Special article

Update on Ischemic Heart Disease and Critical Care Cardiology

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ABSTRACT

This article summarizes the main developments reported in 2013 on ischemic heart disease, together with the most important innovations in the management of acute cardiac patients.

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Actualización en cardiopatía isquémica y cuidados críticos cardiológicos

RESUMEN

Se revisan los principales avances publicados en el año 2013 sobre cardiopatía isquémica, junto con las novedades más relevantes sobre el manejo de los pacientes cardiacos críticos.

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EPIDEMIOLOGY AND PATHOGENESIS

Cardiovascular diseases are the leading cause of death in the Spanish population older than 30 years; of these diseases, ischemic heart disease has the greatest impact on this age group. A recently published estimate of the number of acute coronary syndromes (ACS) in the Spanish population in the coming years suggests that there will be more than 115 000 cases in 2013 (56% will be non-ST-segment elevation ACS [NSTEACS]), with mortality reaching nearly 35% in the first month.[1] Although prehospital mortality rates have remained unchanged in recent years, there has been a decrease in hospital mortality. Projections for the next 30 years suggest that the number of ACS cases will stabilize in the population younger than 75 years and will increase in those older than 75 years such that, due to population aging, there will be an overall increase in the total number of ACS cases.[1] Studies conducted in the United States show that mortality from ischemic heart disease has decreased in recent years, due to the improved control of smoking, hypertension, and dyslipidemia, but with a progressive increase in obesity and diabetes mellitus.[2,3.] The

obesity epidemic from early ages onward remains a cause of concern. In Spain, it has been estimated that 26% of children between 8 and 17 years are overweight and 13% are obese, although this ratio seems to have stabilized during the last 12 years.[4]

Risk factor control is far from ideal, even in the setting of secondary prevention where it could achieve greater benefit. In this regard, a recently published analysis of pooled data from 3 clinical trials (COURAGE, BARI-2D, and FREEDOM) in the diabetic population showed that, even in the controlled setting of a clinical trial, only between 8% and 23% of patients met all 4 treatment targets: low-density lipoprotein cholesterol<100 mg/dL (70 mg/dL in the FREEDOM trial), systolic blood pressure<130 mmHg, glycemic control (glycosylated hemoglobin<7%), and smoking cessation (Fig. 1).[5] The main reasons given for the poor control of cardiovascular risk factors include medication underdosing and poor adherence in patients prescribed long-term polymedication therapy.

A recently published review article by Crea et al[6] proposed a new classification of ACS into 3 groups based on pathogenesis: ACS patients with obstructive atherosclerosis and systemic inflammation, ACS patients with obstructive atherosclerosis without inflammation, and ACS patients without obstructive atherosclerosis. Patients in the first group have a worse outcome and can be

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identified by measuring inflammation markers and even by invasive techniques. In patients without systemic inflammation, individuals at the greatest risk and the level of risk are determined by plaque characteristics (greater lesion size, reduced lumen area, or reduced fibrous cap thickness). Patients without obstructive lesions may account for a third of ACS patients and have the best outcome, although up to 10% undergo a major cardiovascular event in the first year. In this group of individuals, the cause of the problem is impaired vascular tone leading to epicardial or microvascular vasoconstriction; future research should investigate how to improve vascular tone.

CARDIOVASCULAR PREVENTION

In primary prevention, a clinical trial showed the benefit of the Mediterranean diet in patients at high cardiovascular risk in relation to the incidence of severe cardiovascular events. The PREDIMED multicenter trial was conducted in Spain and randomly assigned 7447 participants at cardiovascular risk to a Mediterranean diet supplemented with extra virgin olive oil, a Mediterranean diet supplemented with mixed nuts, or a control diet. The results of following a Mediterranean diet were striking, with a reduction in 3 cardiovascular events per 1000 person-years and a 30% reduction in relative risk among high-risk participants who were free of cardiovascular disease.[7] This effect reaffirms the benefit of a heart-healthy diet in secondary prevention, in which diet quality is inversely related to cardiovascular risk.[8] This beneficial effect is additive to the pharmacologic benefit already obtained in secondary prevention. In contrast, in another large clinical trial that randomized 12 513 patients, supplementary omega-3 polyunsaturated fatty acids did not reduce cardiovascular morbidity and mortality in a population at high cardiovascular risk.[9]
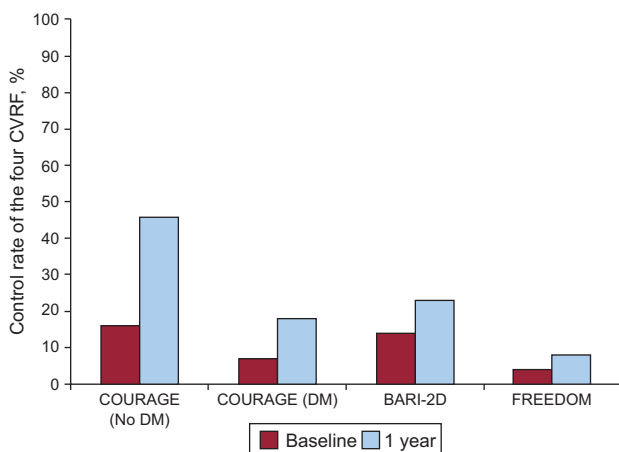

Figure 1. Percent control rate of the four cardiovascular risk factors in the COURAGE (data on diabetic and nondiabetic cohorts are presented separately), BARI-2D, and FREEDOM clinical trials. CVRF, cardiovascular risk factors; DM, diabetes mellitus. Adapted with permission from Farkouh et al.[5]

These data highlight the crucial importance of intensive secondary prevention in patients with ischemic heart disease, especially because a recent epidemiological study has predicted that mortality from myocardial infarction will decrease in American patients compared with Spanish patients, thus reversing the trend of the last 20 years.[10] The authors of this study suggest a more aggressive approach to identifying and correcting cardiovascular risk factors.

DIAGNOSTIC TECHNIQUES

The use of magnetic resonance imaging in the prognosis of postinfarction patients continues to provide valuable information. We highlight a recent Spanish study that found that a simple semiquantitative analysis of the extent of transmural necrosis was the best magnetic resonance imaging index to predict long-term outcome.[11] Several resonance parameters were quantified in 206 consecutive patients 1 week after a first ST-segment elevation ACS. A semiquantitative assessment was also performed that included dobutamine wall motion abnormalities, first-pass perfusion, and microvascular obstruction. The simple and non-time-consuming semiquantitative analysis of the extent of transmural necrosis was the best index to predict the long-term outcome of these patients (Fig. 2). On the other hand, in segments with questionable viability on cardiac magnetic resonance imaging, gated single-photon emission computed tomography studies using threshold values can show uptake, as shown by a recent study published in *Revista Española de Cardiología*.[12]

Interest in the role of the high-sensitivity cardiac troponin assay has recently increased, after its implementation in several hospitals.[13] Furthermore, this assay raises questions about the role of other biomarkers. The PITAGORAS multicenter study recently showed that in low-risk patients with chest pain of uncertain origin assessed using high-sensitivity T troponin, the N-terminal pro-brain natriuretic peptide does not contribute additional predictive value to diagnosis or the prediction of short-term outcomes, whereas high-sensitivity T troponin shows a strong association with the diagnosis of NSTEACS[14] (Table).

Copeptin is a marker of endogenous stress levels that is released immediately after the onset of chest pain. It has been proposed as a useful biomarker in the diagnosis of patients with chest pain in the emergency room[15] in combination with high-sensitivity T troponin.[16] Thus, the combination of high-sensitivity T troponin<14 ng/L and copeptin<14 pmol/L showed a negative predictive value of 91%.

The importance of renal function has been confirmed in the prognosis of ACS. Several studies conducted in Spain have shown that abnormal renal function[17] (whether estimated using various formulas or assessed using biomarkers previously proposed as indicators of renal function) is associated with the development of clinical events in patients.[18] Other studies have shown the potential role of classical biomarkers, such as inflammatory markers.[19,20] Future studies could investigate novel biomarkers, such as circulating microparticles or micro-RNA,[21,22] and new technologies, such as proteomics and metabolomics.[23] It remains unclear whether analysis of these biomarkers, associated with prognosis, should change clinical practice with real-world patients.

NON-ST-SEGMENT ELEVATION ACUTE CORONARY SYNDROME

The majority of information on the new oral antiplatelet agents, prasugrel and ticagrelor, has been previously published and included in the European and American guidelines for the management of NSTEACS; however, there have been few developments in recent months.