Biochemistry: On bicuspid aortic valve's aortic service

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The purpose of studying the aorta in patients with bicuspid aortic valves (BAVs) is related to proximal aortic dilatation and the risk of dissection. If the BAV is incompetent, considerable proximal aortic dilatation requires aortic surgery.¹ If the BAV is competent despite sclerosis, proximal aortic dilatation may be only relative.² In other words, BAV per se may no longer be only considered as a disease entity including dilatation of the proximal aorta leading to dissection. This argument has been tested in investigating patients with BAV after aortic valve replacement with and without aortic surgery.³

In the current study “Elevated Oxidative Stress in the Aortic Media of Bicuspid Aortic Valve Patients” by Billaud and colleagues,⁴ a biochemical investigation was undertaken to show that oxidative stress is present in the proximal aorta during BAV. Ascending aortic tissue was obtained from patients with BAV and compared with aortas from patients with tricuspid aortic valves. Indicators of oxidative stress, such as superoxide anion levels, were measured using a sensitive high-pressure liquid chromatography method, and lipid peroxidation was evaluated using enzyme-linked immunosorbent assay to quantify 8-iso-prostaglandin F2 α . Protective indicators against oxidative stress were evaluated by investigating the enzymatic activity of superoxide dismutase and peroxidase. Indicators of oxidative stress and peroxidase activity were increased, whereas superoxide dismutase remained unchanged in BAV aortas. The most prominent difference was found in BAV aortas devoid of dilatation compared with those with dilatation or tricuspid aortic valves. A milieu of oxidative stress in the setting of BAV-associated aortopathy was suggested.⁴

Instead of being a trigger for ongoing aortic disease, oxidative stress also may reflect aortic wall remodeling in patients with competent BAV⁵; most of the patients with BAV in the study by Billaud and colleagues⁴ have aortic valve stenosis.⁴ Instead, incompetent BAV is associated with increased risk for dissection.² Aortic media degeneration and smooth muscle cell loss may not necessarily be present during BAV.⁶ The total number of aortas included is reasonable, but categorizing the patients according to different phenotypes and aortic dilatation renders the groups still too small for detailed answers concerning aortic

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Central Message

Competent/incompetent BAV versus proximal aortic dilatation/dissection.

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valve function.⁴ Molecular research has still to discover relevant genetic footprints for BAV and associated aortic disease.

The present study by Billaud and colleagues⁴ adds importantly to the literature of BAV and associated aortic dilatation. Because oxidative stress has a role during aortic remodeling, we should seek for the plausible clinical worth of intervening on oxidative stress in patients with aortic valve disease. Together while speculating about the significance of different phenotypes of the aortic valve, one also may ask about the consequences of a diseased aortic valve, and furthermore, what makes the functionally diseased aortic valve prone to aortic dissection.

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