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Commentary: A new Fontan commandment

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Choussat's Ten Commandments¹ delineating the appropriate selection criteria for Fontan palliation are well known and carefully regarded among practicing congenital heart surgeons. While many of the criteria have evolved, ventricular performance and the hemodynamic health of the pulmonary vascular bed remain cornerstones of candidacy. Lin and colleagues² share important insights in their study, "Preoperative N-terminal pro-brain natriuretic peptide is associated with Fontan outcomes," and provide compelling data that would suggest adding an 11th commandment to the list.

The retrospective cohort study enrolled all ($n = 110$) consecutive Fontan recipients in a single center from 2011 to 2019. Although decision-making in the cohort was not influenced by preoperative N-terminal pro-brain natriuretic peptide (NT-BNP) level, this was routinely assayed ($n = 91$). A variety of preoperative demographic characteristics and variables derived from echocardiography and catheterization data were collected and analyzed for their effect on primary and secondary end points, event-free survival (Fontan takedown, death, transplantation), and heart failure-associated rehospitalizations and postoperative tachyarrhythmia. Via univariate Cox regression, mean pulmonary artery pressure >15 mm Hg, pulmonary vascular resistance index, ventricular function (normal vs abnormal), and log₁₀ NT-BNP showed a significant association, with log₁₀ NT-BNP surviving as the dominant variable in multivariate regression. This prompted receiver operating characteristic analysis to define a threshold NT-BNP value, of

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CENTRAL MESSAGE

Preoperative NT-BNP is a convenient assay to improve our decision-making around Fontan candidacy, fenestration creation, and event-free survival. Validation will be necessary to encourage adoption.

which 280 pg/mL provided the greatest degree of combined sensitivity (75%) and specificity (71%). Scoring systems were created, using generally accepted selection criteria (ie, pulmonary artery pressure, pulmonary vascular resistance index) without and with the addition of NT-BNP, and showed an improved ability to predict Fontan failure with NT-BNP. Interestingly, Fontan fenestration was separately assessed in this cohort, with fenestration improving event-free survival for patients with an elevated NT-BNP level preoperatively.

Using a regularly available serum marker as an adjunct to increase predictive power in long-term Fontan survival and candidacy is attractive and certainly convenient. Various groups have had success and failure at correlating ongoing NT-BNP levels with accepted measures of stable Fontan circulation (ventricular function, functional class, exercise capacity).³⁻⁵ This report presents the first attempt at correlating presurgical NT-BNP levels with post surgical long-term outcomes, and its findings are compelling, with the caveat that nothing is known about the candidates who were not selected for surgery. As the authors mention, their retrospective analysis will certainly require prospective validation. In the meantime, a borderline Fontan candidate with an NT-BNP >280 pg/mL would certainly give pause to

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proceeding with surgery, or at a minimum, to including a fenestration during the procedure.

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