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Clinical Acceptance of the Universal Definition of Myocardial Infarction

Aceptación clínica de la definición universal del infarto de miocardio

To the Editor,

In the emergency department, troponin determination is a useful test to differentiate between non–ST-segment myocardial infarction (MI) and unstable angina. Acute and chronic myocardial lesions due to a large spectrum of cardiac and noncardiac causes are recognizable in clinical practice.[1] In 2007, the universal definition of MI established the classification of patients according to the etiology of the condition.[2] Since then, the term type 2 MI has been used to describe clinical conditions associated with an ischemic myocardial lesion in the absence of complicated atheromatous plaques. Although several studies have reported higher mortality rates in patients with type 2 MI than in those with type 1, discrepancies remain regarding this prognosis, possibly because of the different diagnostic criteria used.[3–5] Nonetheless, there are no studies investigating the degree of acceptance of this classification or the extension of its use in clinical practice. Our aim was to evaluate the concordance between diagnosis associated with a

Table 1
Patients' Baseline Clinical Characteristics of the Patients According to the Department Issuing the Discharge Report

	Cardiology (n = 119)	Internal medicine (n = 105)	Others (n = 125)	Emergency (n = 303)	*P*
Age, y	75 [63-81]	84 [75-88]	72 [59-81]	81 [72-85]	< .001
Men	73 (61.34)	52 (49.52)	76 (60.80)	159 (52.48)	.128
Myocardial infarction	29 (24.37)	21 (20.00)	30 (24.00)	80 (26.40)	.624
Heart failure	19 (15.97)	21 (20.00)	16 (12.80)	63 (20.79)	.218
Stroke or TIA	18 (15.13)	19 (18.10)	11 (8.80)	14 (15.51)	.200
COPD	23 (19.33)	38 (36.19)	24 (19.20)	94 (31.02)	.003
Diabetes	41 (34.45)	37 (35.24)	42 (33.60)	118 (38.94)	.677
Hypertension	91 (76.47)	80 (76.19)	86 (68.80)	239 (78.88)	.175
Chronic kidney disease	27 (22.69)	17 (16.19)	34 (27.20)	71 (23.43)	.257
Charlson index	2 [1-3]	2 [1-4]	2 [0-4]	2 [1-4]	.255
Symptoms					
Chest pain	27 (22.69)	17 (16.19)	15 (12.00)	97 (32.01)	< .001
Dyspnea	44 (36.97)	65 (61.90)	30 (24.00)	103 (33.99)	< .001
Syncope	25 (21.01)	4 (3.81)	13 (10.40)	17 (5.61)	< .001
Others	30 (25.21)	29 (27.62)	72 (57.60)	127 (41.91)	< .001
Electrocardiogram[*]					
Atrial fibrillation	36 (31.30)	34 (33.66)	21 (19.09)	114 (40.43)	.001
Vital signs					
HR, bpm	90 [67-117]	100 [81-112]	87 [73-109]	87.5 [69-113]	.126
SAP, mmHg	134 [119-159]	129 [116-148]	134 [110-159]	134 [119-156]	.368
SaO_2, %	96 [93-98]	93 [89-96]	97 [92-99]	97 [94-99]	< .001
Analytical determinations					
eGFR, mL/min/1.73 m^2	58.6 [40.2-78.0]	59.3 [39.0-80.2]	45.8 [19.8-82.3]	53.7 [41.0-74.1]	.021
Hemoglobin, g/L	130 [109-140]	123 [110-134]	123 [98-139]	124 [112-140]	.282
TnI maximum, ng/mL	0.25 [0.08-1.09]	0.12 [0.06-0.46]	0.14 [0.08-0.67]	0.09 [0.06-0.17]	< .001

COPD chronic obstructive pulmonary disease; eGFR, estimated glomerular filtration rate; HR, heart rate; SAP, systolic arterial pressure; SaO_2, arterial oxygen saturation; TIA, transient ischemic attack; TnI, troponin I
The data are expressed as No. (%) or median [interquartile range].
[*] Electrocardiography data available for 115 patients admitted in cardiology, 101 admitted in internal medicine, 110 admitted in other departments, and 282 who were not admitted.

troponin elevation in medical reports and diagnosis according to the universal definition of MI in patients with a positive troponin result and no acute coronary syndrome (ACS).

A retrospective study was carried out in a university hospital, including all consecutive patients admitted to the emergency department between January 2012 and December 2013 with at least 1 troponin determination. The exclusion criteria were as follows: troponin determination lower than the 99th percentile reference value, age younger than 18 years, patient recovering from cardiac arrest, patient with myocarditis, residence outside the hospital catchment area, and type 1 MI. Troponin determinations were all performed using the same immunoassay (Siemens Advia Centaur troponin I-Ultra; 99th percentile reference value 0.039 ng/mL and coefficient of variation < 10%). The diagnoses were categorized by consensus between 2 cardiologists: *a)* type 2 MI was established based on the criteria of Saaby et al.[6] (who used a contemporary troponin assay having greater analytical imprecision than that used in our study), and *b)* myocardial injury without an ACS: patients with high troponin values who did not meet the criteria for type 2 MI. The study was approved by the local ethics committee. Patients were divided into 4 groups according to the department discharging them (cardiology, internal medicine, emergency, and others). The diagnoses associated with the troponin elevation in the discharge reports were classified into 5 categories: type 2 MI, myocardial injury without an SCA, secondary SCA, not specified, and others.

In total, 652 patients were included in the analysis. Baseline characteristics are shown in Table 1. Patients hospitalized in internal medicine had a history of chronic obstructive pulmonary disease more often. Dyspnea was the main symptom in patients hospitalized in cardiology and internal medicine, whereas atypical symptoms were more common in those hospitalized in other departments and in patients directly discharged from the emergency department. Of the 188 patients categorized as having type 2 MI, the discharge reports specified this diagnosis in only 6 patients (3.2%); of the 464 patients with myocardial injury, the discharge reports specified this diagnosis in only 11 (2.4%). The overall concordance between the categorization and the diagnosis recorded in the discharge reports was 2.61% (κ = 0.006; 95% confidence interval, −0.002 to 0.013). The results of the overall analysis and the analyses according to the department issuing the discharge report are shown in Table 2.

Table 2
Analysis of Concordance Between the Diagnoses in the Discharge Reports and the Classification According to the Universal Definition of MI in the Overall Sample and by the Department Issuing the Report

Discharge diagnoses	Classification according to the universal definition of MI		Total
	Type 2 MI	Myocardial injury without ACS	
Total of patients			
Type 2 MI	6	1	7
Myocardial injury without ACS	5	11	16
Others	17	30	47
Not specified	160	422	582
Total	188	464	652
Concordance, 2.61%; κ = 0.006 (95% CI, −0.002 to 0.013)			
Cardiology (n=119)			
Type 2 MI	4	1	5
Myocardial injury without ACS	2	8	10
Others	7	5	12
Not specified	45	47	92
Concordance, 10.08%; κ = 0.039 (95% CI, 0.006-0.074)			
Internal medicine (n = 105)			
Type 2 MI	2	0	2
Myocardial injury without ACS	0	0	0
Others	3	4	7
Not specified	27	69	96
Concordance, 1.90%; κ = 0.013 (95% CI, −0.005 to 0.031)			
Others (n = 125)			
Type 2 MI	0	0	0
Myocardial injury without ACS	0	1	1
Others	3	8	11
Not specified	32	81	113
Concordance, 0.80%; κ = 0.002 (95% CI, −0.002 to 0.006)			
Emergency (n = 303)			
Type 2 MI	0	0	0
Myocardial injury without ACS	3	2	5
Others	4	13	17
Not specified	56	225	281
Concordance, 0.66%; κ = −0.006 (95% CI, −0.015 to 0.002)			

95% CI, 95% confidence interval; ACS, acute coronary syndrome; MI, myocardial infarction

Our study performed in daily practice shows that a number of patients in the emergency department with a wide variety of clinical diagnoses have elevated troponin values. In these patients, diagnosis related to troponin elevation is specified in very few discharge reports, which indicates that acceptance of the terms type 2 MI and myocardial injury is lacking. In some cases, clinicians hesitate to assign a diagnosis of type 2 MI and, in contrast, "accept" a diagnosis of myocardial injury. There are several possible reasons for this finding. Physicians may avoid classifying patients as having type 2 MI or myocardial injury because of uncertainty that there is an underlying coronary disease. Or they may wish to avert treatments when there is scientific evidence of type 1 MI, but insufficient evidence to support treatment in the absence of a complicated atherothrombotic plaque. Another possible explanation is a lack of understanding of what actually constitutes type 2 MI. For type 2 MI and myocardial injury to be universally accepted, there should be broad consensus on the criteria to establish these diagnoses. This would enable standardization of research and identification of therapeutic strategies that could modify the prognosis. Perhaps when the evidence reaches this point, clinical acceptance of the terms included in the universal definition of MI will become more widely recognized. This study has the limitations of a single-center design and inclusion of patients with only 1 troponin determination, factors that may have had an impact on assigning some of the diagnoses.

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Catheter Ablation of Peri-Hisian Atrial Tachycardia From the Noncoronary Sinus of Valsalva After Aortic Valve Replacement

Ablación con catéter de taquicardia auricular perihisiana desde el seno de Valsalva no coronario tras reemplazo de válvula aórtica

To the Editor,

A 77-year-old woman with severe rheumatic aortic stenosis and paroxysmal atrial fibrillation was admitted for aortic valve replacement. After the surgery (21-mm Perceval S sutureless aortic bioprosthesis [Sorin Group] and isolation of pulmonary veins with bipolar radiofrequency ablation forceps), the patient was moved to the postoperative surgical intensive care unit. Two days later, she developed repeated runs of atrial tachycardia (AT) (Figure 1A) with hemodynamic compromise. The tachycardia was refractory to treatment with amiodarone and atenolol, so urgent ablation was performed.

A 24-pole catheter (Orbiter, Bard Medical) was positioned around the tricuspid ring with the distal portion in the coronary sinus. The patient was showing spontaneous runs of narrow-complex tachycardia, with 1:1 A:V conduction, alternating with Wenckebach phenomenon with a constant A-A interval and variable V-A interval, allowing confirmation of the diagnosis of AT. The earliest atrial electrogram on the 24-pole catheter was found in the coronary sinus ostium. An electroanatomic map of the right atrium was created (Carto navigation system, ThermoCool irrigated ablation catheter, SmartTouch J curve for mapping; Biosense, Webster) (Figure 2), on which the earliest atrial electrogram site was in the anterior interatrial septum, 8.8 mm posterior to the bundle of His. This distance was considered safe for ablation with radiofrequency (rather than cryoablation). The focal ablation (2 applications; 45 and 65 s, power, 35-40 W) suppressed the tachycardia without affecting the PR interval (after 21 and 25 seconds, respectively), but with recurrence (with the same cycle length) after a few minutes. An extension was performed superior to the ablation (40 s, 35 W), unsuccessfully. Therefore, an electroanatomic map of the aortic root was created, mapping specifically the noncoronary sinus of Valsalva. The presence of the aortic prosthesis did not impede the mapping. The earliest atrial electrogram sites were similar to those found in the right interatrial septum (Figure 1B); the distance between the earliest activation site and the prosthetic aortic valve was considered safe for ablation. Focal ablation (initial application: 45 s, 45-50 W, successful; additional adjacent application of 30 s at 50 W) led to termination of the tachycardia in 17 seconds (Figure 1C), which remained uninducible. The patient was discharged 3 days later, and at 6 months' follow-up she was arrythmia-free with no antiarrhythmic drugs.

ATs that arise from the interatrial septum close to the bundle of His are relatively uncommon.[1,2] The anterior portion of the interatrial septum is in close relation to the posterior part of the aortic root, such that these tachycardias can be ablated from the noncoronary sinus of Valsalva (and, less often, from the other sinuses of Valsalva). In fact, their theoretical origin is an embryological remnant of retroaortic nodule tissue,[3] an extension of the atrioventricular nodule that is situated below the noncoronary sinus. Ablation from the aortic root has higher success rates (88%-100%) and lower recurrence rates (0%-4%)[4–6] than ablation from the right or left interatrial septum, and also avoids the risk of