicting chest tube duration greater than the mean while an age of 3.5 years was 48% specific.

None of these factors impacted arterial oxygen saturation at discharge, 1-year, or 5-year follow-up.

### **Conclusions**

Age, arterial oxygen saturation, pulmonary arteriovenous malformations, interruption of the inferior caval vein, and atrioventricular valve regurgitation should all be taken into consideration when timing Fontan completion in patients with isomerism. Arterial oxygen saturations between 82 and 84% with an approximate age of 3 years appear to be a time at which it is reasonable to consider Fontan in patients with isomerism.