Commentary: Is prosthesis oversizing warranted for pulmonary valve replacement in patients with congenital heart disease?

Roosevelt Bryant III, MD

From the Division of Cardiovascular Surgery, The Heart Institute, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio.

Disclosures: Author has nothing to disclose with regard to commercial support.

Received for publication June 27, 2019; accepted for publication June 28, 2019; available ahead of print July 23, 2019.

Address for reprints: Roosevelt Bryant III, MD, Division of Cardiovascular Surgery, The Heart Institute, Cincinnati Children's Hospital Medical Center, 3333 Burnet Ave-MLC 2004 Cincinnati, OH 45229 (E-mail: Roosevelt.BryantIII@chmc.org).

J Thorac Cardiovasc Surg 2020;159:1060

0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2019.06.044>

Roosevelt Bryant III, MD

Central Message

Oversizing of the stented bioprosthesis for pulmonary valve replacement may not be warranted.

See Article page 1051.

In this issue of the *Journal*, Dr Pragt and colleagues¹ report an important experimental analysis looking at the function of the Carpentier Edwards (Irvine, Calif) Perimount Magna Ease heart valve. Because it was originally designed for systemic semilunar valve replacement, a central element of the experimental model was to assess the function of the valve under the physiologic conditions of the pulmonary circulation. Two valve sizes were analyzed: 21 mm and 25 mm. Under pulmonary pressure conditions, the authors found there was incomplete closure of the Magna Ease valve during diastole and an increased regurgitant area. However, this did not translate into a significant regurgitant fraction (5%). They also found the larger 25-mm prosthesis had an increased regurgitant area. Although firm conclusions cannot be reached, the study does provide a potential mechanical basis for structural valve deterioration. In a series of 227 patients with tetralogy of Fallot undergoing pulmonary valve replacement with a bioprosthetic valve, the predominant cause of structural valve deterioration was pulmonary regurgitation.² Forty-two percent of the patients in the series had a Carpentier Edwards Magna Ease valve.² The mechanism for pulmonary regurgitation was unclear, but the authors found that upsizing the pulmonary valve was a factor in the development of structural valve deterioration. The findings of the study by Pragt and colleagues¹

add another level of evidence that perhaps we should reconsider the concept of placing the largest possible prosthesis when faced with patients who require pulmonary valve replacement. At the very least, hopefully this study will lead to more intensive investigation of bioprosthetic valves in the pulmonary circulation and stimulate more interest in developing a stented bioprosthesis specifically designed for the pulmonary circulation.

References

1. Pragt H, van Melle JP, Verkerke GJ, Mariani MA, Ebels T. Pulmonary versus aortic pressure behavior of a bovine pericardial valve. *J Thorac Cardiovasc Surg*. 2020; 159:1051-9.e1.
2. Chen PC, Sager MS, Zurakowski D, Pigula FA, Baird CW, Mayer JE, et al. Younger age and valve oversizing are predictors of structural valve deterioration after pulmonary valve replacement in patients with tetralogy of Fallot. *J Thorac Cardiovasc Surg*. 2012;143:352-60.