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Characteristics of patients with acute aortic dissection in Villa Clara: Multicentric study

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ABSTRACT

Introduction: Acute aortic dissection is considered one of the most tragic cardiovascular diseases that occur in humans, with high mortality which requires early diagnosis and treatment.

Objectives: To describe the characteristics of patients with aortic dissection treated in 4 hospital institutions in the province of Villa Clara.

Method: An observational, descriptive, cross-sectional, multicenter study was conducted in 25 patients who were treated under the diagnosis of aortic dissection in the period between January 2012 and December 2017, in 4 secondary-level hospital centers in Villa Clara province, Cuba.

Results: The mean age of the patients was 60.48 ± 13.99 years, 21 were male, which represented 84.0%. According to the Stanford classification, type A predominated in 17 patients (68.0%). The most common symptom was anterior chest pain while the most frequent complication was cardiac tamponade (28.0%).

Conclusions: The characteristics of patients with aortic dissection in the Villa Clara context manifested in a similar way to those in the national and international sphere. A high level of suspicion is required by the doctor to achieve a timely diagnosis and treatment.

Keywords: Aortic diseases, Aortic dissection, Acute aortic syndrome

Características de los pacientes con disección aórtica aguda en Villa Clara: Estudio multicéntrico

RESUMEN

Introducción: La disección aórtica aguda es considerada como una de las enfermedades cardiovasculares más catastróficas que ocurren en el ser humano, tiene una alta mortalidad que obliga a un diagnóstico y tratamiento precoces.

Objetivo: Describir las características de los pacientes con disección aórtica atendidos en 4 instituciones hospitalarias de la provincia de Villa Clara.

Método: Se realizó un estudio observacional, descriptivo, de corte transversal, multicéntrico, en 25 pacientes que fueron atendidos con el diagnóstico de disección aórtica en el período comprendido entre enero de 2012 y diciembre de 2017, en 4 centros hospitalarios de nivel secundario de la provincia de Villa Clara, Cuba.

Resultados: La media de la edad de los pacientes fue 60,48 ± 13,99 años, 21 fueron del sexo masculino lo que representó el 84,0%. Según la clasificación de Stanford,

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predominó el tipo A, en 17 pacientes (68,0%). El síntoma más referido fue el dolor torácico anterior y el taponamiento cardíaco fue la complicación más frecuente (28,0%).

Conclusiones: Las características de los pacientes con disección aórtica en Villa Clara fueron similares a lo que acontece en el ámbito nacional e internacional, con una elevada mortalidad y una mayor incidencia en hombres, hipertensos y mayores de 65 años de edad. El dolor torácico fue el síntoma cardinal y el taponamiento cardíaco la complicación más temida. La disección aórtica requiere un alto nivel de sospecha por parte del médico para un diagnóstico y un tratamiento tempranos.

Palabras clave: Enfermedades de la aorta, Disección aórtica, Síndrome aórtico agudo

INTRODUCTION

A lot has been written about the challenge posed by the diagnosis and treatment of the acute aortic dissection (AD) and the fatal consequences of failing its attempt. The history of the AD is marked by the person who suffered the first one described in the medical literature, King George II of England[1]. There are indications that Galen described the arterial dissection in the II century and that Vesalius contributed with other knowledge of the disease in the XVI century[1]. The first detailed clinical descriptions were made by Maunoir in 1802, and it was defined as a dissecting aneurysm by the French physician René Théophile Hyacinthe Laenec, in 1819[1,2].

The AD is defined as the rupture of the middle layer caused by intramural hemorrhage that results in the separation of the layers of the aortic wall and the subsequent formation of a true light and a false light, with or without communication between them[3]. This tear takes place as a result of repeated torsional forces applied to the artery during the cardiac cycles, as well as the sustained high blood pressure levels, among other causes. The AD may also occur in the absence of high blood pressure, as in the case of abnormalities as: smooth muscle, elastic tissue, collagen, pregnancy, bicuspid aortic valve and aortic coarctation[4,5].

There are few updated data on the epidemiology of this disease, but despite its low incidence, it is considered the most catastrophic event that affects to the aorta, with an estimated incidence –according to the Oxford Vascular Study– in 6/100000 people/year[6]; it has a high mortality that requires an early diagnosis and treatment. In a series of necropsies, the prevalence of AD ranged between 0.2 and 0.8%[7]. On the other hand, in an analysis of 464 patients from the IRAD (International Registry of Acute Aortic Dissection), two thirds of the patients were male, with a mean age of 63 years[5]; although women tend to be less frequently affected by the acute AD, their age is significantly higher than that of men, with an average of 67 years[8].

The AD is classified according to its duration and location. It will be acute if the clinical manifestations have lasted 14 days or less (period of increased morbidity and mortality); subacute, between 2 and 6 weeks; and chronic, beyond 6 weeks[9]. From the point of view of its location there are two classifications: the Stanford group refers to types A and B, according to whether or not the ascending aorta is affected; and that of De Bakey differences between type I when the ascending and descending aorta are affected, and also the aortic arch; type II, when only the ascending aorta and the aortic arch are of interest; and type III when only the descending aorta is affected[3,5,9-11].

The AD represents a diagnostic challenge because of the broad spectrum of manifestations and atypical presentations of this disease, forcing to differentiate it from many other diseases. According to IRAD[5], the diagnosis is not correct in 38% of patients, and in Cuba there are studies that have also reflected this problem, since in the province of Cienfuegos the diagnosis of AD at admission was only raised in 12.9% of cases[13]. For this reason, the present study was carried out with the aim of describing the characteristics of the patients with AD treated in four hospital institutions in the province of Villa Clara, in order to provide a material that allows to know the reality of this disease in this province.

METHOD

An observational, descriptive, cross-sectional, multi-

center study was conducted in 25 patients who were treated under the diagnosis of AD in the period between January 2012 and December 2017, in the following secondary-level hospital centers in the province of Villa Clara: *Hospitales Universitarios Mártires del 9 de Abril, Arnaldo Milián Castro, Celestino Hernández Robau* and *Hospital Militar Comandante Manuel Fajardo Rivero*.

The variables studied were: year of occurrence of the event, age, sex, personal pathological records, diagnostic impression at admission and classification; as well as the main clinical manifestations, imaging, and the complications presented during the hospital stay. The information was extracted from individual medical records.

For the organization and records of the information collected, a database was created in Microsoft Excel with all the variables, in order to enable the corresponding calculations for the descriptive analysis of the results and the preparation of tables and graphs. In addition, the inferential statistics were calculated with the statistical package Epidat 3.1 with the non-parametric Chi-square test (χ^2), were used to determine the differences found in the distributions of the qualitative variables. A significance level of 95% ($p<0.05$) was accepted, thus, the results were considered depending on the associated p value in: not significant ($p>0.05$), significant ($p<0.05$) and highly significant ($p<0.01$).

RESULTS

The average age of the population was of 65.48±13.99 years, 21 patients were males representing 84.0%. for a male:female ratio of 5.25 to 1. Patients with white skin color represented 80.0% of the cases.

There were associated diseases (**Table 1**) present in 18 patients (72.0%), who were hypertensive, followed, in decreasing order, by the ones with smoking habit (56.0%) and dyslipidemia (36.0%).

In **table 2** is shown the clinical impression of these patients on admission, which was interpreted correctly as AD in 8 patients (32.0%), followed in order of frequency, by the acute myocardial infarction, which was the disease that confused the most the diagnosis in 6 patients (24.0%).

According to the Stanford classification of AD, the type A prevailed in 17 patients (68.0%), of which 13 (52.0%) corresponded with type I and 4 (16%) with type II of De Bakey. The Stanford's type B and De Bakey's type III dissections were found in 8 (32.0%) patients (**Figure**).

The chest pain was the most frequent symptom

Table 1. Distribution of patients diagnosed with aortic dissection, according to demographic variables and personal pathological background.

Variables	Nº	%
Age (years, $\bar{\chi}$±SD)	65.48 ± 13.99	
Sex		
Female	4	16.0
Male	21	84.0
Skin color		
White	20	80.0
Not white	5	20.0
Personal pathological records		
High blood pressure	18	72.0
Smoking habit	14	56.0
Dyslipidemia	9	36.0
Alcohol consumption	8	32.0
Diabetes mellitus	7	28.0
Obesity	4	16.0
Ischemic heart disease	6	24.0
Renal failure	2	8.0
Heart failure	2	8.0
COPD	5	20.0
Chronic gastritis	2	8.0
Systemic erythematosus lupus	1	4.0
Previous aortic aneurysm	4	16.0

COPD, chronic obstructive pulmonary disease; $\bar{\chi}$±SD, mean ± standard deviation.

Table 2. Distribution of patients diagnosed with aortic dissection according to diagnostic impression at admission.

Diagnostic impression at admission	Nº	%
Aortic dissection	8	32.0
Hypertensive emergency	4	16.0
Acute myocardial infarction	6	24.0
Cerebrovascular disease	3	12.0
Sudden death	1	4.0
Acute pulmonary edema	1	4.0
Acute abdomen	1	4.0
Thromboembolic disease	1	4.0

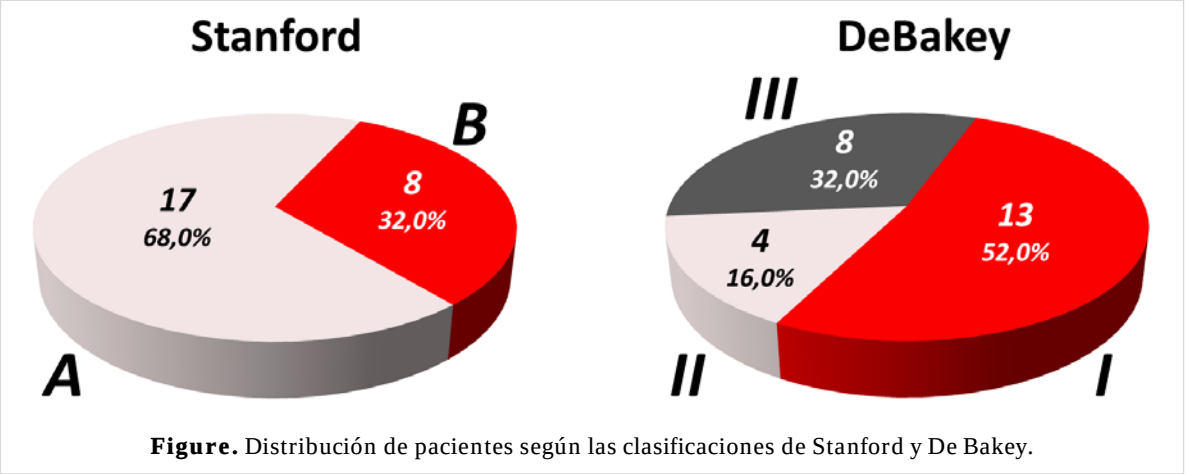

Figure. Distribución de pacientes según las clasificaciones de Stanford y De Bakey.

of presentation (**Table 3**) and it was further referred in the anterior part of the chest in the type A AD with respect to the type B AD (94.1 *vs.* 50%; p=0.010). In these last ones, the pain was most often located in the dorsal region (11.8 *vs.* 87.5%; p<0.0001) or in the abdomen (5.9 *vs.* 75.0%; p<0.0001). Both, syncope and shock/hypotension were more frequent in type A dissections (35.3 *vs.* 25.0% and 35.3 *vs.*12.5%; respectively) in relation to type B. Moreover, the gastrointestinal disorders were more frequent in type B (62.5%; p=0.002).

There can be observed, that the most common complication was the cardiac tamponade in 7 patients (28.0) with significant statistical ratio (p=0.032) in favor of type A (**Table 4**). In contrast, the acute renal failure was the one that had a significantly higher presentation in type B dissections (p=0.002).

Table 3. Distribution of patients diagnosed with aortic dissection, according to the Stanford classification and clinical manifestations.

Clinical manifestations	Total (N=25)	A (n=17)	B (n=8)	χ^2	p
	n (%)	n (%)	n (%)		
Anterior thoracic pain	20 (80.0)	16 (94.1)	4 (50.0)	6.6176	0.010
Abdominal pain	7 (28.0)	1 (5.9)	6 (75.0)	12.8910	<0.0001
Dorsal pain	9 (36.0)	2 (11.8)	7 (87.5)	13.5429	<0.0001
Murmur	9 (36.0)	8 (47.1)	1 (12.5)	2.8199	0.093
Syncope	8 (32.0)	6 (35.3)	2 (25.0)	1.7236	0.189
Paleness and sweating	9 (36.0)	7 (41.2)	2 (25.0)	0.6179	0.431
Neurological symptoms	6 (24.0)	5 (29.4)	1 (12.5)	0.8530	0.355
Shock/low blood pressure	7 (28.0)	6 (35.3)	1 (12.5)	1.4020	0.236
Gastrointestinal disorders	6 (24.0)	1 (5.9)	5 (62.5)	9.5604	0.002
Dyspnea	8 (32.0)	6 (35.3)	2 (25.0)	0.2649	0.606
Cyanosis	5 (20.0)	4 (23.5)	1 (12.5)	0.4136	0.520
Hemoptysis	3 (12.0)	3 (17.6)	0 (0)	1.6043	0.205
Absence of pulse	10 (40.0)	7 (41.2)	3 (37.5)	0.0306	0.861
High blood pressure	17 (68)	10 (58.8)	7 (87.5)	2.0558	0.151

Table 4. Distribution of patients according to the Stanford classification and in-hospital complications.

Complications	Total (N=25)	A (n=17)	B (n=8)	χ^2	p
	n (%)	n (%)	n (%)		
Cardiac tamponade	7 (28.0)	7 (41.2)	0 (0)	4.5752	0.032
Hypovolemic shock	4 (16.0)	3 (17.6)	1 (12.5)	0.1072	0.743
Hemothorax	5 (20.0)	5 (29.4)	0 (0)	2.9412	0.086
Cardiorespiratory arrest	3 (12.0)	2 (11.8)	1 (4.0)	0.0028	0.957
Acute myocardial infarction	2 (8.0)	2 (11.8)	0 (0)	1.0230	0.311
Acute renal failure	6 (24.0)	1 (5.9)	5 (62.5)	9.5604	0.002
Peripheral ischemia	3 (12.0)	2 (11.8)	1 (12.5)	0.0028	0.957

DISCUSSION

The imaging studies are one choice for diagnosing AD, mainly the computed axial tomography, in addition to the echocardiography. There are reports that show the usefulness of ultrasound at the patient's bedside in the diagnosis of AD with atypical clinical presentation[12].

Our results are similar to those found in prestigious studies such as IRAD[5], RADAR[14] and RESA[15], where male patients over 60 years old predominated. Advanced age, closely associated with high prevalence of high blood pressure, and atherosclerotic disease are described as risk factors or conditions for the occurrence of AD. Although women tend to be less frequently affected by the acute AD, the female sex is more prone to clinical-surgical complications during this disease[7].

The most common risk factor was high blood pressure, which coincides with 72.1% of cases in the IRAD study[5], besides, it has also been described in 65-75% of patients with AD, most of them poorly controlled[10]. This disease causes a thickening of the aortic intima, with calcification and fibrosis of the adventitia, which increases the stiffness of the arterial wall and the predisposition to aneurysms and dissections. Other risk factors included are the preexisting aortic diseases or aortic valve disease, including family history of such disease, previous cardiac surgery, smoking, direct chest trauma and intravenous use of cocaine and amphetamines[5,11].

Despite having such a complicated clinical presentation, there are often considerable delays in its diagnosis, because the AD is rare and it is frequently confused with the acute coronary syndrome. This explains that the diagnosis at admission will only be considered in 32% of the patients, a figure higher than that found by Romero-Cabrera *et al*[13] in the province of Cienfuegos, where the correct clinical diagnosis at admission was only raised in 12.9% of cases. Meanwhile, Monzó Blasco *et al* [9] found that, from the cases who died due to AD, 40% had gone to the hospital a day earlier and received erroneous medical diagnoses.

According to the bibliography, the dissection can simulate many other more frequent disorders, such as pleurisy, pericarditis, pulmonary embolism, coronary ischemia and even stroke[11,16]; and it can present a wide variety of symptoms and signs, these in the presence, at the same time, of numerous complications. The main manifestations include: severe chest pain, irradiated to the back, abdomen, neck or upper and lower extremities; it can be accompanied by syncope, profuse sweating, neurological manifestations, intestinal ischemia and renal failure; also, a murmur due to retrograde involvement of aortic valve leaflets can be auscultated; it can also cause cardiac failure to and cardiac tamponade[11]. For all these reasons, a high index of suspicion is very important in order to diagnose this disease.

The De Bakey classification is very important from the physiological point of view and the Stanford's has won the favor of most authors because it is more useful for determining the practice to follow[5]. The results of the present study coincide with those found by Valdés Dupeyrón *et al*[17], with a prevalence of the Stanford's type A in 543 deceased patients (61.1%). On the other hand, regarding the De Bakey classification, our results disagree with those found by that author and others from the province of Cienfuegos[13], where those patients with type II predominated. Some series, however, inform an

increased frequency of type B AD[18].

Although it is known that patients usually have chest pain, which is described as acute, stabbing or tearing, the symptoms may be diverse, and about 5% may not experience pain[11]. Our results agree with previous publications[3,5,11] which pose that the anterior chest pain is usually associated with type A AD, although patients with type B dissections usually present abdominal or back pain. The clinical presentations of the two types of AD are often confused. The pain may migrate from its point of origin to other locations, by continuing through the dissection's extension. In the IRAD[5], a migratory pain was observed in less than 15% of patients with acute type A AD and in approximately 20% of those with type B AD.

The high blood pressure in the acute phase was more frequent in type B AD; conversely, low blood pressure and shock was present in patients with type A AD, results that agree with those found by Hagan *et al*[5], Evangelista *et al*[15] and Pape *et al*[19].

The physical signs most characteristically associated with an AD (absence of pulse, murmur of aortic failure and neurological manifestations) are more typical of dissections of the ascending aorta[11]. The most frequent causes of death are: the aortic rupture with cardiac tamponade (41.6%) and the visceral ischemia (13.9%)[5]. In the present study, the most common complication found in the evolution of the patients was the cardiac tamponade, which was significantly greater in the type A AD, which agrees with the results of the study Evangelista *et al* [15]. Meanwhile, Valdés Dupeyrón *et al* [17] found, as the most frequent direct cause of death, the hemopericardium (390 deceased patients, 43.9%), which represents the high incidence of such complication and its direct relation to the mortality rates. Similar results have also been described by Gilon *et al*[20].

The AD should always be considered in the differential diagnosis of patients with acute myocardial infarction, especially in those of inferior topography[11], also if the risk factors, symptoms and physical examination are compatible with this diagnosis. In addition, because both diseases can coexist in the same patient, as shown in this and other studies[5,11]. Because the acute myocardial ischemia and infarction are much more frequent than AD, if an acute infarction complicates the acute dissection, its diagnosis may go unnoticed[11].

As it was pointed out, the acute AD is not rare in our context[13,17], despite its low incidence in the population, it is a critical situation that requires immediate clinical response and an emergent surgical intervention, in most cases. The limitations of this study were derived from the small number of patients because of the low incidence of this disease, which limits the scope of the findings and the mathematical impossibility of calculating necessary predictors. However, it works as a reference for comparing this condition with respect to other geographical areas and provide the clinical and epidemiological characteristics, until now unknown in the Villa Clara's context.

CONCLUSIONS

The characteristics of patients with aortic dissection in Villa Clara were similar to those of the national and international contexts, with high mortality and a higher incidence in hypertensive males over 65 years old. The chest pain was the cardinal symptom, and cardiac tamponade the most feared complication. The aortic dissection requires a high level of suspicion by the physician, for early diagnosis and treatment.

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