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Commentary: Permanent dialysis access following total artificial heart implantation: A question of maturity

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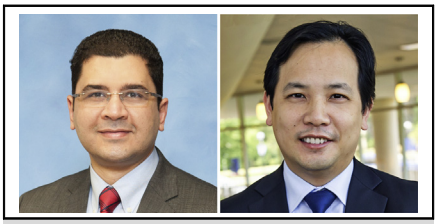

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CENTRAL MESSAGE

Arteriovenous fistula access is a viable approach to minimize the sepsis risk and increase the chances of successful transplantation in patients with total artificial heart and other durable devices.

Renal failure requiring dialysis presents is challenging in the setting of durable mechanical circulatory support. Borgi and collegues[1] reported a high 1-year mortality of 29% among patients who experienced acute renal failure after continuous-flow left ventricular assist device (cfLVAD) implant. Furthermore, 33% of the patients who required dialysis died within 1 month of cfLVAD implant. The top causes of death for the renal failure group were sepsis, right heart failure, and stroke.[1] The impact of right heart failure in the setting of renal failure is not expected to play a role for total artificial heart (TAH). Permanent dialysis in patients with TAH has been previously described in several case series, and it was not surprising that achieving optimal outcomes proved elusive.[2-4] For patients with a cfLVAD on dialysis, a much lower likelihood of bridging to transplant is expected.[5] An important driver of this is the development of sepsis, especially when dialysis access involves foreign materials.[5]

Although temporary dialysis access is often used given immediate need, this presents a heightened risk of infectious complications in the longer term. Other important limitations include loss of future peripheral venous access, development of deep venous thromboses, and the occurence of embolic phenomenon. Peritoneal dialysis is also a suboptimal option given the proximity of the dialysis catheter to device drivelines and there is also a significant risk of sepsis often in the form of peritonitis.[6] As Hair and colleagues[7] pointed out, transitioning the temporary access to an arteriovenous fistula (AVF) with avoidance of foreign material is currently the most favorable option when recovery of renal function is not anticipated.[6]

Readiness for AVF use is determined by its maturation and requires adequate hemodynamics.[6] While the lack of pulsatility was theorized to lead to uncertainty of fistula maturation in the setting of continuous flow support, several authors have reported long-term success in this setting with excellent AVF maturation for use in dialysis.[8-10] Now, Hair and colleagues[7] also confirm that AVF can be successfully matured in a circulation supported by a TAH with mechanically induced pulsatile flow. It is, however, important to note that the shunt created by a mature AVF may reach 600 to 1200 mL/min,[4] and the risk of elevating pulmonary vascular resistance should be factored into the decision to pursue an AVF in a bridge-to-transplant candidate.

While developing a mature AVF is a multistaged procedure with a heightened risk of surgical complications in the setting of chronic anticoagulation, the lowered risk of infection on device makes it seem worthwhile. Future studies on whether this will increase the success of bridging to transplantation will be facilitated by pooling cases from multiple institutions. We congratulate the authors on their successful management of this complex scenario. For durable mechanical support with bridge-to-transplant indications and end-stage renal failure requiring dialysis where significant transplant wait time is anticipated, construction of an AVF is a very viable option. Maximal benefit would be gained for the patient by early consideration of this approach.

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