

Characterization of adult patients operated for congenital heart defects in Camagüey, Cuba

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Abstract

An observational, descriptive, cross-sectional study was carried out with the objective of characterizing adult patients operated for congenital heart defects in Camagüey in the period from September 2013 to August 2016. The universe consisted of 628 patients followed up in secondary care and a sample of 100, selected by the non-probability random sampling method; the primary source of data was the spreadsheet created by the author according to the literature consulted and the secondary one, the outpatient medical records. The information was processed using the Microsoft Excel for Windows 2010 package. The variables studied were: symptoms and signs, type of congenital heart disease, electrocardiographic, ergometric and echocardiographic findings; hospital monitoring and incorporation into social life. It was concluded that about half of these patients presented symptoms and signs; being the atrial-ventricular sept defects the most frequent of the heart diseases; the enlargement of heart chambers was the most evident electrocardiographic finding; the majority of the patients had a functional capacity above 12 metabolic equivalents on the ergometric tests; the left ventricular ejection fraction on the echocardiogram was greater than 50% in three quarters of those studied; the most frequent follow-up hospital was the Pediatric Hospital of Camagüey. All the patients had received schooling and the majority had an employment relationship.

Key words

Congenital cardiopathies, sequelae, residua

■ INTRODUCTION

Congenital heart disease constitutes a heterogeneous group of morphological and/or functional defects of the heart and blood vessels. Clinically some of them are evident at birth, while others are not evident until days, months or even years have elapsed.(1,2) These are considered the most frequent congenital malformations.(3,4) The reported incidences are very variable, depending on the inclusion or

not of trivial defects, although it is estimated that a moderate or severe cardiac malformation is present in approximately six out of every 1000 births.(5,6) For this reason, a WHO Expert Committee on Prevention in Childhood and Youth of Adult Cardiovascular Diseases, which includes congenital heart disease, was created in Geneva in October 1990.(7)

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Approximately 60% of congenital heart diseases are diagnosed in children under one year of age, 30% in older children and 10% in adults.(8)

Diagnosing and successfully treating congenital heart disease represents one of the greatest triumphs of cardiovascular medicine and surgery in the twentieth century.(8) The publication of the book *Congenital Malformations of the Heart*, by Dr. H. Taussig(9) opened the doors to understanding congenital heart disease. The development and incorporation of new surgical

techniques, together with better medical care, has progressively increased the number of early diagnosed and treated patients for congenital heart disease (fetal diagnosis, neonatal treatment)(10,11) and have enabled in turn a significant reduction in mortality from 20% in the 1970s to the current 5%.(12)

In developed countries, with low birth rates, adult patients with congenital heart disease exceed the child population with these diseases.(13–15) The diagnostic and therapeutic evolution of congenital heart disease in recent decades allowed the survival of a significant number of children, once with small chance of living, who require differentiated attention for their integral insertion into the community upon reaching adulthood.(16,17) The therapeutic success, allowing the growth and development of these patients and their systematic follow-up, has led to the emergence of a new population of adults with congenital heart disease. (18,19)

Some survive spontaneously regardless of their quality of life, but most reach adulthood thanks to palliative or reconstructive interventions carried out at an early age. However, intervention is not synonymous with total hemodynamic normalization, so adults in this state will require specialized medical assistance for life. The evolution is determined by the anatomical anomaly of the heart disease, its evolution time and/or the type of treatment or intervention performed during childhood.

Most of them have a lower life expectancy than the general population and there is the possibility of sequelae, recurrences, residual lesions or new complications in the medium and long term. Furthermore, the most complex heart diseases will require re-interventions throughout their lives. All this constitutes a health problem, since it is a population of school age or labor-active and/or of childbearing age that can present complications that threaten their hope and quality of life, that can incapacitate them for work, affecting their self-esteem.(20) For this reason psychological care is part of the integral evaluation necessary in these patients. The transition of adolescents with congenital heart disease to adult life is usually more difficult when the patient has a complex heart surgery. Support should be directed to the understanding and acceptance of the heart problem. At this point it is more important to provide understandable and clear information about the problem and type of surgery. Finally, psychological support must consider the sexual and labor life of the patient.(21)

In the year 2000, in the US, there were an estimated 787 800 adults with congenital heart disease, of which 46.8% were of low complexity and the rest of moderate or high complexity.(15,22) The report of the 32nd Bethesda Conference in 2001 estimated that there were about 2 800 adults with this anomaly per million inhabitants, more than half of them with a defect of moderate or high complexity.(21)

It is currently estimated that 85% of children born with congenital heart disease will survive until adulthood, the majority of them thanks to therapeutic procedures performed in childhood.(27) However, the most striking is the exponential increase in adults with these diseases who have already received some type of previous treatment. It is estimated that by 2020 they will outnumber children born with this condition.(10)

At present, congenital heart disease accompanies its carrier for life, from birth to old age,(28,29) so that the scheduled or urgent cardiological consultation of these patients is increasingly frequent.(28)

Undoubtedly, the problem to be solved is complex for several reasons. First, congenital heart malformations constitute an extensive and varied number of lesions, each of which covers a range of subtypes, and in many cases, they are associated with two or more anomalies, generating a diagnostic heterogeneity that makes classification difficult.(30) Secondly, training in congenital heart disease provided to the adult cardiologist is often insufficient and has created a pediatric view of these diseases, which leads to a lack of knowledge of their evolution and thirdly, the varied surgical techniques used at different times for the same heart disease confront doctors to patients with surgeries that are no longer performed in the world.(27) The operated adults require a periodical follow-up plan according to the characteristics of their base heart disease that the specialist must be familiar with and fully understand, with precise knowledge on the interventions performed, their techniques and objectives. It should also take into account residual complications of the treatment, possibly occurring in the medium and long term, as a result of persistent short circuits, electrical conduction disorders or alterations of the heart rhythm of different magnitudes, myocardial dysfunction, vascular lesions of the pulmonary tree, problems derived from the prosthetic materials used, infectious interurrences or thromboembolic phenomena. (10)

The adult congenital patient should ask for the necessary advice before starting a certain job or sports activity,(31) they should also be concerned about the limits of their sexual life or the best contraceptive method, as well as the risks of hereditary burden that his offspring might have. (10,32,33)

Congenital heart disease in adults represents a new diagnostic challenge for the clinical cardiologist, unfamiliar with the anatomical and functional complexity of cardiac malformations. Evaluation with imaging techniques in adults can be as accurate as in children, but these techniques cannot replace a detailed clinical assessment. (35)

The treatment of patients with congenital heart disease has evolved dramatically. A new population of adolescents and

adults with repaired congenital heart disease and in need of a specialized cardiological control has been born, so a new challenge lies ahead with no easy solution.

■ MATERIAL AND METHODS

An observational, descriptive, cross-sectional study was conducted with the objective of characterizing adult patients operated for congenital heart disease followed in consultations for three years in the period from September 2013 to August 2016.

The research universe consisted of 628 consecutive patients operated for congenital heart disease in secondary care consultations including the Eduardo Agramonte Piña Pediatric Hospital and the Manuel Ascunce Domenech University Hospital, both in Camagüey, and in the William Soler Cardiocenter in Havana, Cuba. The sample, finally consisting of 100 patients, was selected by non-probabilistic random sampling. The primary source of the investigation was the form created by the author according to the bibliography consulted, and the secondary source were the outpatient medical records.

The Bruce protocol was used for the ergometric tests and the Simpson method, to measure the Left Ventricular Ejection Fraction (LVEF) using the echocardiogram.

■ RESULTS AND DISCUSSION

The first table of this study shows that palpitations in 23 of the patients were the most frequent symptom that afflicted adult-operated cardiac patients, followed by 17 who

Table 1. Characterization of adults patients operated of congenital heart disease in Camagüey, Cuba, followed-up for three years. Most represented symptoms.

Symptom	No	%
Dyspnea	17	17
Chest pain	9	9
Palpitations	23	23

Source: Medical records

reported shortness of breath and only 9, with chest pain. In the national literature consulted there were no studies referring to this topic, however Dr. Jorge Morales in a study presented in a congress course held in Montevideo, Uruguay mentions these as the most frequent symptoms in their patients too. The results coincide with a study conducted in Mexico,(40), in which these are the most common symptoms also, but in their research there is predominance of dyspnea represented as 35% followed by

Table 2. Most frequent signs

Signs	No	%
Heart murmurs	11	11
Arrhythmias	7	7
Cyanosis	18	18
Body structural changes	10	10
Arterial hypertension	21	21

Source: Medical records

palpitations and chest pain in 6% and 4% of the patients, respectively.

Table 2 shows the signs of these cardiopathy patients upon the physical examination, of which 21 showed high blood pressure; 18, cyanosis and 11, a heart murmur, particular data on this are not collected in any revised national study, but Dr. Yañez (40) in her study found predominance of arrhythmias followed by high blood pressure, our research does not agree with this study. While the Riberao Preto Clinic Hospital in Brazil,(18) agrees that hypertension is the most representative sign.

Table 3. Congenital cardiopathies

Cardiopathies	No	%
Atrial-ventricular septal defect	57	57
Falot tetralogy	4	4
Persistence of the arterial duct	7	7
Valve anomalies	13	13
Transposition of the great vessels	5	5
Aortic coarctation	5	5
Other anomalies	9	9
Total	100	100

Source: Medical records

Table 4. Electrocardiographic findings

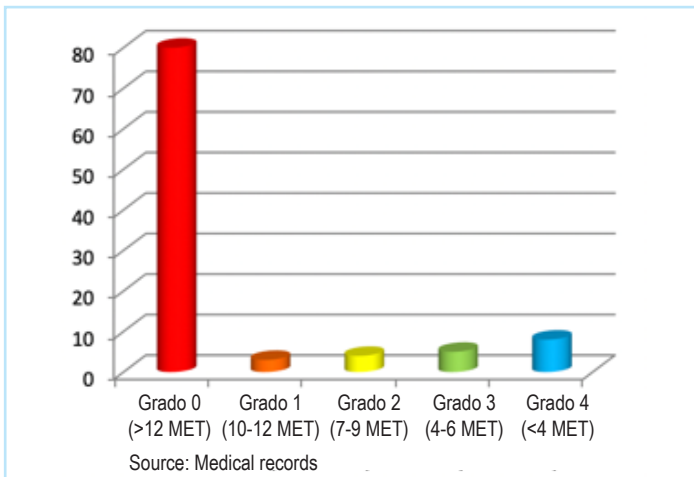
Electrocardiographic findings	YES		NO	
	No.	%	No.	%
Arrhythmias	7	7	93	93
Conduction disorders	14	14	86	86
Enlargement of cavities	24	24	76	76
Systolic or diastolic overload	16	16	84	84
Ischemic disorders	2	2	98	98

Source: Medical records

Table 3 shows the most representative cardiopathies in this study, in which more than 50 % were atrial-ventricular septal defect and thirteen cases had valve abnormalities, not coinciding with a study in William Soler Cardiocenter of the Havana, Cuba,(42) in which the Falot tetralogy was the most frequent (22.98%), followed by atrial septal defect (ASD), also not in agreement with a study conducted in the Adult Echocardiography Service of the Santa María Cardiovascular Clinic in Colombia,(43) where these septal defects represent the second type of congenital heart disease, after the bicuspid aortic valve. Our study agrees with those of Yañez(40) and Amaral(18) in that septal defects are the most frequently encountered heart disease.

Regarding electrocardiographic findings, (Table 4)24% of cases had cardiac cavity enlargement, followed by systolic or diastolic overload in 16%.

In relation to the ergometric test results, graphic 1 and Table 5 show the functional capacity achieved, where 80% reached 12 MET (metabolic equivalent), which means that they achieved a maximum heart rate (220-age) with absence of symptoms and only 8% had symptoms at rest



Graphic 1. Functional capacity results

Table 5. Functional capacity

Functional capacity	No	%
Grade 0 (>12 MET)	80	80
Grade 1 (10-12 MET)	3	3
Grade 2 (7-9 MET)	4	4
Grade 3 (4-6 MET)	5	5
Grade 4 (<4 MET)	8	8
Total	100	100

Source: Medical records

Table 6. Ergometric findings

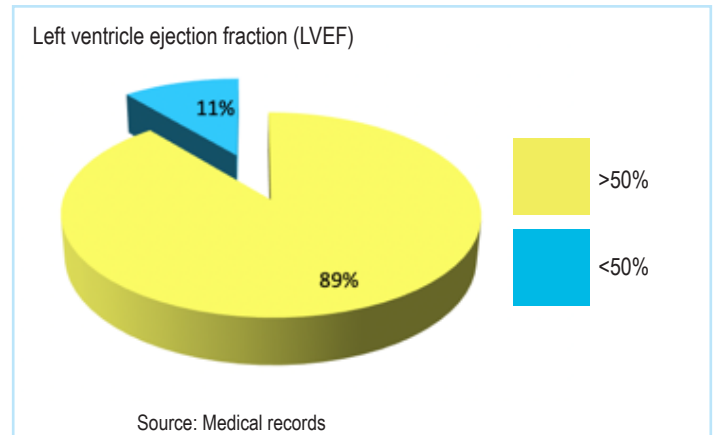
Ergometric findings	YES		NO	
	No.	%	No.	%
Arrhythmias	9	9	91	91
Ischemic disorders			100	

Source: Medical records

(functional grade 4); Table 6 shows that only 9 patients presented arrhythmias and none had ischemic alterations during physical exercise. Although in our country ergometry is a widely used diagnostic means, no study has been conducted, at least in adults with congenital heart disease. However, in Argentina, Inés Abella in her paper "Work capacity in patients with congenital heart disease"(45) states that it is the most useful test to assess work capacity, with a sensitivity of 65–85% and a specificity of 85% with a positive predictive value of 80%.

Observe in graphic 2 that the echocardiographic findings studied revealed that more than 80 patients had an LVEF above 50% and 29 had structural abnormalities. On this topic there is no Cuban or foreign study that reflects echocardiographic data statistically, although in the journal CONAREC(45) there is a complementary study par excellence, which enables determining the dimensions of the cavity and the thickness of the ventricular walls, ventricular systolic function measured by LVEF and diastolic function.

The color mode Doppler allows the functional study of valve anomalies. In the case of congenital heart disease, it also



Graphic 2. Echocardiographic findings

allows anatomic diagnosis. An article in the Costa Rican journal of cardiology(46) also reflects that transthoracic echocardiography is the imaging technique that provides more information. In the conclusion of his article, Dr. Juan Calderón(47) points out that the echocardiogram is the corner stone where the diagnosis of congenital heart disease rests, that the information obtained and the accuracy of the echocardiographic evaluation will increase with increasing clinical support. At present, it is considered an accessible, adequate and sufficient diagnostic imaging technique to establish the surgical correction plan in most patients with congenital heart disease.(49)

■ CONCLUSIONS

About half of the patients had symptoms and signs, the most common were palpitations and cyanosis in that order. Defects in the atrial-ventricular sept showed the highest incidence of congenital heart disease.

The most obvious electrocardiographic finding was the enlargement of the heart chambers; while among the ergometric ones, regarding functional capacity almost all the patients had functional group 0 and a minority presented arrhythmias.

In more than three fourths of the patients studied, a left ventricular ejection fraction (LVEF) higher than 50% was found, and structural anomalies were found in more than one fourth.

Caracterización de pacientes adultos operados de cardiopatías congénitas en Camagüey, Cuba

Resumen

Se realizó un estudio observacional, descriptivo, de corte transversal con el objetivo de caracterizar a pacientes adultos operados de cardiopatías congénitas de Camagüey en el período de septiembre 2013–agosto 2016. El universo estuvo constituido por 628 pacientes seguidos en consultas de la atención secundaria y la muestra de 100, seleccionados por el método de muestreo no probabilístico fortuito; la fuente primaria de datos fue la planilla creada por la autora según bibliografía consultada y la secundaria las historias clínicas ambulatorias. El

procesamiento de la información se realizó mediante el paquete Microsoft Excel para Windows 2010. Las variables estudiadas fueron: síntomas y signos, tipo de cardiopatía congénita, hallazgos electrocardiográficos, ergométricos y ecocardiográficos; hospital de seguimiento e incorporación a la vida social. Se concluyó que cerca de la mitad de estos presentaron síntomas y signos; siendo los defectos de septación auriculoventriculares la más frecuente de las cardiopatías; el crecimiento de cavidades cardíacas fue el hallazgo electrocardiográfico más evidente; la mayoría de los pacientes tuvo una capacidad funcional por encima de los 12 MET en la ergometría; la fracción de eyección del ventrículo izquierdo en el ecocardiograma fue mayor del 50% en las tres cuartas partes de los estudiados; el hospital de seguimiento más frecuente fue el Hospital Pediátrico de Camagüey. Todos los pacientes se escolarizaron y la mayoría tenían vínculo laboral.

Palabras clave

Cardiopatías congénitas, secuelas, residuos

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Peptide makes drug-resistant bacteria sensitive to antibiotics again

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Scientists at Nanyang Technological University, Singapore (NTU Singapore) have developed a synthetic peptide that can make multidrug-resistant (MDR) bacteria sensitive to antibiotics when used with traditional antibiotics, offering hope for the prospect of a combination treatment strategy to tackle certain antibiotic-tolerant infections. On its own, the synthetic antimicrobial peptide can also kill bacteria that have grown resistant to antibiotics.

Every year, an estimated 700,000 people die globally of antibiotic-resistant diseases, according to the WHO. In the absence of new therapeutics, infections caused by resistant superbugs could kill an additional 10 million people each year worldwide by 2050, surpassing cancer. This threat is accelerated by the developing COVID-19 pandemic, with patients admitted to hospitals often receiving antibiotics to keep sec-

ondary bacterial infections in check, amplifying the opportunity for resistant pathogens to emerge and spread.

The NTU Singapore team developed an antimicrobial peptide known as CSM5-K5 comprising repeated units of chitosan, a sugar found in crustacean shells that bears structural resemblance to the bacterial cell wall, and repeated units of the amino acid lysine. They believe that this structural similarity to the bacterial cell wall helps the peptide interact with and embed itself in it, causing defects in the wall and membrane that eventually kill the bacteria.

The team tested the peptide on biofilms, slimy coats of bacteria that can cling onto surfaces such as living tissues or medical devices in hospitals, and are difficult for traditional antibiotics to penetrate. In both preformed biofilms in the lab and biofilms formed on wounds in mice, the NTU-developed peptide killed at least 90 % of the bacteria strains in 4–5 hours.

When CSM5-K5 was used with antibiotics that the bacteria are resistant to, more bacteria was killed off as compared to when CSM5-K5 was used alone, suggesting that the peptide rendered the bacteria susceptible to antibiotics. The amount of antibiotics used in this combination therapy was also at a concentration lower than what is commonly prescribed.

Assoc Prof Kimberly Kline, a Principal Investigator at the Singapore Centre for Environmental Life Sciences Engineering (SCELSSE) at NTU, said: "Our findings show that our antimicrobial peptide is effective whether used alone or in combination with conventional antibiotics to fight multidrug-resistant bacteria. Its potency increases when used with antibiotics, restoring the bacteria's sensitivity to drugs again. More importantly, we found that the bacteria we tested developed little to no resistance against our peptide, making it an effective and feasible addition to antibiotics as a viable combination treatment strategy as the world grapples with rising antibiotic resistance."

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