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Commentary: Not many tools in the toolbox

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CENTRAL MESSAGE

Use of VADs designed for adults but placed in small children pose significant challenges. Clinicians need to tailor the implant and the VAD settings to the unique physiology.

The outcomes for children who need support with a ventricular assist device (VAD) have improved dramatically over the past 3 decades owing to several factors. The use of a VAD for a young child with dilated cardiomyopathy can now be achieved with a high rate of success and relatively low morbidity. However, the pediatric cardiothoracic surgeons care occasionally confronted with more challenging cases. Moon and colleagues[1] describe the use of a continuous flow device in a young child with restrictive cardiac physiology. This report highlights the challenges of using adult devices in small children, particularly when the anatomy and physiology are atypical. The use of adult devices in small children is challenged by the small ventricular cavity size. This is exacerbated further in the setting of restrictive physiology. In this case, the authors chose to utilize a HeartWare HVAD (Medtronic, Minneapolis, Minn). The decision to use this device was driven in part by the desire to discharge to home. Notably the only approved device for a child this size (ie, Excor; Berlin Heart, Berlin, Germany) does not permit discharge to home. In order to accomodate the HVAD device in such a case several surgical modifications could be considered. Some surgeons have performed thinning of the ventricle in the body of the left ventricle to create more room.[2] Alternatively, atrial cannulation can be considered. However, atrial cannulation in a child with height <100 cm certainly would create its own challenges.

Another key point highlights the use of the waveform data from the HeartWare HVAD, which rely on the HQ curves. The authors' attention to the subtleties of the waveform in this case report is admirable, particularly during the early postoperative period when fluid status and vascular resistance is variable. Frequent alternations to the setting of continuous flow device in young children is often required to work around these complications such as suction events.

The troubleshooting described by Moon and colleagues[1] underscores that postoperative physiologic manipulation, rather than surgical implant, may be the most challenging element of VAD management in some children. Clinicians need to be mindful that all currently available devices for a patient of this size and physiology have some significant limitations. Whether devices still under investigation such as the Jarvik 2015 (Jarvik Heart, New York, NY), which is studied in the Pumps for Kids, Infants and Neonates (PumpKIN) trial, could offer a smoother course remains to be determined. One hopes that all clinical centers use the data presented here and consider all possible devices and implant strategies to best bridge complex pediatric patients with advanced heart failure to transplantation.

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