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## Commentary: How to avoid early Fontan failure?

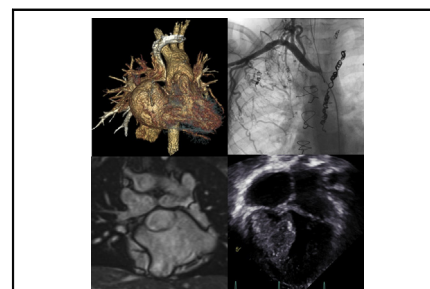
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We congratulate Quail and colleagues<sup>1</sup> for their article in this issue of the *Journal* and their efforts to advance this complex field of single-ventricle palliation. Currently, the Fontan procedure, or total cavopulmonary connection (TCPC), serves as the last step of palliation for several single-ventricle congenital heart conditions.<sup>2</sup> It allows for the entire systemic venous return to passively flow to the pulmonary arterial tree without an interposed pump.<sup>3</sup> Several requirements must be met for TCPC to be successful (some well-known, others still being explored), necessitating extensive and meticulous evaluation of pre-Fontan patients.

The current common practice of pre-TCPC evaluation is aimed at providing an in-depth physiological understanding of the prospective Fontan candidate, with one of the goals being to avoid, among several other complications, early Fontan failure (EFF). EFF is a devastating scenario following TCPC that presents with low cardiac output and elevated central venous pressure (CVP).<sup>4</sup>

During this evaluation, patients usually undergo echocardiography, cardiac catheterization, and computed tomography or cardiovascular magnetic resonance (CMR). Although some centers have a wide implementation of preoperative cardiac catheterization,<sup>2</sup> others do not.<sup>5</sup> Cardiac catheterization provides precise hemodynamic and physiological parameters of the patient being evaluated.

In their study, Quail and colleagues attempted to omit the pre-TCPC catheterization, using a different approach to



The evaluation of the prospective Fontan candidate requires a multimodality approach.

### CENTRAL MESSAGE

Our goal should be to achieve a zero percent rate of early and late Fontan failure.

predict post-TCPC CVP ( $CVP_{TCPC}$ ). It is generally accepted that elevated CVP after TCPC is associated with Fontan failure.<sup>4</sup> The authors used information gathered from a pre-TCPC CMR, along with the CVP measured via jugular venipuncture at the same time, to predict the  $CVP_{TCPC}$ .

Although the authors did not demonstrate a perfect correlation between the predicted and actual post-TCPC CVP, they did find a consistent association between the predicted  $CVP_{TCPC}$  and EFF. They concluded that estimated  $CVP_{TCPC}$  can help guide important clinical decisions, such as creating a preemptive TCPC fenestration (reserved by some institutions for high-risk patients).<sup>6</sup> It should be mentioned that the rate of elective TCPC fenestration in this study was rather high (41%).

The authors should be congratulated for this important contribution to the body of knowledge, and for providing us with additional tools in our everlasting attempt to better define the ideal hemodynamics for Fontan patients. Owing to the critical importance of this palliative step and its potential morbid and/or fatal complications, it is our practice and recommendation to undertake elaborate and comprehensive preoperative evaluation for all patients. We recommend continuing to perform pre-TCPC catheterization, as well as taking a highly targeted approach to TCPC fenestration. The value of  $CVP_{TCPC}$  can very well be added to our armamentarium.

The ultimate goal should be to have an early Fontan failure rate of zero percent.

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