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Commentary: Superior vena cava syndrome should not hinder use of a percutaneous right ventricular assist device

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CENTRAL MESSAGE

The fear of superior vena cava syndrome after dual lumen percutaneous right ventricular assist device is justified, but the incidence is rare, and the authors present an elegant and simple procedure as a solution.

Long-term implantable ventricular assist devices are being increasingly accepted as a surgical modality in patients with left ventricular failure from a variety of etiologies.[1] The right side of the heart has no such durable, implantable option. Right-sided heart failure can occur after myocardial infarction, pulmonary embolism, cardiac surgery, and left ventricular assist device implantation.[2,3] Despite these severe insults, the right ventricle has been shown to be more resilient, owing to reduced oxygen demand, a dual coronary blood supply, and more consistent transmural perfusion across the ventricular wall.[4] As such, enthusiasm exists for the use of a temporary right ventricular assist device (RVAD) as a bridge to recovery.

With increased experience, temporary percutaneous RVAD use in severe RV failure is rising. The two most common devices are the Impella R, introduced via the femoral vein and the Protek Duo, a dual-lumen cannula (DLC) introduced by way of the right internal jugular (RIJ) vein.[5] For many, the use of a DLC via the RIJ is the best method, given the better ability to ambulate while awaiting RV recovery.[6] There remain no articles describing the rare but dreaded complication of superior vena cava (SVC) syndrome.

In this issue of the *Journal*, Badu and colleagues[7] report on 2 patients suffering from SVC syndrome after placement of a DLC for RV failure. The setting for RV failure in both patients after left ventricular assist device implantation. A common theme for both was a short SVC length, of 52 cm and 59 cm, respectively. This is in comparison to the mean SVC length of 64 cm in the authors' cohort of 40 patients who received this DLC. Although it stands to reason that the SVC diameter would be the determining factor, both patients had a diameter of 14 cm, whereas the larger cohort of had a mean diameter of 15 cm. The authors also suggest that the DLC diameter is a factor in the risk of obstruction. Both patients received a 31 Fr DLC. It would provide clarity to know how many of the 40 patients had a 31 Fr DLC placed.

In addition to the excellent description of these 2 cases, Badu and colleagues describe a novel method of treating SVC syndrome in this population. Using a 9.5 Fr sheath placed into the left subclavian vein and connecting it into the inflow to the pump, they were able to successfully treat the physical manifestations of SVC syndrome. The authors should be applauded for developing a simple yet effective way to decompress the cranial venous system. The fear of SVC syndrome during placement of a DLC RVAD is well known, and thus a method of treating this feared complication as described is valuable.

Further clarity would be helpful in these patients if measurements of venous pressures could be performed. This would lead to less reliance on purely physical findings to

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diagnose SVC syndrome and would allow for quantification of the effectiveness of the described technique used to decompress the cranial venous system. Hopefully, more published descriptions of this complication of DLC RVAD implantation will inform our enthusiastic use of this modality.

References

1. Michaels A, Cowger J. Patient selection for destination LVAD therapy: predicting success in the short and long term. *J Curr Heart Fail Rep*. 2019;16:140-9.
2. Grignola JC, Domingo E. Acute right ventricular dysfunction in intensive care unit. *Biomed Res Int*. 2017;2017:8217105.
3. Argiriou M, Kolokotron SM, Sakellaridis T, Argiriou O, Charitos C, Zarogoulidis P, et al. Right heart failure post–left ventricular assist device implantation. *J Thorac Dis*. 2014;6(suppl 1):S52-9.
4. Laster SB, Shelton TJ, Barzilai B, Goldstein JA. Determinants of the recovery of right ventricular performance following experimental chronic right coronary artery occlusion. *Circulation*. 1993;88:696-708.
5. Kapur NK, Esposito ML, Bader Y, Morine KJ, Kiernan MS, Pham DT, et al. Mechanical circulatory support devices for acute right ventricular failure. *Circulation*. 2017;136:314-26.
6. Badu B, Cain MT, Durham L, Joyce LD, Sundararajan S, Gaglianello N, et al. A dual-lumen percutaneous cannula for 93 managing refractory right ventricular failure. *ASAIO J*. 2020;66:915-21.
7. Badu B, Durham III L, Joyce LD, Joyce DL. Iatrogenic superior vena cava syndrome from percutaneous right ventricular assist device. *J Thorac Cardiovasc Surg Tech*. 2021;6:92-4.