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ORIGINAL ARTICLE

Body mass index and myocardium at risk in patients with acute coronary syndrome

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KEYWORDS

Obesity paradox;
BARI score;
Acute myocardial infarction;
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Abstract

Background and objectives: Whilst traditional studies have shown that obese individuals are at a higher risk of cardiovascular events compared to lean subjects, recent studies in patients with acute myocardial infarction (AMI) have suggested that obesity may exert protective effects (the "obesity paradox"). We sought to assess the relationship between body mass index (BMI) and the BARI score (BARisc), a validated tool used to assess myocardium at risk, in patients with acute coronary syndrome.

Patients and methods: Participants were 116 consecutive patients (mean age, 60.6 years; 97 men) with AMI (68 ST elevated myocardial infarction, STEMI; 48 non-ST elevated myocardial infarction, NSTEMI). Demographics, BMI, risk factors, biochemistry data, left ventricular function, angiographic data and the BARisc were assessed in every patient.

Results: Multiple linear regression analyses showed that BMI significantly correlated with BARisc; $\beta = .23$, $p < 0.02$. This was found only in the overweight/obese patients, $\beta = .27$, $p < 0.01$, but not in patients with normal BMIs, $\beta = 0.08$, $p = 0.71$.

Conclusions: An increased body weight is associated with an increased area of myocardium at risk in patients with ACS.

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Abbreviations: CAD, coronary artery disease; ACS, acute coronary syndrome; BMI, body mass index; PCI, percutaneous coronary intervention; BARisc, BARI score; AMI, acute myocardial infarction; NSTEMI, non-ST elevated myocardial infarction; STEMI, ST elevated myocardial infarction.

Abreviaturas: EAC, enfermedad arterial coronaria; SCA, síndrome coronario agudo; IMC, índice de masa corporal; ICP, Intervención coronaria percutánea; BARisc, score BARI; IAM, infarto agudo de miocardio; SCACESTs, síndromes coronarios agudos con elevación de ST; SCASESTs, síndrome coronarios agudos sin elevación de ST.

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PALABRAS CLAVE

Paradoja de la obesidad;
Puntuación BARI;
Infarto agudo de miocardio;
Síndrome coronario agudo

Índice de masa corporal y miocardio en riesgo en pacientes con síndrome coronario agudo

Resumen

Introducción y objetivos: Algunos estudios han demostrado que los pacientes obesos presentan un mayor riesgo cardiovascular, pero estudios más recientes en pacientes con infarto agudo de miocardio (IAM) han sugerido que la obesidad puede ejercer un efecto protector (efecto conocido como la "paradoja de la obesidad"). Hemos examinado la relación entre el índice de masa corporal (IMC) y la puntuación ofrecida por el BARI (BARlsc), una herramienta validada para determinar la cantidad de miocardio en riesgo en los pacientes con síndrome coronario agudo.

Pacientes y métodos: Se incluyeron 116 pacientes de forma consecutiva (edad media, 60.6 años; 97% varones) con IAM (68 con un síndrome coronario agudo con elevación de ST [SCACEST], y 48 con síndrome coronario agudo sin elevación de ST [SCASEST]). En todos ellos se determinaron las variables demográficas y analíticas, los factores de riesgo cardiovascular, el IMC, la función ventricular, los datos angiográficos, y el BARlsc.

Resultados: El análisis de regresión lineal múltiple mostró que el IMC se correlacionaba significativamente con el BARlsc, $\beta = .23$; $p < 0.02$. Esto se demostró únicamente en los pacientes con sobrepeso u obesidad, $\beta = .27$; $p < 0.01$, pero no en los que presentaban IMC normal $\beta = 0.08$; $p = 0.71$.

Conclusiones: El aumento de peso se asocia a la cantidad de miocardio en riesgo en pacientes que con un SCA.

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Introduction

Obesity has reached epidemic proportions both in adults and children in recent years^{1,2} and it has been suggested to have adverse effects on the cardiovascular system. Prospective studies^{3,4} have indicated that obesity is an independent risk factor for major coronary artery disease (CAD) events, especially in women. A large 10-year follow up study with more than 527,000 participants aged 50–71 years found a significant association between high body weight during midlife and increased risk of death.⁵

Although the above-mentioned studies showed obesity to be a powerful risk factor for cardiovascular disease, several recent studies have reported a paradoxical finding, the so-called "obesity paradox". In a systematic review of 40 cohort studies involving 250,000 cardiovascular disease patients, Romero-Corral et al.⁶ found that overweight patients (BMI 25–29.9 kg/m²), paradoxically, were at a lower risk for total cardiovascular mortality than normal BMI patients. In contrast, patients with severe obesity (BMI ≥ 35 kg/m²) were at the highest risk for cardiovascular mortality. In a meta-analysis of patients undergoing both surgical and percutaneous coronary revascularization, Oreopoulos et al.⁷ also showed similar results.

There is no clear explanation for the contradictory findings in the literature about the "obesity paradox." Importantly, most of the research investigating whether BMI is related to the area of myocardium at risk used cardiac computed tomography.⁸ This research suggests that BMI is a predictor of the presence, but not severity of CAD. However, coronary angiography is now considered the standard method for assessing injury of coronary arteries. To the best of our knowledge, there is no published research assessing the relationship between BMI and the area of myocardium at risk by using such technique. To fill this gap in the literature,

in the present cross-sectional study we investigated this relationship by calculating the Bypass Angioplasty Revascularization Investigation score (BARlsc) in patients admitted to hospital with ACS.

Methods**Patients**

Study participants were 116 consecutive patients (average age 60.6 years, range 33–82; 97 (83%) males) who had been referred to coronary angiography for acute myocardial infarction to the Virgen de las Nieves University Hospital (Granada, Spain). Patients were recruited between July 2010 and December 2010. Both patients with ST elevation myocardial infarction (STEMI) and non-ST elevation myocardial infarction (NSTEMI) were considered to be eligible for the study. All had typical ECG changes and elevated cardiac troponin I. Patients were excluded if they had a history of previous coronary revascularization (PCI or bypass) or had recently experimented a substantial weight change (more than 10 kg in the last year), to avoid false modification of the BMI and BARlsc scores. The study protocol was approved by the Ethics Committee of the Virgen de las Nieves University Hospital (Granada, Spain). All participants signed written informed consent prior to study entry.

Study protocol

Patient demographics, anthropometric, and biochemistry laboratory data, including fasting lipid profile, renal and liver function and serum glucose, were measured at baseline. Patients' height and weight were specifically measured in hospital, fasting, at 7 a.m. and three days after

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