The Impact of CAD Risk Factors Differs by Gender

Written by Toni Rizzo

Pamela Ouyang, MBBS, Johns Hopkins University, Baltimore, Maryland, USA, discussed sex differences in risk factors for the development and assessment of coronary artery disease (CAD). Cardiovascular disease (CVD) risk factors are similar for men and women; however, the prevalence of these risk factors differs between the sexes. Hypertension is more common in women aged > 65 years. Physical inactivity rates are higher and smoking rates are lower in women. Diabetes is more prevalent and may impart a higher CVD risk in women [Kalyani RR et al. *Diabetes Care* 2013].

The American College of Cardiology (ACC) National Cardiovascular Data Registry reported that significant obstructive CAD is less common in women than in men ($p < .0001$) [Shaw L et al. *Circulation* 2008]. Among white women and men with angina and CAD, women had a higher in-hospital mortality rate but lower rates of treatment with coronary revascularization and aspirin.

A Finnish study showed that the presence of angina and coronary artery diagnosed by either stress test or angiography was associated with higher mortality rates in women than in men aged 45 to 74 years [Hemingway H et al. *JAMA* 2006]. In a sample of 136,247 patients (28% women) from 11 acute coronary syndrome (ACS) trials, 30-day mortality rates were significantly higher among women with ST-segment elevation myocardial infarction (STEMI; adjusted OR, 1.15; 95% CI, 1.06 to 1.24; $p < .005$) and lower among women with unstable angina (adjusted OR, .55; 95% CI, .43 to .70; $p < .005$) compared with men with the same diagnoses [Berger JS et al. *JAMA* 2009].

Women with chest pain have a lower rate of anatomic coronary disease but are hospitalized more often for persistent chest pain [Shaw L et al. *J Am Coll Cardiol* 2009]. Women with atypical chest pain or chest pain with no obstructive CAD have an increased risk of adverse events [Gulati M et al. *Arch Intern Med* 2009; Robinson JG et al. *Am J Cardiol* 2008]. Women with sudden cardiac arrest have significantly lower CAD rates and less severe left ventricular dysfunction than men [Chugh SS et al. *J Am Coll Cardiol* 2009].

The Framingham Risk Score (FRS) and American Heart Association/ACC Cardiovascular Risk Guidelines Work Group pooled cohort risk equations are used to assess atherosclerotic CVD (ASCVD) risk [Goff et al. *Circulation* 2013]. Women, however, can be misclassified if these scores are used alone. Nontraditional factors that increase cardiovascular risk include a family history of premature CVD; high-sensitivity C-reactive protein ≥ 2 mg/L; coronary artery calcification (CAC) score ≥ 300 Agatston units or ≥ 75th percentile for age, sex, and ethnicity; and ankle-brachial index < .9. Additional risk factors in women include menarche age, menopause age, and gestational diabetes or hypertensive disorders during pregnancy.

Another recent study showed that a patient's predicted risk of cardiovascular events as assessed by the FRS could be modified with the CAC scoring [Erbel et al. *J Am Coll Cardiol* 2010]. As a result, it possible to use CAC scores to reclassify intermediate-risk patients into either a higher (or lower) risk category.

Women with chest pain have a less severe extent of coronary obstruction than do men. Nonobstructive coronary disease is, however, associated with increased risk versus normal coronary arteries. Causes of chest pain other than ASCVD are more common in women. Risk stratification tools may misclassify some intermediate-risk women. Therefore, Dr. Ouyang concluded that additional testing should be considered in women with high levels of a single risk factor.

Aortic Valve Repair Provide Durable Results

Written by Toni Rizzo

Although mitral valve repair is well established, initial reports of the success of aortic valve repair were mixed. A review of 11 studies from 1990 to 2002, including 761 patients who underwent aortic valve repair, reported that the durability of the repairs was unclear and that patients with rheumatic valvular disease had an increased incidence of recurrence and repair failure [Carr JA, Savage EB. *Eur J Cardiothorac Surg* 2004]. However, Edward B. Savage, MD, Cleveland Clinic Florida, Weston, Florida, USA, stated that since that report, new standardized techniques have been developed for durable aortic valve repair, making it a viable and favorable option when anatomically possible.

Conditions that can cause aortic regurgitation (AR) include cusp prolapse, perforation, and retraction. Dilation of the annulus or the sinotubular junction can also lead to regurgitation. The main principle in aortic valve repair is to correct the primary abnormality. The length of the coaptation-free margins should be evened and the height of the leaflets raised, resulting in increased coaptation height.

One repair technique involves shortening the length of the free margin of the leaflet by central plication or by free-margin suspension to match the others [Tamer S et al. *Ann Cardiothorac Surg* 2013]. In patients with annular dilation, subcommissural annuloplasty can be performed, in which a suture is placed and tightened to pull the bottom together and push the leaflets up. Another way to accomplish this

is with commissural plication, in which a suture is placed around the commissure outside the aorta to shrink the annular diameter and push the leaflets together.

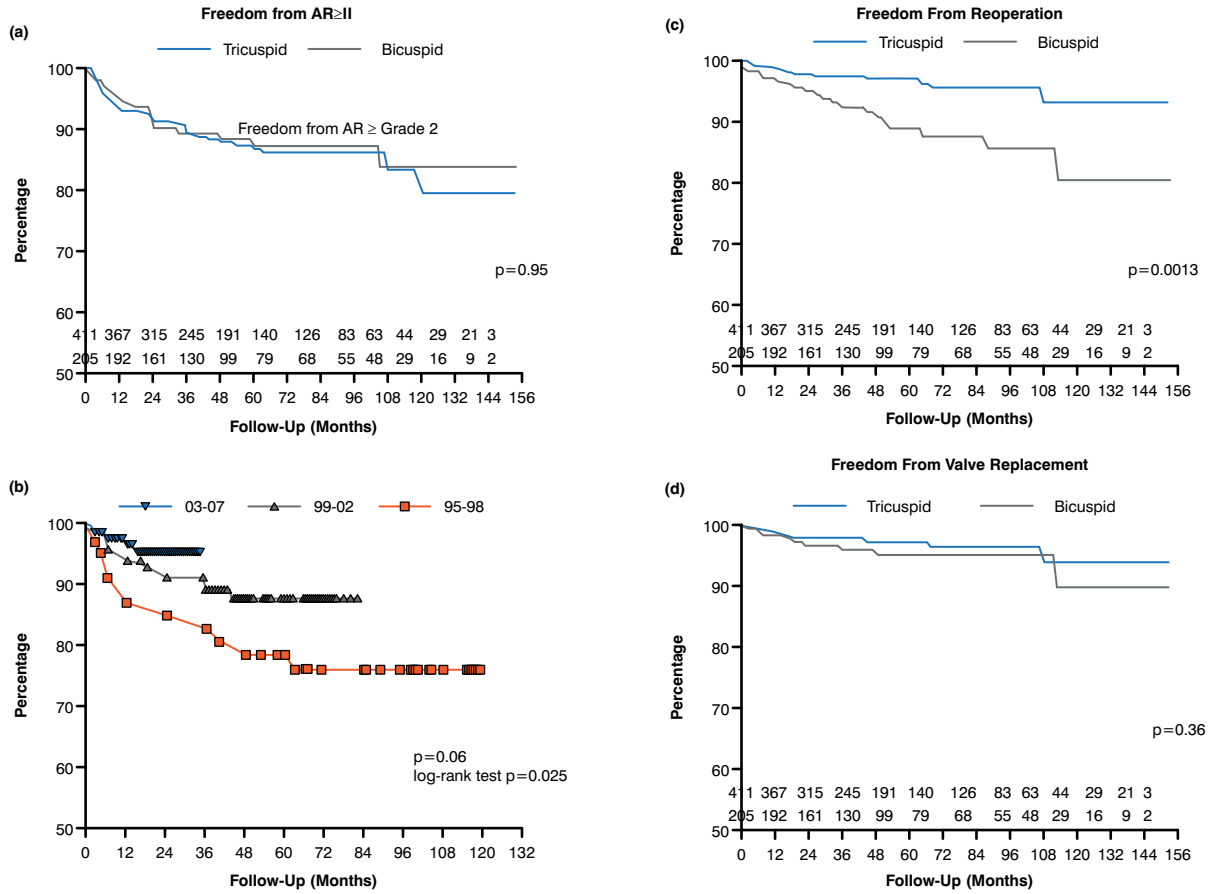
A new technique under development in an animal model involves using a ring, which fits beneath the valve with 3 posts fitting into the commissures to match the normal configuration of the aortic root [Rankin JS et al. *J Thorac Cardiovasc Surg* 2011]. According to Dr. Savage, the ring will reduce the diameter of and stabilize the annulus. One note of caution is that fibrosis might develop on the valve, affecting the leaflets, so long-term follow-up is needed to assess the durability of these devices.

Another repair method, if there is inadequate valve tissue, is augmentation using the patient's pericardium as a patch, which is glutaraldehyde fixed and sutured to the free margin of the leaflet. Good long-term results of this technique have been published, but the patch can calcify and restrict leaflet motion.

A study evaluating aortic valve repair with cusp or root repair or a combination of both reported comparable freedom from AR greater than or equal to grade 2 in repaired bicuspid and tricuspid valves (p = .95; Figure 1) [Aicher D et al. *Eur J Cardiothorac Surg* 2010]. There was a significant improvement in freedom from AR greater than or equal to grade 2 for repairs performed during more recent years, demonstrating the influence of valve repair experience (log-rank p = .025). Freedom from reoperation at 10 years was 81% in bicuspid valves and 93% in tricuspid valves (p = .0013), while freedom from valve replacement was 90% in bicuspid valves and 94% in tricuspid valves (p = .36).

Dr. Savage concluded that aortic valve repair is durable in appropriate situations and is a viable treatment option. He argued that there may be situations in which aortic valve repair is preferable to mechanical or bioprosthetic valve replacement.

Figure 1. Ten-Year Results of Aortic Valve Repair



AR=aortic regurgitation.

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