Pediatric continuous-flow left ventricular assist devices: No longer just a bridge? The changing of a mindset!

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Central Message

Pediatric CFVAD support has dramatically improved outcomes. Our mindset and use of the devices must evolve along with the devices.

See Article page 1358.

Dr Adachi has nicely described the past, present, and future (potential) use of continuous-flow ventricular assist devices (CFVADs) in children.¹ He also describes how the reliability and side-effect profile of CFVADs, as well as the fact that they enable patients to be discharged to their homes, have altered patient management. These advantages have led centers to preferentially implant CFVADs over pulsatile ventricular assist devices (VADs) in children weighing 25 kg or more,² despite limited data regarding the off-label use of these devices. Recent case series,³ as well as the recent study from Pediatric Interagency Registry for Mechanical Circulatory Support,⁴ support this approach. The early, positive experience has led some centers to implant CFVADs in children weighing less than 25 kg, but it remains unclear whether the positive outcomes, especially the lower complication rate, apply to the smaller size patients. The “positive” case series to date have already reported a higher stroke rate.⁵

Since our community began implanting “adult” intracorporeal devices in preteens, we have used “virtual implantation” to help assess device fit. This method is now widely used and has been accepted as a fit criterion for a Food and Drug Administration trial of the Syncardia-50/50cc Total Artificial Heart.⁶ In the coming years, the use of gross anatomic measurements, such as weight and body surface area, will begin to wane clinically and in device development. The pediatric VAD field will continue to evolve as new CFVADs are developed. The Pumps for Kids-Infants-Neonates trial, which will launch in the coming months, will offer an AA battery-sized, axial-flow CFVAD (Jarvik-Infant; Jarvik Heart Inc, New York, NY) to children weighing 8 to 20 kg.

The development of reliable, smaller CFVAD technology with a better morbidity profile has allowed our field to mature especially in regard to patient selection, implant timing, and less use of biventricular VADs, resulting in improved outcomes. This, coupled with the ability to discharge patients to their homes, prompted Dr Adachi to note that “VAD support may be accepted as a stand-alone

therapy for medically resistant heart failure requiring hospitalization, akin to a pacemaker implant in pacing-dependent patients.”¹ The adult VAD community has clearly moved in this direction, as surgeons implant VADs in progressively “less ill” patients.⁷ The pediatric community no longer needs to see CFVADs as a bridge to something, but rather as a therapeutic tool in the management of medically resistant heart failure. When we place a pacemaker for a patient in the hospital for a pacing-dependent lesion, we do not have to state the intention of that pacemaker (ie, bridge to a percutaneous pacemaker or destination pacemaker). It is just a pacemaker.

Our understanding and use of CFVADs in children continues to grow but is far from complete. However, we should acknowledge the revolutionary nature of these devices and the rapid evolution that has occurred in our field. In less than 5 years (2013), we have matured from a situation in which 2 to 3 independent pediatric VAD centers were implanting VADs in patients and discharging patients with CFVADs across the world to the current day when more than 50% of VADs implanted in children are CFVADs. CFVADs continue to be used almost exclusively as a bridge to transplant in children⁸; however, it seems that this mindset is changing daily.

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