Commentary: Impella support in kids: “Are we there yet?”

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This article by Dr Tume and colleagues from Texas Children’s Hospital describes the largest series to date investigating the use of catheter-based axial pump (CBAP) devices in a pediatric population.¹ Their experience included 37 patients with 43 CBAP devices and demonstrated 96% survival at 1 month and 88% survival at 6 months. The rate of major device complication was 21%, of which more than one-half involved device repositioning.

The authors are to be commended for pushing the envelope in pediatric mechanical circulatory support. Their article is clearly written, and the results are not overstated in the discussion section. In adult patients, the limitations of extracorporeal membrane oxygenation (ECMO) led to rapid adoption of the percutaneously placed devices. However, as I was often reminded on my pediatrics rotation in medical school, “children are not just little adults,” and the differences between pediatric and adult patients are important when evaluating the need for mechanical circulatory support. A 2017 multicenter review of Impella use in pediatric patients demonstrated that the population is quite heterogeneous.² The patients ranged in age from 4 to 21 years and in weight from 15 to 134 kg. The diagnoses varied, including 28% patients with congenital heart disease (CHD), 26% with acute rejection after transplantation, and 23% with dilated cardiomyopathy. CHD encompasses a variety of different diagnoses, many of which involve profound differences in the structure and function of the heart, adding to this heterogeneity. These and other differences have led to the slower adoption of CBAPs in pediatric and CHD patients. Effectively, there are more variables to consider in cumulatively fewer patients.

This article provides insight into the approach, outcomes, and complications associated with this therapy, and thus provides a valuable contribution to the literature. That said, their cohort was relatively small and their data were primarily descriptive in nature. In addition, although the study was performed in a pediatric center, the median patient age was almost 17 years, the median weight was 61 kg, and only 4 patients had heart failure due to CHD. Thus, I was left wondering: How can I apply this to smaller kids and patients with complex CHD, such as those with a failing single ventricle? How do we choose which patients will be best supported by primary CBAP versus ECMO? What is the ideal access site for patients of varying sizes and functional ability? Are there specific criteria that should be considered in decision making (eg, patient size, anatomy, ventricular size or volume, vascular diameter)? The relatively low rate of complications in this study demonstrates the potential to use this technology to support pediatric patients for longer periods with less morbidity than ECMO, however, we are not at the end of the road and there remains work to be done. I hope this article will inspire the continued use and study of CBAP devices in pediatric and complex CHD patients, as only ongoing scientific evaluation will allow us to develop a systematic approach to their use in our practice.
References
