Authors have nothing to disclose with regard to commercial support.

**REPLY: COMMENTARY
ON DO NOT FORGET
LATE ANEURYSM
AFTER HEART
TRANSPLANTATION:
MORE EVIDENCE FOR
COMPUTED**

TOMOGRAPHY SCREENING

Reply to the Editor:

We read with interest the letter from Fukunaga and Rao¹ about late aortic pseudoaneurysm after heart transplantation. They address in part an article we previously commented on from Bojko and colleagues,² who describe the development of a pseudoaneurysm in native aortic tissue 22 years after heart transplantation on the background of aortic valve replacement for bicuspid aortic valve (BAV) in the recipient. The outcome of the report is a recommendation for regular surveillance in this clinical setting.

Fukunaga and Rao¹ are in agreement with us that pseudoaneurysmal disease could be found irrespective of the native recipient BAV disease.² They quote late aneurysmal disease in patients who are undergoing cardiovascular surgery outside of the field of transplantation and the asymptomatic nature of the presentation of disease. At a rate of 0.4%, it is a rare but a life-threatening complication that is challenging to treat and needs identification on surveillance scanning.³ We also questioned the significance of the underlying BAV disease and suggested more evidence would need to be provided to secure this theory.⁴ But in practice, long-term follow-up of heart transplant recipients will usually be in the hands of transplant cardiologists who will not be aware of the evolving BAV literature. To agree with them, as the authors suggest, the need for surveillance is sound advice, although not fully supported by the report from Bojko and colleagues.²

We have also seen late pseudoaneurysmal disease after heart transplantation and report a similar case to that of Fukunaga and Rao.¹ A patient underwent transplantation in 1994 after left ventricular failure after emergency aortic and mitral valve replacement for native bacterial endocarditis at another center. The endocarditis was on a background of long-standing mitral valve prolapse, with no suggestion of BAV. He presented 7 years post-transplant on screening angiography for cardiac allograft vasculopathy with an 8 × 7-cm aortic pseudoaneurysm. The scan is no longer available, but the aneurysm was successfully treated and the patient died of renal cell carcinoma 11 years later.

The link with bicuspid aortic valve, originally proposed by Bojko and colleagues² remains one of interest, but in

reality we think Fukunaga and Rao¹ will join with us in agreeing that pseudoaneurysmal disease is more common and needs identification because it presents asymptotically.

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References

1. Fukunaga N, Rao V. Do not forget late pseudoaneurysm after heart transplantation. *J Thorac Cardiovasc Surg.* 2020;159:e127.
2. Bojko M, Eisen H, Mather P, Vallabhajosyula P. Delayed aneurysmal complication of bicuspid aortic valve disease after heart transplantation. *J Thorac Cardiovasc Surg.* 2019;158:e185-6.
3. Fukunaga N, Koyama T. Outcomes of surgical repairs for thoracic aortic pseudoaneurysms after cardiovascular surgery. *J Card Surg.* 2016;31:535-40.
4. Booth K, Dark J. Commentary: pseudoaneurysm after aortopathy heart transplantation—a link too far? *J Thorac Cardiovasc Surg.* 2019;158:e187-8.

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**REPLY FROM THE
AUTHORS:
PSEUDOANEURYSM
AFTER HEART
TRANSPLANTATION—
DID BICUSPID
AORTOPATHY**

CONTRIBUTE?

Reply to the Editor:

We read with great interest a Letter to the Editor regarding our case report, which described a patient with native bicuspid aortic valve (BAV) disease who developed a pseudoaneurysm of the distal ascending aorta more than 20 years after heart transplantation.¹ In this letter, the authors contend that pseudoaneurysm of the thoracic aorta is known to occur after previous cardiovascular surgery with an incidence of 0.4%² and could occur independent of the underlying diagnosis of BAV. They further point out that there are no data describing differences in the incidence rates of pseudoaneurysm formation in patients with BAV versus tricuspid aortic valves. Although there are data demonstrating greater aortic growth rates in patients with BAV compared with patients with tricuspid aortic valve,³ this would predispose to true aneurysm and not pseudoaneurysm formation. Therefore, they state that this patient's complication may not be related to bicuspid aortopathy but may simply be a rare sequela of cardiovascular surgery, which could have occurred even

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in a patient with a normal tricuspid aortic valve. We acknowledge and commend the authors for raising this salient point.

In response, we would like to clarify 2 important points regarding the nature of the aneurysm and the intraoperative findings. First, the anastomotic site between the donor and recipient aorta was unequivocally not the site of origin of the pseudoaneurysm. The donor aorta and the site of anastomosis were both found to be normal and not at all involved in the aneurysmal portion, which occurred more distally in the ascending aorta and extended partially into the proximal aortic arch. Second, there was circumferential dilatation of this segment involving all 3 layers of the aortic wall. Therefore, this was a primary true saccular aneurysm located in the distal ascending aorta/proximal aortic arch that ruptured and developed into a pseudoaneurysm. These 2 intraoperative findings made it evident that BAV aortopathy may have played a role in this complication.

As discussed extensively in our case report, the true etiology of this aneurysm may not ever be completely elucidated. There are many risk factors related to heart transplantation and immunosuppression that may have played a role.¹ However, due to the fact that the donor aorta and site of anastomosis were not involved, and that there

was an element of true aneurysm formation, we suspect that bicuspid aortopathy may have contributed. Regardless of the cause in this specific case, we uphold our assertion that surveillance computed tomography imaging of the thoracic aorta should be considered in patients with BAV after heart transplantation, especially if they have aortic ectasia or aneurysmal dilatation at baseline.

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References

1. Bojko M, Eisen H, Mather P, Vallabhajosyula P. Delayed aneurysmal complication of bicuspid aortic valve disease after heart transplantation. *J Thorac Cardiovasc Surg.* 2019;158:e185-6.
2. Fukunaga N, Koyama T. Outcomes of surgical repairs for thoracic aortic pseudoaneurysms after cardiovascular surgery. *J Card Surg.* 2016;31:535-40.
3. Borger MA, Fedak PWM, Stephens EH, Gleason TG, Girdauskas E, Ikonidis JS, et al. The American Association for Thoracic Surgery consensus guidelines on bicuspid aortic valve-related aortopathy: full online-only version. *J Thorac Cardiovasc Surg.* 2018;156:e41-74.

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