

# Outcomes of Females with Normal Coronaries on Coronary Angiogram

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This issue addresses the dilemma of management in women with chest pain and normal coronaries. The protocol for these patients must incorporate probability of future coronary events<sup>1</sup> and mortality there from.<sup>2</sup> The economic burden to individual family and community as also the emotional impact must be borne in mind.

Angina in the absence of obstructive coronary artery disease (CAD), sometimes referred to as *cardiac syndrome X* (CSX), is known to disproportionately affect women.<sup>3</sup> More than 50% of women evaluated for angina have nonobstructive disease by cardiac catheterization.<sup>4</sup>

Two hypotheses have existed to explain CSX: the ischemic hypothesis—abnormal coronary microvascular function, and the nonischemic hypothesis describing altered pain perception and myocardial hypersensitivity. A prospective study using intravascular ultrasound (IVUS) and cardiac magnetic resonance imaging (cMRI) in women presenting with acute myocardial infarction (MI) without obstructive CAD at angiography demonstrated plaque disruption as a frequent finding.<sup>5</sup>

With regard to treatment strategies,  $\beta$ -blockers have been the mainstay along with other antianginals, angiotensin-converting enzyme (ACE) inhibitors, statins, and lifestyle modifications. However, there is still a paucity of data to define an optimal algorithm for diagnosis and management more so with regard to women.<sup>6</sup>

In a population-based cohort study of 32,856 patients published in 1981, women with angiographically normal coronaries were more than four times more likely to be readmitted to hospital for acute coronary syndrome (ACS)/chest pain within 180 days compared with men. The observed sex difference suggested that traditional diagnostic methods may be inappropriate for women.<sup>7</sup>

The Coronary Artery Surgery Study (CASS) registry<sup>8</sup> incorporated 25,000 patients undergoing coronary angiography for angina, of whom 39% of women had normal coronary arteries compared with 11% of men. Data from 375,886 patients referred for angiography due to stable angina in the American College of Cardiology–National Cardiovascular Data Registry (NCDR) showed that the prevalence of nonobstructive

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disease was significantly higher in women (51%) than in men (32%).

Higher prevalence in women was again confirmed by the Women's Ischemic Syndrome Evaluation (WISE) study, as per which 62% of women referred for angiography had nonobstructive CAD.

Our conventional understanding of CAD presupposes that premenopausal women are less likely to suffer from CAD than their age-matched male counterparts.<sup>9</sup> Though this may be true in a larger context, it becomes pertinent to review the study published by Proudfit et al in *Circulation*.<sup>10</sup> This study followed up more than a 1,000 women younger than 50 years for more than 5 years and reported a survival rate of 96.9%. Causes of death were coronary ectasia and sudden cardiac death.

Seven of the 727 women who had less than 30% luminal narrowing went on to have coronary events whereas 6 of the 324 women who had 30 to 50% lesions went on to have coronary events. Overall, such cases represented 6.8% of patients referred for coronary angiography.

Thus the subset of patients presenting with chest pain and angiographically insignificant lesions namely with less than 50% luminal narrowing presents a challenging situation from the clinical perspective, and protocols for optimal follow-up are yet to be defined.

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