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Characterization of Wellens syndrome and its relationship as a predictor of severe obstruction of the left anterior descending artery. Intensive Coronary Care Unit Hospital Manuel Fajardo 2016-2017

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ARTICLE INFORMATION

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Abbreviations
LAD: left anterior descending artery
NSTE-ACS: non-ST-segment elevation acute coronary syndrome

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ABSTRACT

Introduction: Wellens syndrome is an electrocardiographic pattern that has been suggested, since the 1980s, as indicator of severe obstruction of the left anterior descending artery, although it is poorly understood and it is not found in the main treatment guidelines for acute coronary syndromes.

Objectives: To demonstrate the usefulness of the diagnosis of Wellens syndrome as a predictor of severe obstruction of the left anterior descending artery.

Method: A cross-sectional study with an analytical component was carried out, covering the 40 patients admitted to the Intensive Coronary Care Unit of the Hospital Manuel Fajardo, in the period from January 2016 to December 2017, with a diagnosis of non-ST-segment elevation acute coronary syndrome, who underwent coronary angiography.

Results: The presence of Wellens syndrome was found in 13.5% of the patients admitted with this type of acute coronary syndrome. Age, sex and the presence of comorbidities were not significantly related to the presence of this syndrome. The angiographic study showed, in patients with a Wellens syndrome, a relative risk −3.4 times greater than the rest− of presenting a severe obstruction of the left anterior descending artery.

Conclusions: The timely identification of Wellens syndrome and its relationship with a severe coronary obstruction should motivate an early interventionist strategy in these cases.

Keywords: NSTE-ACS, Wellens syndrome, Coronary angiography, Ischemic heart disease, unstable angina

Caracterización del síndrome de Wellens y su relación como predictor de obstrucción grave de la arteria descendente anterior. Unidad de Cuidados Coronarios Intensivos Hospital Manuel Fajardo 2016-2017

RESUMEN

Introducción: El síndrome de Wellens es un patrón electrocardiográfico que se ha sugerido desde la década del 80 como indicador de obstrucción grave de la arteria descendente anterior, a pesar de ello es poco conocido y no se encuentra en las principales guías de tratamiento de los síndromes coronarios agudos.

Objetivo: Demostrar la utilidad del diagnóstico del síndrome de Wellens como

predictor de obstrucción grave de la descendente anterior.
Método: Se realizó un estudio transversal con componente analítico, que abarcó a los 40 pacientes ingresados en la Unidad de Cuidados Coronarios Intensivos del Hospital Manuel Fajardo, en el período enero de 2016 hasta diciembre de 2017, con diagnóstico de síndrome coronario agudo sin elevación del segmento ST, a los que se les realizó coronariografía.
Resultados: Se encontró la presencia de síndrome de Wellens en un 13,5% de los pacientes ingresados con este tipo de síndrome coronario agudo. La edad, el sexo y la presencia de comorbilidades no se relacionaron significativamente con la presencia de este síndrome. El estudio angiográfico evidenció, en los pacientes con un síndrome de Wellens, un riesgo relativo 3,4 veces mayor que el resto, de presentar una obstrucción grave de la arteria descendente anterior.
Conclusiones: La identificación oportuna del síndrome de Wellens y su relación con una obstrucción coronaria grave deben motivar una estrategia intervencionista precoz en estos casos.
Palabras clave: SCASEST, Síndrome de Wellens, Coronariografía, Cardiopatía isquémica, Angina inestable

INTRODUCTION

Coronary artery diseases are the leading cause of death in most developed countries[1,2], and in 2016, they were the leading cause of death in Cuba, with a rate of 217.7 per 100 thousand inhabitants[3].

Among the patients with this type of disease, an important number present non-ST-segment elevation acute coronary syndrome (NSTE-ACS). In the 12-lead electrocardiogram, usually, there appear alterations like: inverted T wave, transient ST-segment depression or elevation, although up to one third can have normal electrocardiograms, and the enzymatic markers often are within normal values[4].

Since the early 80s, de Zwaan, Bär and Wellens[5] described the negative pattern of T wave in right precordials, associated with a severe injury of the left anterior descending artery (LAD) of proximal location. Wellens syndrome is then defined by the presence of[5,6]:

a) Negative deep or isodiphasic T waves in precordial leads (V_2-V_3), and occasionally in V_1 and V_4, after events of angina pectoris.
b) Absence of elevation or minimum elevation of the ST-segment (<1 mm).
c) Absence of pathological Q waves.
d) Normal progression of the R wave in precordials.
e) All this accompanied by normal or very slightly elevated myocardial necrosis markers (cardiac enzymes)

In addition, types I and II are differentiated; the first of these is less frequent, but with greater sensitivity[5,6].

However, major global guidelines on treatment of acute coronary events do not register these variants as presenting high risk of myocardial infarction[4,7,8]. There is still a group of patients who, if they do not have a coronary angiography for percutaneous treatment, would suffer from a large anterior infarction.

There are no publications in Cuba that recognize the incidence of this electrocardiographic syndrome, nor the implications that its timely identification might have[9], therefore, the objective of this research has been to demonstrate the usefulness of Wellens syndrome as a predictor of severe obstruction of the LAD.

METHOD

A study was conducted retrospectively, with analytical component, which included 40 patients diagnosed with NSTE-ACS, admitted to the Intensive Coronary Care Unit of the Hospital Comandante Manuel Fajardo, in the period from January 2016 to December 2017, which were performed coronary angiography during hospitalization.

The variables analyzed were: age, sex, personal pathological history, presence of Wellens syndrome and severe obstruction of the LAD, which was considered when it was equal to or greater than 75% of stenosis in coronary angiography. In **figure 1**, an electrocardiogram is shown with the T wave abnor-

malities to be found in this syndrome. In **figure 2** is shown the lesion of the LAD.

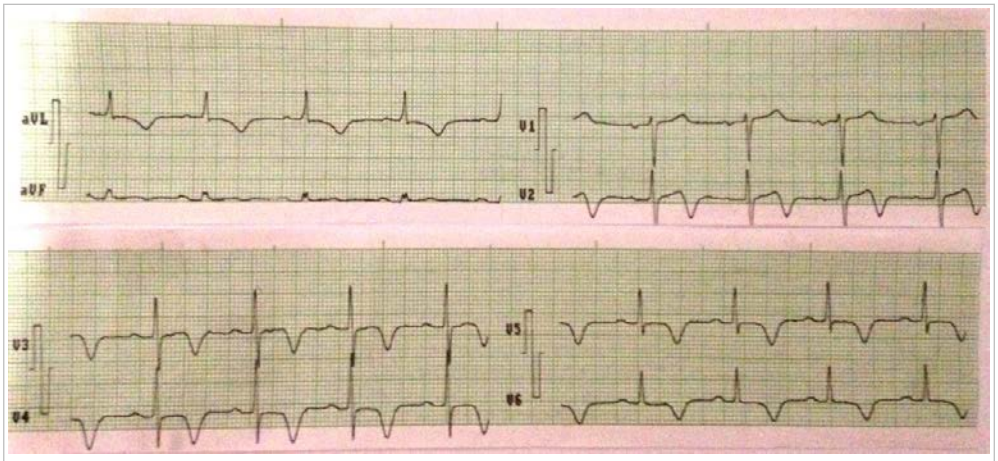

Figure 1. Electrocardiographic fragment of a patient who comes to the emergency department with a non-ST-segment elevation acute coronary syndrome, where a type I Wellens pattern is observed.

Procedure

A structured interview was conducted to all patients where variables such as age, sex, clinical data and personal pathological history were researched. The patients underwent a general physical, neurological and cardiovascular examination at the time of admission to the unit, as well as a conventional 12-lead electrocardiogram upon arrival daily in the first 72 hours of evolution. All patients underwent a coronary angiography in the first 72 hours after admission.

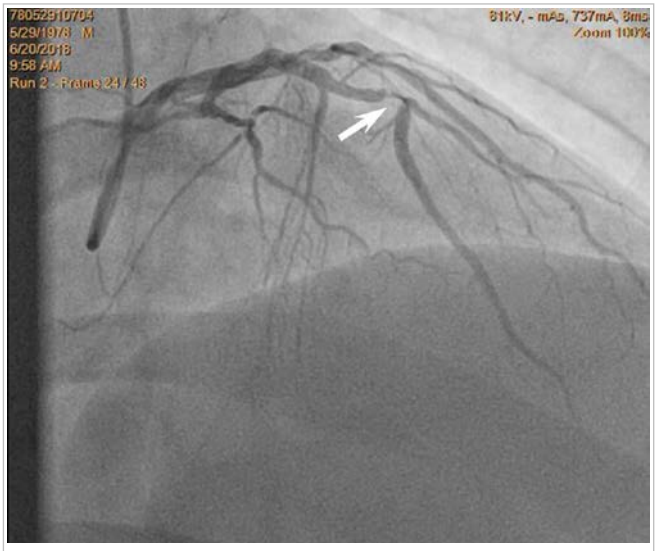

Figure 2. Coronary angiography showing left coronary artery, in right anterior oblique view with cranial angulation, where a severe lesion of the LAD (arrow) is observed.

Statistical analysis

All data were obtained from the patients' medical records, and processed in the IBM SPSS Statistics version 21.0 software for Windows. For defining the association between the variables, the Chi-square test was used. If significant, the relative risk (RR) was used to define the intensity of this association. In all cases, a 95% confidence level was the aim, and a critical or rejection zone (alpha) of 0.05 was prefixed, associated with the probability value p; that is, if $p < 0.05$, there was statistical significance.

Ethical considerations

The authors state that for this research, no experiments on humans or animals have been conducted, being followed the protocols of the work center on the publication of patient data and, at all times, the confidentiality of data and patients have remained. Due to the design of the study, no informed consent was required.

RESULTS

In the period studied, 223 patients with NSTE-ACS were admitted; of these, electrocardiographic abnormalities compatible with Wellens syndrome were identified in 29 cases (13.5%). The coronary angiography was performed during admission to 40 patients (5.6% of the total).

There was a predominance of males, with ages

Table 1. Distribution of patients according to age and sex. Hospital Manuel Fajardo, 2016-2017.

Age range (years)	Sex			
	Male		Female	
	Nº	%	Nº	%
40 – 55	8	30.8	2	14.3
56 – 70	12	46.2	2	14.3
71 – 85	5	19.2	10	71.4
Older than 85	1	3.8	0	0.0
Total	26	100.0	14	100.0

Fuente: Historias clínicas.

Table 2. Behavior of the variables age, sex and comorbidities in relation to the presence of Wellens syndrome.

Variables	Wellens syndrome			
	Yes(n=14)		No (n=26)	
	Nº	%	Nº	%
Age (mean ± SD)*	61 ± 13		67 ± 10	
Male	9	64.3	17	65.4
Personal history*				
Ischemic heart disease	9	64.3	21	80.8
High blood pressure	10	71.4	21	80.8
Diabetes mellitus	2	14.3	7	26.9
Dyslipidemia	1	7.1	3	11.5
Obesity	1	7.1	6	23.1

* p>0.05

between 56-70 years for men, and more than 70 years for women (**Table 1**).

No significant differences were observed when comparing patients with and without Wellens electrocardiographic pattern with respect to age and sex. In the case of comorbidities, although these were generally identified more frequently in patients without Wellens syndrome, this was not significant from the statistical point of view (**Table 2**).

A statistically significant relationship was observed between the presence of Wellens syndrome and LAD obstruction greater than 75%, as a relative risk was 3.4 times greater in patients with this electrocardiographic pattern (**Table 3**).

Table 3. Relationship between severe obstruction of the left anterior descending artery (LAD) and Wellens syndrome.

Wellens syndrome	Severe obstruction of LAD		Total	RR	IC (95%)
	Yes	No			
Yes	11	3	14	3.405	1.603 - 7.231
No	6	20	26		

DISCUSSION

The incidence of Wellens syndrome in the population studied was similar to what is reported in the bibliography in general, ranging between 10 and 18%[5,6,10]. In their 1982 study, Zwaan *et al*[5] confirmed it in 18% of patients with unstable angina, which suggests that it is not a rare finding. Despite this, few case series have been published, the majority having two or three patients[11,13], but multiple individual case presentations[14,20]. This is possibly related to the general ignorance of this electrocardiographic pattern, both by emergency physicians and by cardiologists.

In another study by de Zwaan *et al*[6], patients came to the emergency department for events of unstable angina. After relieved the pain and performed the 12-lead electrocardiogram, they tended to have negative or isodiphasic T wave in right precordial leads. A 75% of those who were not revascularized suffered an extensive anterior infarction in the next 23 days, with an average of 8.5 days. The conservative approach may be that these changes in the morphology of the T wave may appear once finalized the painful episode and be interpreted as unspecific[21]. In fact, Tandy *et al*[22] report a case that had an infarction shortly after starting a stress test, which shows how careful we should be with these electrocardiographic presentations.

In our study, there was a very similar behavior regarding the variables age and sex in patients with or without Wellens syndrome. Although patients under 40 years have been identified in several publications[23], this did not occur in the present series. Despite previous comorbidities were found more frequently in patients without Wellens syndrome, they had no significant statistical difference. Regardless of communications from patients without risk factors, most of the authors agree that, in Wellens syndrome, these are shared with the traditional ones for coronary heart disease such as: high blood pressure, diabetes mellitus, dyslipidemia, smoking, family history of coronary heart disease, obesity and sedentary lifestyle[11,16].

In our case study, it was found that patients with Wellens syndrome present a risk greater than three times of an obstruction greater than 75% of the LAD. In 1989, de Zwann *et al*[6], including Wellens, published an analysis that included 180 patients, mostly men, which showed that 89% of patients with inverted T waves in right precordial had a stenosis greater than 50% of the LAD detected by coronary angiography. From that date, numerous cases have been published, where the presence of this diagnosis is related to unfavorable results in the angiographic study[14,18,20,24].

The sensitivity of the negative T wave in precordial leads (V_1-V_4) in order to diagnose critical lesion of the LAD in patients with acute coronary syndrome is approximately 69%, with a specificity of 85% according to some series[25].

The explanation of why such electrocardiographic changes take place has not yet been wholly clarified, although many hypotheses have been exposed, which speak of the influence of stunned myocardium, after spontaneous reperfusion of the artery in the repolarization of the heart muscle; as well as the role that coronary spasm, right ventricular overload and microvascular disease could have as precipitating or aggravating factors[16].

CONCLUSIONS

The identification of the Wellens syndrome in patients with non-ST-segment elevation acute coronary syndrome has a significant relationship with severe stenosis (greater of 75%) of the left anterior descending artery

RECOMMENDATIONS

It is extremely important to insist on the knowledge of these electrocardiographic presentations called atypical, because they represent a considerable group of patients, with great prognostic implications if their early detection is delayed.

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