

A tear in the fabric: unravelling gender differences in aortic dissection

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This editorial refers to ‘Sex differences and temporal trends in aortic dissection: a population-based study of incidence, treatment strategies, and outcome in Swedish patients during 15 years’[†], by C. Smedberg et al., on page 2430.

In an era when disruption is often billed as a positive phenomenon—be it technological, sociological, or ideological—acute cardiovascular events continue to disrupt lives and humble clinicians worldwide. Among the most morbid and mortal conditions are the acute aortic syndromes. Medical students learn that aortic dissection (AD) and rupture usually present in a very dramatic fashion, with tearing or ripping chest and back pain, syncope, and sudden death. But in reality, not every patient steps out of a classic textbook, and a fresh take on these challenging clinical entities can be enlightening.

In this issue of the *European Heart Journal*, Smedberg and colleagues have described contemporary trends in AD in the Swedish population.¹ Their study is truly population based, as it draws on both the National Patient Register and the Cause of Death Register, and has therefore captured patients regardless of whether they survived to hospital admission. From 2002 to 2016, 8057 patients were diagnosed with AD in Sweden, with a mean annual incidence of 7.2/100 000 patient-years. This is higher than reported in the Oxfordshire, UK population from 2002 to 2012 (6.0/100 000),² and in the Icelandic population from 1992 to 2013 (2.53/100 000).³ An American study based on residents of Olmstead, Minnesota in 1995–2015 found an incidence of 7.7/100 000 for all aortic syndromes, including AD, intramural haematoma, and penetrating atherosclerotic ulcer. The AD incidence in that study was 4.4/100 000.⁴ It is important to note that the study of Smedberg and colleagues is by far the largest of these, as each of the others included fewer than 200 AD

cases.^{2–4} The population of Sweden is largely Caucasian and served by a universal healthcare system. Elsewhere in the world, among other sociodemographic groups with greater genetic and environmental predispositions to cardiovascular disease, and with more limited access to healthcare, it is likely that the incidence of AD is higher than reported in this study.

The present study corroborates prior findings that men suffer AD more frequently than women, and that men tend to present with AD earlier in life (mean age 66 years in men vs. 71 years in women). Among men, the incidence was 9.8/100 000 in 2002–2006, decreasing significantly to 8.8/100 000 in 2012–2016. The mean incidence in women was 5.4/100 000 and did not decline significantly over the study period.¹ One potential reason for this gender difference is less proactive screening of women for aortic aneurysms in the setting of risk factors such as positive family history, smoking, and hypertension. Current European and American guidelines do not provide different recommendations for thoracic aortic aneurysm screening based on gender.^{5,6} While the Society for Vascular Surgery advocates screening women and men similarly for abdominal aortic aneurysm (AAA), citing the fact that women are predisposed to rupture at smaller diameters,⁷ AAA screening in women is discouraged by the United States Preventive Services Task Force, on the basis of limited evidence.⁸

A troubling finding of the present study is that women suffered pre-hospital death more often than men.¹ Aside from a lack of awareness of pre-existing aortic aneurysms, gender differences in clinical presentation could account for some of this discrepancy. Based on data from the International Registry of Acute Aortic Dissection (IRAD), women with AD are less likely to have abrupt onset of chest or back pain, potentially leading to delayed activation of emergency services by patients and families, or failure to seek medical care at all. More frequent presentation with coma or altered mental status, preventing accurate history taking, coupled with absence of suspicious physical examination findings such as pulse deficit, may result in

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Aortic dissection in women: Pillars of prevention and care

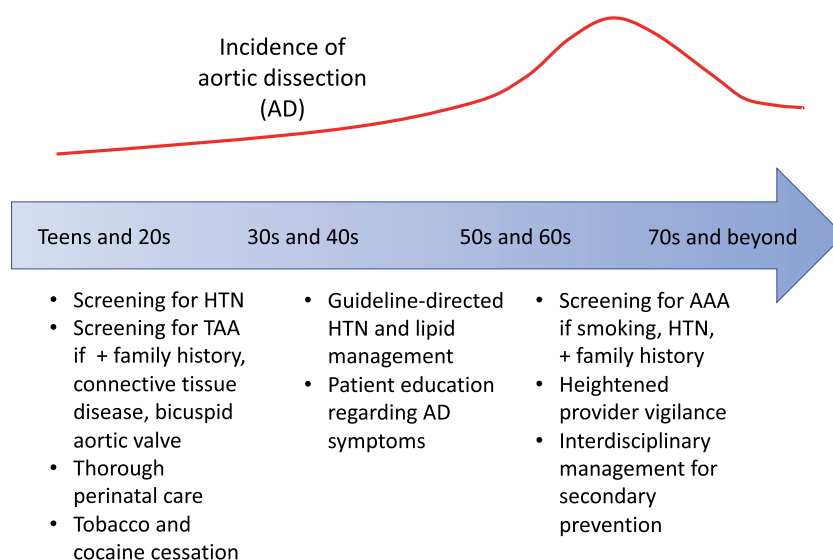


Figure 1 Proposed preventive and therapeutic strategies to reduce aortic dissection (AD) incidence and improve clinical outcomes in women. At each stage of life, strategies that have been recommended at earlier stages remain important. AAA, abdominal aortic aneurysm; HTN, hypertension; TAA, thoracic aortic aneurysm.

decreased clinical suspicion for AD in women.⁹ The fact that women tend to present in the eighth decade of life, when other causes of chest pain and dyspnoea such as myocardial infarction (MI), pulmonary embolism, and pneumonia are common, may result in availability bias on the part of providers, leading to delayed or missed diagnoses.

Among women diagnosed with AD in the Swedish cohort, clinical outcomes were less favourable than in men, even after adjustment for age.¹ In particular, women treated surgically had higher 30-day mortality than men (17% vs. 12%, odds ratio 1.38, 95% confidence interval 1.04–1.82). These findings are congruent with those of a recent meta-analysis of thoracic endovascular aortic repair (TEVAR) for type B AD, demonstrating an odds ratio for 30-day mortality of 1.75 for women as compared with men, along with greater length of stay in women.¹⁰ As the authors suggest, one potential explanation for this difference is increased fragility of the aorta in women, which could be driven by greater atherosclerotic burden in the setting of advanced age. Other anatomical factors, such as smaller aortic and branch-vessel sizes, as well as greater comorbidity burden in women, could also play a role. Women in this study were less likely to undergo TEVAR than men. Could this practice pattern represent a response to clinically observed poorer outcomes in women undergoing surgery, i.e. a first do no harm approach? Might surgeons be less willing to intervene in women unless they are clearly failing medical therapy for type B AD, when the likelihood of a favourable surgical outcome could be lower? These questions deserve further study.

While population-level discussions of AD most often focus on the elderly population, women of childbearing age are potentially vulnerable to this life-threatening problem, particularly in the setting of underlying aortic aneurysm. Smedberg and colleagues found that

patients 18–49 years of age represented 7% of women with AD in 2002–2006 and 4% in 2012–2016.¹ Notably, Sweden has one of the lowest maternal mortality rates in the world, with lifetime risk of maternal death 1/12 600 as compared with 1/3000 in the USA, 1/940 in Brazil, and 1/76 in Kenya.¹¹ Though data on pregnancy status are not presented in the current study, and gender-specific mortality data are not presented by age group, it is encouraging to see that mortality in the youngest group of patients was only 12%, perhaps speaking to swift and appropriate management of acute aortic pathology, as well as thorough perinatal and postnatal care.

How can we, as physicians and stewards of public health, close the gender gap in AD? A multipronged approach is needed (Figure 1). Perhaps the lowest-hanging fruit is to increase public awareness. Thanks in part to campaigns led by professional societies including the European Society of Cardiology, American College of Cardiology, and American Heart Association, many patients understand that MI may be heralded by symptoms such as nausea, dyspepsia, and dyspnoea, rather than chest pain. AD is much less common than MI, but its symptoms in women may be similarly insidious in onset, and existing platforms for patient education could be used to convey this information.

Earlier recognition of aortic aneurysm would probably be protective for some patients. The proactive approach to AAA screening advocated by the Society for Vascular Surgery seems prudent, particularly in women with suboptimally controlled hypertension and extensive smoking histories. When aortic aneurysm has been diagnosed, primary care physicians and cardiologists may be more likely to treat hypertension aggressively and to advocate strongly for smoking cessation.

In order to ensure that all patients are treated optimally for type B AD, a heart–vascular team approach to clinical decision-making should be considered. This model has become standard in many institutions for valvular heart disease and complex coronary artery disease. Sharing viewpoints among individuals with diverse specialty backgrounds, including cardiologists and vascular surgeons not directly involved in a patient's care, may enhance objectivity and promote carefully reasoned choices in non-emergent situations. Continued interdisciplinary care after hospital discharge, with appropriate follow-up imaging and strict blood pressure control, may help prevent late complications.

Though AD is often acute, it may occur on a background of chronic underlying conditions and unfavourable lifestyle choices. Therefore, as with other forms of cardiovascular disease, effective prevention must start early in life. Providers should take every opportunity to counsel against smoking and cocaine use, to flesh out family history, and to screen for hypertension. Primary care physicians and obstetricians are the first line of defence in this regard. As cardiovascular specialists, we must educate and support our colleagues as well as our patients. Do we need to be disruptive in order to make progress? Not necessarily, but we cannot be complacent.

Conflict of interest: none declared.

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