

Results of Intra-aortic Balloon Counterpulsation in Patients With ST-elevation Myocardial Infarction With Cardiogenic Shock Undergoing Percutaneous Coronary Intervention: Is There a Benefit?

Resultados del uso del balón de contrapulsación en el shock cardiogénico secundario a infarto agudo de miocardio sometido a revascularización coronaria percutánea: ¿hay beneficio?

To the Editor,

Intra-aortic balloon counterpulsation (IABC) was first used in 1968. In hemodynamic terms, use of IABC is based on increasing diastolic coronary flow and systemic systolic flow, reducing afterload and myocardial work.¹ Given these physiologic effects, its use extended to myocardial infarction in cases of cardiogenic shock, in the belief it would improve organ and myocardial recovery.²

European and North-American cardiology societies' clinical practice guidelines on management of ST-segment elevation acute myocardial infarction (STEMI) strongly recommend its use (class I).^{3,4} Nonetheless, the rate of IABC use in patients with STEMI in Killip class IV is relatively low (20%-40%).¹

The recently published IABP-SHOCK II study results concluded that IABC use does not significantly reduce mortality in patients with STEMI complicated by cardiogenic shock and undergoing early percutaneous revascularization.⁵ These results constitute a contradiction of current international cardiology society recommendations. The purpose of the present short study is to analyze the results of IABC use in patients with cardiogenic shock secondary to STEMI in a tertiary-care hospital.

We enrolled all patients with STEMI admitted to the coronary unit of our hospital (n=1478) from 2004 through 2010 and selected those with cardiogenic shock (n=120 [8.1%]). A patient was considered to be in cardiogenic shock when systolic blood pressure was <90 mmHg for >30 min and an amine infusion was needed to hold systolic blood pressure above this value, together with signs of poor peripheral perfusion and/or pulmonary congestion. We excluded patients who did not undergo percutaneous coronary revascularization or in whom the intervention took place following >24 h delay (n=19). Hence, the final sample consisted of 101

patients undergoing early percutaneous coronary intervention; IABC was used in 26 (25.7%). Table 1 shows patient characteristics. Note that a priori in-hospital risk calculated with the GRACE score was higher in patients without IABC; they also had worse renal function. However, cardiac disease, in terms of the percentage of multivessel disease and reduced left ventricular ejection fraction, was significantly greater in patients with IABC. Use of the different types of amine was similar in both groups.

Of 101 patients, 60 died in-hospital (59.4%), with no significant differences between patients with IABC (69.2%) and without IABC (56.0%) ($P=.236$). Nor were there differences between the groups in the appearance of heart failure. However, the reinfarction rate was greater among patients with IABC (Table 2). Given that patients with IABC had a higher percentage of multivessel disease, we analyzed patients with single vessel disease independently. Our findings were similar to those for all patients; the death rate (66.7% vs 59.5%; $P=.738$) and rate of heart failure (16.7% vs 13.5%; $P=.836$) were similar, and the percentage of reinfarctions remained higher in patients with IABC (16.7% vs 0; $P=.012$). This surprising result could be explained by the higher percentage of multivessel disease in the IABC group (76.9% vs 50.7%; $P=.020$).

Current scientific evidence does not support widespread use of IABC in patients with cardiogenic shock. In a 2009 meta-analysis, the published data showed no benefit from IABC for patients with STEMI complicated by cardiogenic shock.⁶ In subgroup analysis, the authors found patients receiving thrombolysis did show benefits but those undergoing percutaneous revascularization did not. Our results, from a single-center registry of patients undergoing percutaneous revascularization, coincide with those of the aforementioned study. Recently published IABP-SHOCK II trial data will lead to a change in current clinical practice guidelines' recommendations.⁵ This clinical trial involving patients with STEMI with cardiogenic shock and undergoing revascularization found no benefit from IABC use on reducing mortality versus conventional treatment. Furthermore, as secondary objectives, they analyzed length of stay in the coronary unit, dosage and duration of catecholamines, renal function, and lactate concentrations, none of which showed significant differences between groups. Rates of hemorrhage or cerebral infarction showed no significant differences either.

Table 1
Comparison of Patient Clinical Characteristics With and Without Intra-aortic Balloon Counterpulsation

	With IABC (n=26)	Without IABC (n=75)	P
Age, years	69.74±10.35	70.26±14.03	.863
Women, %	23.1	38.7	.150
Diabetes mellitus, %	19.2	21.3	.820
Hemoglobin on admission, g/dL	13.28±2.25	13.49±2.08	.666
GFR-MDRD-4 (mL/min/1.73 m ²) on admission	60.36±24.56	52.46±21.23	.120
AF in-hospital, %	30.8	12.0	.028
LVEF, %	30.89±12.96	38.55±14.08	.041
Anterior site of infarction, %	53.8	49.3	.692
Multivessel disease, %	76.9	50.7	.020
GRACE score, points	241.42±51.04	264.20±30.48	.040
Dopamine/dobutamine, %	88.5	74.7	.142
Noradrenalin, %	57.7	45.3	.277
Invasive mechanical ventilation, %	61.5	58.7	.797
Hemodiafiltration, %	7.7	4.0	.455

AF, atrial fibrillation; GFR-MDRD-4, glomerular filtration rate calculated with the MDRD 4 equation; IABC, intra-aortic balloon counterpulsation; LVEF, left ventricular ejection fraction.

Data are expressed as no. (%) or mean±standard deviation.

Table 2

Comparison of Clinical Events in Patients With and Without Intra-aortic Balloon Counterpulsation

	With IABC (n=26)	Without IABC (n=71)	P
Major in-hospital hemorrhage, %	19.2	28.0	.378
Heart failure during hospitalization, %	23.1	12.0	.171
Reinfarction during hospitalization, %	11.5	1.3	.021
Cerebral infarction, %	3.8	6.7	.600
In-hospital death, %	69.2	56.0	.236

IABC, intra-aortic balloon counterpulsation.

Therefore, to conclude, IABC use should not be generalized in patients with STEMI complicated by cardiogenic shock undergoing percutaneous coronary intervention. More studies are needed to clarify when IABC can be of use, as well as to identify the benefits of ventricular assist devices in reducing mortality and events in this patient group.

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Disease Burden Attributable to Major Risk Factors in Western European Countries: The Challenge of Controlling Cardiovascular Risk Factors

La carga de enfermedad atribuible a los principales factores de riesgo en los países de Europa occidental: el reto de controlar los factores de riesgo cardiovascular

To the Editor,

The description and detailed evaluation of the magnitude and distribution of diseases and risk factors, acknowledging their specific characteristics, are important for establishing strategies that make it possible to improve the health of the general population. Although in recent decades enormous advances have been made in the analysis of the effects of risks on our health, mortality assessments have historically been the indicators used to evaluate the health of populations, and even to define their degree of social and human development.

During the 20th century, there was a considerable decrease in mortality in every country of the world, and especially in the most highly developed nations. Consequently, the measurements of mortality have decreased sensitivity to detect changes in the health of populations, and the need to use alternative indicators is becoming increasingly evident. The burden of disease, the major indicator of which is the number of disability-adjusted life-years, measures the health losses in the population that represent both the fatal and nonfatal consequences of diseases and the risk factors associated with them. The advantage of using disability-adjusted life-years with respect to other measurements is that it offers the possibility of condensing the entire set of epidemiological data on each disease or risk factor (mortality, prevalence, disability,

severity) into a single indicator. It can be used to measure and compare the health of different populations or social groups, study the changes in the health of a population or the magnitude of a health problem over the course of time, enable the utilization of these findings as a tool in the definition of health priorities, or even to evaluate the impact of certain health interventions.^{1,2}

Specifically, the Global Burden of Disease study was the first to establish a systematic evaluation of the changes in population health resulting from the modification of a group of risk factors. More recently, new epidemiological estimates of the health losses attributable to 67 risk factors have been published for several regions, in what constitutes the largest collaborative effort of its kind to date.³ Despite the uncertainties inherent in quantifying disease burden, the new estimates show that the loss of health in Western European countries is strongly affected by cardiovascular risk factors (smoking, hypertension, overweight and obesity, and alcohol consumption, among others) that continue to be widespread and have a great impact on health.

Using the information provided in the databases of the Institute for Health Metrics and Evaluation⁴ (<http://www.healthmetricsandevaluation.org/>) and applying meta-analysis techniques that weight the measurements using inverse variance, we quantified the health losses (on average) attributable to the major risk factors in Western European countries. The cross-sectional comparison of the population impact in 1990 and 2010 (Figure) shows that, while the prevalence of risk factors like hypertension, smoking, alcohol consumption, and hypercholesterolemia appears to have decreased in absolute terms, they continue to be the major contributors to the burden of mortality and disability in the European region. However, it seems that these potential improvements have been eclipsed by