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Commentary: Toward mechanical circulatory support in univentricular hearts

Michael Huebler, MD, Daniel Biermann, MD, and Joerg S. Sachweh, MD

Mechanical circulatory support (MCS), either short- or long-term and as a bridge to decision, to recovery, or to heart transplantation, has emerged as standard therapy in adult cardiac care. In pediatric patients, there are more obstacles to overcome; somatic size, growth, complex anatomy, and available hardware limit the options.

In particular, patients with Fontan circulation have a high failure rate in the first 2 decades after Fontan completion.¹ MCS may be used to maintain or improve a Fontan patient's condition to be eligible for heart transplantation.

The article by Granegger and colleagues² is focused on MCS in pediatric patients with biventricular hearts and univentricular hearts; however, the authors' main direction is toward univentricular support. The EXCOR device (Berlin Heart, Berlin, Germany) served as the pulsatile ventricular assist device (VAD), and the HVAD (Medtronic, Minneapolis, Minn) and HeartMate II (Abbott, Abbott Park, Ill) were the continuous-flow VADs. In the univentricular hearts, cavopulmonary support was established with custom-made graft adaptations to redirect systemic venous blood with the EXCOR pump toward the central veins and toward the pulmonary arteries.

In summary, survival was not significantly related to the type of circulation, patient age, or device type. Freedom from adverse events were negatively related to a pulsatile device and lower age; biventricular and univentricular

Daniel Biermann, MD, Joerg S. Sachweh, MD, and Michael Huebler, MD (left to right)

CENTRAL MESSAGE

Mechanical circulatory support in pediatric patients, particularly those with univentricular anatomy, requires large clinical studies, evidence-based treatment strategies, and extensive technical development.

hearts were not different in terms of freedom from treatment-related adverse events. Pulsatile VADs were associated with a higher rate of pump thrombosis. Other adverse events were not different based on pump technology. Thus, in the authors' institution, the tendency is to implant continuous-flow VADs if the anatomic conditions appear suitable. The authors emphasize that their findings are in line with previous reports indicating that outcomes are affected by device and patient factors, which are highly interdependent.

Of note, in this study in all but 1 patient with univentricular physiology, the systemic ventricle was supported; in 1 patient, concomitant cavopulmonary support was attempted. Particularly in cases of dysfunction of the systemic left ventricle and/or subpulmonary failure, further research is needed. Innovative approaches facilitating subpulmonary support with existing or novel devices tailored to patient anatomy and physiology are currently in development.³

MCS in children remains an ongoing challenge, particularly in those with univentricular anatomy and physiology, and any report on this issue providing solutions or at least deeper insight is important for the future treatment of our patients. Finally, the need for large prospective multi-institutional, international studies is obvious, as is the need for generously supported grants for technical development.

From the Clinic for Children's Heart Medicine, Pediatric Heart Surgery, University Heart and Vascular Center, University Hospital Hamburg-Eppendorf, Hamburg, Germany.

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Address for reprints: Michael Huebler, MD, Clinic for Children's Heart Medicine, Pediatric Heart Surgery, University Heart and Vascular Center, University Hospital Hamburg-Eppendorf, Martinistrasse 52, 20246 Hamburg, Germany (E-mail: m.huebler@uke.de).

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