

The Recurring Theme of Gender Difference in Cardiac Surgical Outcomes

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In this issue of the Journal of Cardiac Surgery,¹Newell and colleagues examined contemporary national outcomes following surgical resection of benign primary atrial and ventricular tumors. The 2016-2018 Nationwide Readmissions Database was queried for all patients > 18 years of age with a primary diagnosis of benign neoplasm of the heart who underwent resection of the atria, ventricles, or atrial/ventricular septum. A weighted total of 2,557 patients met inclusion criteria. Mean age was 61 years, 67.9% were female, and patients had relatively low comorbidity burdens. The authors found that while there was no difference in 30-day mortality (2.1% vs 1.3%, $p=0.550$), 30-day readmission (7.0% vs 9.1%, $p=0.222$), or 30-day composite morbidity (56.8% vs 53.8%, $p=0.369$) between females and males respectively, on multivariable analysis, female sex was independently associated with increased risk of 30-day mortality (OR 2.65, $p=0.028$).

Overall, this was a well study which documents a large contemporary cohort of benign cardiac tumor resections. However, perhaps the most interesting feature of this study is the finding of sex as an independent predictor of 30 day mortality after propensity matching. Cardiac surgery suffers from a gender gap in

terms of its outcomes. It has been well established that for many procedures such coronary bypass surgery (CABG), aortic valve replacement, mitral valve surgery, and aortic surgery.² For CABG, women referred for surgery are typically older than men, have a higher comorbidity (hypertension, renal failure, diabetes, peripheral vascular disease) profile, and more often present in urgent or emergent status for surgery.³ Large, risk-adjusted, propensity matched studies have documented increased mortality in women as compared with men.⁴⁻⁷ This difference also extends into the interventional cardiology realm, where mortality and complication rates have been shown to be higher in women following percutaneous interventions for ST-elevation myocardial infarction.⁸ For aortic valve replacement, a Nationwide Inpatient Sample study of 166809 patients with aortic stenosis from 2003 to 2014 found that women experience higher inpatient mortality (5.6% versus 4%, $P<0.001$) which persisted after propensity matching (3.3% versus 2.9%, $P<0.001$).⁹ For mitral valve surgery, a randomized controlled trial of patients with severe ischemic mitral insufficiency undergoing repair versus replacement found that women had higher mortality than men (27.1% versus 17.4%, $p<0.03$).¹⁰ For aortic surgery, female gender was associated with a higher mortality after both aortic dissection and aortic arch repair.^{11,12} Reduction in surgical stress through application of minimally invasive approaches still resulted in female sex being a risk factor for higher in-hospital mortality.¹³ The findings of the present study add further support to the above observations, with the potential addition that, in contrast to the other disease processes described, the majority of patients presenting for surgical removal of benign cardiac tumors were likely free of either symptoms or cardiac sequelae due to the disease, but nevertheless still the gender disparity in mortality persisted.

While it is obvious that the above disease processes and their related surgical remedies are quite disparate, the association with increased mortality seen in females seems to be constant. Why is this? A considerable amount has been written regarding sex bias in referral patterns for surgery and even decreased functional reserve and health profiles of women when they are referred for surgical intervention compared with men.² With regard to these referral patterns, published guidelines directing practitioners regarding indications for surgery are, in general, based upon studies in which the majority of patients were male. Interestingly, in the present study, females made up over two thirds of the patient population.¹ While this suggests that females carry a disproportionately more benign cardiac tumors amenable to surgery, the post-surgical mortality disparity remained.

The exact reasons for the above disparity remain unelucidated and further work is required to eliminate the gender gap in cardiac surgical outcomes. There is considerable focus on the removal of sex bias in animal and human research, as well as the development of disease treatment guidelines that consider gender in the algorithms. Hopefully and these and other sex-balanced approaches will reveal new insights that will allow us to bring equipoise to gender-stratified cardiac surgical outcomes.

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