

CORRESPONDENCE

Letters to the Editor

Bicuspid Aortic Valve Morphology

We read with interest and appreciation 3 recent papers in the *Journal* on the bicuspid aortic valve (BAV).

Fernandez et al. (1) describe distinct developmental patterns for mice and hamsters with right-noncoronary and right-left coronary cusp fusion, respectively. Incredibly, William Osler anticipated, within the limitations of his era, these findings and their significance more than a century ago:

If it turns out to be correct . . . that the affected valves are usually those behind . . . the coronary arteries . . . this would point to some error associated especially with the development of these cusps. It would appear from the observations of Tonge, that two of the segments are formed before the division of the primitive *truncus arteriosus* is complete, while the third arises later after the pulmonary artery and the aorta have divided. It is not at all improbable that we may have here a clue to an explanation of this anomaly, but this is conjectural until we have fuller details of the process of the development of the sigmoid valves in mammals (2).

As it becomes increasingly apparent that right-noncoronary and right-left coronary cusp fusion are distinct diseases, research reports on the BAV should make this distinction as Osler suggested: "This point [right-left coronary cusp fusion is the most common BAV morphology], previously overlooked, may prove of interest in the etiology, and should be carefully noted in future observations" (2).

Biner et al. (3) report evidence of a bicuspid aortopathy in first-degree relatives of BAV patients, but did not address the relationship of BAV morphology to aortic properties. We would be interested to know whether BAV morphology in the proband modifies the extent of aortic dilation and stiffness in first-degree relatives.

Tzemos et al. (4) provide data suggesting that the BAV is associated with endothelial dysfunction, at least in the presence of aortic dilation. The authors note that three-fourths of the patients in each BAV group had anteroposterior aortic leaflet orientation (presumably right-left coronary cusp fusion), but no data are presented on the relationship between BAV morphology and the parameters studied. Does BAV morphology influence the relationship among aortic dilation, aortic stiffness, serum matrix metalloproteinase levels, and endothelial function?

With deepening understanding of the developmental and physiologic aspects of the BAV and its associated diffuse vasculopathy, we believe that it is vital that data be reported to allow detailed inquiry into potential variation between morphologically and likely clinically and developmentally distinct categories of disease.

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Reply

We are grateful to Drs. Opotowsky and Landzberg for raising an important question such as the impact of bicuspid aortic valve (BAV) morphology on aortic dilation, aortic stiffness, serum matrix metalloproteinase levels, and endothelial function in our study (1). Regrettably, our study was not designed to examine the role of BAV morphology, and it would be inappropriate to perform additional post hoc analyses, particularly in view of the small sample size. Nevertheless, the equal proportion of patients with anteroposterior aortic leaflets orientation within the 2 BAV study groups probably eliminated the confounding effect of bicuspid valve morphology on the observed difference in aortic stiffness, serum matrix metalloproteinase, and endothelial function between the BAV patients with and those without ascending aortic dilation (1).

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