several additional insightful messages. An additional significant drawback is represented by the limited availability of follow-up data beyond the 30th postoperative day. Although the authors' decision to report only patients with complete data is methodologically incontestable, the demonstration of long-term outcomes and their reasoned communication remains a vital asset for contemporary cardiac surgery. In that sense, is the GERAADA a "mutilated" tool?

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Commentary: Gender differences in aortic pathology and detection bias

Hope E. Cordova, DO, and Dawn S. Hui, MD

Health inequality between genders is a well-known phenomenon that has been demonstrated for centuries, first documented in the 1850s by the British epidemiologist William Farr.¹ Such differences are clearly demonstrated when comparing overall life expectancy, which has improved in females since the 1890s²; however, questions remain as to the contributing factors. In this edition of the *Journal*, Rylski and colleagues³ examine gender-related differences in acute aortic dissection, specifically differences in disease presentation, anatomic burden, and surgical outcomes.

We congratulate the authors in examining gender differences in this subset. An editorial series on gender differences in cardiothoracic surgery diseases and outcomes was initiated by the *Journal* nearly 20 years ago,⁴ and yet still much work remains to be done. A strength of this study is that the data are derived from a multicenter, multinational registry. Findings included that women presented at an older age (average, 5 years older), and that men were more likely to have visceral/renal malperfusion and

Hope E. Cordova, DO, and Dawn S. Hui, MD

CENTRAL MESSAGE

A registry study suggests gender differences in the clinical and anatomic presentation and surgical intervention of acute type A dissections. We reflect on the potential for study biases.

neurologic dysfunction and to undergo aortic root replacement. Operative mortality was similar.

A question that arises is whether presentation differences truly represent gender-mediated biological differences in disease behavior, or might they reflect differences in detection and/or management. As with all procedure-based registries, there is a potential for survivorship bias when evaluating disease incidence.⁵ With specialized care, there also may be a referral bias. Inclusion in the study of Rylski and colleagues involved 4 preoperative steps: patients had to have been accurately diagnosed, transferred to a German Registry for Acute Aortic Dissection Type A (GERAADA) center, offered surgery, and consented to surgery as a treatment. This meant that the study excluded patients with type A dissection who had a missed diagnosis (whether clinically or due to lack of high-quality, accurately interpreted

From the Department of Cardiothoracic Surgery, University of Texas Health Sciences Center at San Antonio, San Antonio, Tex.

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Address for reprints: Dawn S. Hui, MD, 7703 Floyd Curl Drive, Suite 211L, San Antonio, TX 78229 (E-mail: huid@uthscsa.edu).

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imaging), patients not transferred to a GERAADA center, and patients who were not considered surgical candidates or refused surgery. That these nonbiological factors may be gender-mediated is something to reflect upon. This phenomenon is appreciated when examining coronary atherosclerosis in women, which traditionally has been underdiagnosed and undertreated. It is well known that biological (ie, estrogen-mediated) differences exist in coronary artery disease (CAD), but there is also a disparity in management even for women with recognized acute coronary syndromes⁶ despite higher risk profiles⁷ and including ST elevation myocardial infarctions.⁸

Differences between CAD and aortic dissection as well as evidence from elsewhere suggest that these potentials for gender-based management differentials may be less relevant in aortic dissection. First, the workup of CAD is not as straightforward as aortic dissection, the former having atypical symptoms in women, the latter having generally a well-recognized presentation. Second, medical management is in fact a reasonable alternative to intervention for CAD depending on the circumstances, whereas surgical therapy is the clearly preferred treatment for aortic dissection. Third, the fact that women in this study were significantly older than the men is encouraging; the risk factor of age did not appear to be a deterrent to surgery in women.

Elsewhere, the direct evidence is scanty. A single-institution study from Japan demonstrated similar findings to those reported by Ryłski and colleagues: an age differential (of an even greater degree at 12 years), greater use of aortic root replacement in men, and similar mortality outcomes.⁹ Compare this to the International Registry of Aortic Dissection (IRAD) data from 2004,¹⁰ in which women were also older than men. Operative mortality was higher in women (32% vs 22%), and women were more likely to present with imaging findings suggestive of severe clinical/anatomic presentation or impending rupture.

Given that we do not expect gender-mediated biology to change over time, the discrepancy between the 2 studies and the older IRAD study suggests 2 possibilities: that diagnosis and treatment of type A dissection in women has improved over the last 15 years, or that both registry studies are subject to differing referral and/or survivorship biases. Notably, the IRAD study reported that women with type A aortic dissections were more likely to be medically managed, at a significant 28.5% versus 13.0%. This kind of inclusion and reporting is a good first step in fully understanding gender-mediated differences. A true understanding of aortic dissection presentation management will not be feasible until the denominator is disease-based, that is, including patients managed both medically and surgically.

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