

1d

Women

L. Salgado (Lisbon)

Cardiovascular disease in women, particularly coronary artery disease (CAD), has been under-diagnosed and under-treated. Nevertheless, CAD is the leading cause of death in women, as well as in men, in most industrialized countries. Cardiovascular disease kills more women annually than all forms of cancer combined.

Having considered for years that oestrogen were protective against coronary artery disease, women themselves are not fully aware of their own risk of heart disease. The same applies to health-carers, that continue to see women as a group of low risk for CAD. This attitude translates to lesser screening for coronary risk factors and coronary risk reduction interventions and even, lesser use of some prescription drugs, such as ACE inhibitors or β -blockers, in women, as compared to men.

There are various recognised risk factors implicated in the aetiology of CAD. High blood cholesterol, high blood pressure and cigarette smoking are risk factors well documented in both men and women. At younger ages, women tend to have lower mean levels of systolic blood pressure and serum cholesterol compared to men, but this pattern reverses at older ages. Cigarette smoking is more prevalent in older men, but its prevalence is now increasing in younger women, and even surpassing the prevalence in their male counterparts of the same age.

Some other factors account for the differences in CAD between men and women. Angina is the most common symptom in women, but in a high majority of cases the presentation can be atypical, either as epigastric discomfort, severe fatigue, dyspnoea or jaw pain. Women under the age of 55 years have worse outcome after myocardial infarction, when compared to men of similar age. The rate for recurrent infarction and the mortality post-infarction are higher in women. There are also clear gender differences in coronary revascularization, with higher mortality in women.

Some anatomical factors are also important. Women have smaller hearts, smaller coronary arteries and the pathogenesis of the disease is more commonly subclinical atherosclerosis than obstructive lesions. Breasts are a reason for false positive results, causing attenuation of the images in myocardial perfusion scintigraphy.

Non-invasive imaging, and myocardial perfusion scintigraphy (MPS) in particular, can have a very important role in the identification of disease at earlier stages, with high accuracy. Guidelines published by the British Cardiac Society and Royal College of Physicians consider that gated-SPECT MPS should be the first line of investigation in women suspected of CAD.

The diagnostic accuracy of conventional exercise testing has been shown to be lower in women. The diagnostic accuracy of thallium-201 SPECT myocardial perfusion was also lower in women, due to a smaller left ventricular chamber size. In a study published in *J Am Coll Cardiol*, in 1996, Hansen and co-workers demonstrated that diagnostic accuracy was lower in women than in men, despite similar values for peak heart rate and rate-pressure product and similar severity of CAD. It was proposed by the authors that the most likely cause was the greater effect of imaging blurring on smaller hearts.

More recently, and with the widespread use of ^{99m}Tc -labelled perfusion agents, the combination of supine and prone acquisitions in the same patient was evaluated, in terms of diagnostic and also, prognostic value. The group of G. Germano, working in Cedars-Sinai Medical Center, published in Jan 2007 (*J Nucl Cardiol*) the results of the diagnostic performance of a combined supine-prone quantification algorithm for MPS in women. The application of this method yielded a significantly increased in specificity and normalcy rates, without compromising sensitivity for the detection of CAD.

Cardiac syndrome X is a relatively common diagnosis. It is characterized by the presence of typical exercise-induced angina, transient ischaemia-like ST segment depression during pain and normal coronary arteries at angiography. Cardiac syndrome X is more common in women than in men, and specially in post-menopausal women. It is considered nowadays that oestrogen deficiency plays a pathogenic role, related to the impairment of coronary endothelial dysfunction and also, to the modulation of pain perception.

In this group, MPS can identify patients with no significant coronary obstruction. These patients have a good prognosis, with a likelihood of coronary events lower than 1% per year.

A new approach to coronary artery disease in women is being implemented in the last few years. This includes some very simple measures, as increasing the awareness of the public and health-carers for the problem and applying in women the same preventive lifestyle approaches that have been used for men. It is necessary to assess and stratify women into risk categories. It is also necessary to include more women in clinical trials, so that therapeutic choices can be well validated in this group. The aim is to have an impact on the high morbidity and mortality rates in women with CAD.

References

1. V Naidoo, K M Fox. Fashioning a new approach to coronary care in women. *Heart* 2006; 92 (Suppl III):i1
2. K-T Khaw. Epidemiology of coronary heart disease in women. *Heart* 2006; 92 (Suppl III):iii2-iii4
3. Mosca L, Appel LJ, Benjamin EJ and al. Evidence based guidelines for cardiovascular disease prevention in women. *Circulation* 2004; 109: 672-93.
4. Hansen CL, Crabbe D, Rubin S. Lower diagnostic accuracy of thallium-201 SPECT myocardial perfusion imaging in women: an effect of smaller chamber size. *J Am Coll Cardiol* 1996; 28 (5): 1214-9.
5. Hayes SW, De Lorenzo A, Hachamovitch R et al. Prognostic implications of combined prone and supine acquisitions in patients with equivocal or abnormal supine myocardial perfusion SPECT. *J Nucl Med* 2003; 44 (10): 1633-40.
6. Slomka PJ, Nishina H, Abidov A et al. Combined quantitative supine-prone myocardial perfusion SPECT improves detection of coronary artery disease and normalcy rates in women. *J Nucl Cardiol* 2007; 14 (1): 44-52.