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EDITORIAL

Women and Heart Disease

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Heart disease is the leading cause of death for both men and women. It is alarming to note that approximately 50,000 more women than men die of heart disease every year, and in fact 1 in 5 women has some form of heart or blood vessel disease.

It is of note that 38% of women who have a heart attack die within a year and 40% of all coronary events in women are fatal; most occur without prior warning.

Nearly twice as many women in the United States die from heart disease and stroke as from all cancers put together, including breast cancer. Undertreatment and underdiagnosis of heart disease in women has been common and has resulted in excess mortality in women.

There is a definite gender difference in patients undergoing cardiac surgery, with women known to be at higher risk than men. This difference has many reasons including the fact that women usually have more comorbidities than men at the time of presentation and are usually of smaller size. Even though this gender difference in outcomes has been ever present, its significance is now being recognized and is the focus of ongoing editorials and articles called the "Gender Initiative" in the *Journal of Cardiovascular and Thoracic Surgery*. This initiative began in September 2003 [Wechsler 2003, Nussmeier 2003], and its "focus will be on gender differences in disease patterns and responses to therapy, the paradoxes, the possible reasons, and the unknowns" [Nussmeier 2003]. In her editorial, "Improving Outcomes for Women after Coronary Artery Bypass Grafting: A Case for Prevention" [Oparil 2003], Dr. Oparil discusses the papers by Vaccarino and Koch [Koch 2003, Vaccarino 2003] and asks the question, "is female gender a marker or a cause of increased risk of poor outcomes after coronary revascularization?" In their papers, Vaccarino and Koch report an increased burden of cardiovascular disease risk factors and comorbid conditions, including hypertension, insulin-treated diabetes, heart failure, renal disease, peripheral vascular disease, and elevated low-density lipoprotein cholesterol and triglyceride levels, in women compared with men. Furthermore, women had a more unstable presentation, including a higher prevalence of unstable angina, preoperative intraaortic balloon pump usage, and emergency surgery, compared with men. When propensity-modeling techniques were used, only 26% of women could be matched with men on propensity scores because of the greater prevalence of risk factors and comorbidities among the women. Although unadjusted postoperative morbidity and mortality outcomes were worse for women than for men overall, in well-matched patients, female gender was not a risk factor for in-hospital mortality and had minimal impact on postoperative morbidity.

Off-pump bypass surgery has been shown to be beneficial in this high-risk group of patients. Brown et al [2004] analyzed patient mortality and 13 procedure complications, controlling for 35 variables representing patient characteristics and comorbid conditions and for procedure characteristics for a population of 16,871 consecutive women undergoing off-pump and on-pump coronary artery bypass graft (CABG) surgery. Mean comparisons reveal that the mortality rate for women undergoing off-pump CABG surgery is nearly a percentage point lower than for women undergoing on-pump surgery (3.12 versus 3.90; $P \leq .052$). The complication rates for all complications analyzed (shock/hemorrhagic, neurologic, cardiac, respiratory, renal, acute renal failure, adult respiratory distress syndrome, implant infection, postoperative infection, septicemia, pneumonia, and peripheral vascular) were lower for women off-pump than women on-pump with the exception of mechanical complications. Logistic regression results reveal, after controlling for 35 relevant patient characteristics, comorbid conditions, and procedure characteristics, that women undergoing on-pump CABG surgery experience a 42% higher mortality rate ($P \leq .0239$) than women undergoing off-pump CABG surgery. Brown and his group concluded that their evidence suggests that off-pump CABG surgery may be better for women than on-pump CABG surgery because it appears to reduce mortality and respiratory complications, shorten lengths of stay, and increase incidence of discharges directly home. None of the 12 other complications that they investigated demonstrated

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an advantage for women undergoing on-pump surgery relative to those receiving off-pump surgery.

We had seen a similar advantage in women undergoing coronary bypass off pump [Petro 2000].

This demonstrated benefit of off-pump CABG to women and men will become even more obvious as the techniques of beating-heart surgery continue to evolve and improve, and surgeons and their cardiac teams become more comfortable with this approach.

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