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Congenital Heart Disease: Epidemiological and Echocardiography Aspects in the Cardiology Department of Tombouctou Hospital, Mali

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Abstract

Congenital heart diseases are abnormalities of heart that occur during intrauterine life. Our work aimed to study the epidemiological and echocardiographic aspects of congenital heart disease with Cardiology Department of the Tombouctou hospital. This was a descriptive cross-sectional study from November 2018 to December 31, 2019 on Doppler echocardiography reports from patients admitted to the Cardiology department. The probes used were 3.5 and 5 MHz on an Esaote Mylab40 device. The inclusion criteria concerned patients of both sexes under the age of 16, hospitalized or followed in the cardiology department for cardiac symptoms and having benefited from a cardiac Doppler ultrasound. Results: During the study period, 370 echocardiographic examinations were performed and revealed 20 cases of congenital heart disease with a prevalence of 5.45%. The female sex was the majority 13/7 cases which makes a sex ratio of 0.54. Heart murmurs were the main reason for requesting cardiac Doppler ultrasound with the 13 out of 20 cases of congenital heart disease (65%). Interventricular communication was represented by 15 cases (75%). Congenital heart disease is a reality in Africa. Its frequency and reported series are underestimated due to the inaccessibility of Doppler echocardiography.

Keywords

Congenital Heart Disease, Cardiology, Tombouctou

1. Introduction

Congenital heart diseases are abnormalities of the heart that occur during heart formation during intrauterine life [1]. They constitute a major public health problem in Mali and are increasingly described in Africa where the incidence is estimated at 8 per 1.000 births [2]. Hospital prevalence varies from country to country with 4.9% in Mali [3], 0.98% in Burkina Faso [4], 5.09% in Congo [5] and 4.18% in Senegal [6]. The Doppler echocardiography is nowadays the essential examination in the diagnosis of congenital heart disease.

The absence of epidemiological data on congenital heart disease at the Tombouctou hospital and the opening of a cardiac surgery Department of University Hospital center Luxembourg "Mère-enfant" Bamako-Mali justify the present study aimed at describing the epidemiological aspects and echocardiography of congenital heart disease in the Cardiology Department, Tombouctou Hospital, Mali.

Material and Methods: This was a descriptive cross-sectional study from November 2018 to December 31, 2019 on Doppler echocardiography reports from patients admitted to the Cardiology department. The inclusion criteria concerned patients of both sexes under 16 years of age presenting symptoms suggesting cardiac involvement and having undergone a cardiac Doppler ultrasound and were not included patients over 16 years of age and those under 16 years old who did not have a cardiac Doppler echo.

The outcome measures were: Patients with symptoms of cardiac involvement. Cardiac Doppler ultrasound was the confirmatory diagnostic examination by revealing structural abnormalities.

The treatment was medical due to the lack of technical platform.

Definitions of terms:

Interventricular communication is a dehiscence of the interventricular septum. They are accompanied by an abnormal diversion of arterial blood into venous blood. It is a predominant left-right shunt between the left ventricle and the right ventricle through a septal defect.

Persistence of the ductus arteriosus is the persistence after birth of a fetal physiological communication between the pulmonary artery and the trunk of the descending aorta just downstream of the left subclavian artery responsible for a congenital non-cyanogenic heart disease with shunt left - right arterial.

Atrioventricular canal is a complex malformation caused by partial or complete absence of the atrioventricular floor resulting in abnormal communication between the atrial and ventricular stages. It is caused by a developmental disorder of the endocardial bulges which normally divide the common ostium into the mitral orifice and the tricuspid orifice.

Inter atrial communication corresponds to abnormal communication between at them atria (right and left).

Ethics: Informed consent was obtained with strict respect for confidentiality.

The data collection: Patients were recruited from an anonymity survey sheet with the cardiac Doppler ultrasound report. The parameters studied were socio-demographic data, clinical circumstances of discovery, CBC results, fasting blood glucose, serum creatinine, frontal chest X-ray and cardiac Doppler echo.

Word and Excel 2013 software were used for data entry and SPSS 11 and Epi Info 3.3.2 software for their analysis. The static test used was the ki2 with a significance level of 5%.

2. Results

During the study period, 370 echocardiographic examinations were carried out and made it possible to highlight 20 cases of congenital heart disease with a hospital prevalence of 5.45%, achieving four (4) different nosological entities (Table 1).

We have not objectified any case of association of congenital heart disease. The interventricular Communication were prominent in congenital heart disease 15 cases (75%), followed by atrioventricular duct and ductus arteriosus with the same percentage of 10 (Table 2).

The majority of congenital heart disease was diagnosed between 5 and 30 months with 45%.

The mean age at the time of the Doppler echocardiogram was 96.95 months with ranges of 5 months and 53 years. The 5 - 30 month age group was the most represented with 9 cases (45%), followed by those over 60 months with 7 cases (35%) (Figure 1 & Table 3).

The female gender was predominantly represented with 13 cases, which makes a sex ratio of 0.54.

Clinically, cardiac murmur and respiratory distress were the major functional signs (Table 4). The result of the cardiac Doppler echo made it possible to retain four (4) nosological entities (Table 1).

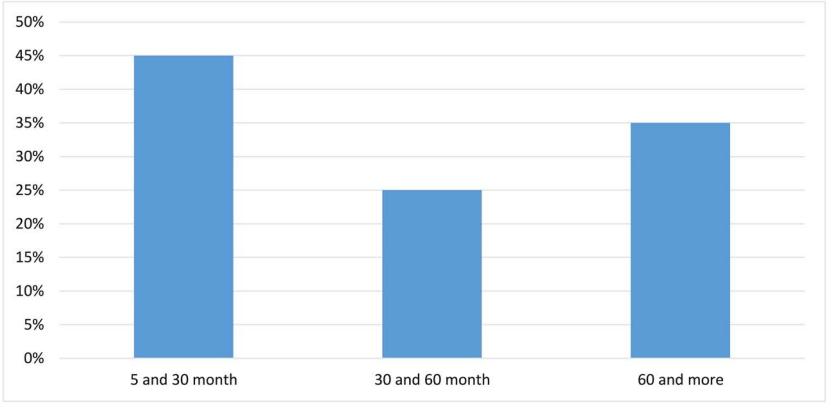

Figure 1. Distribution of patients with congenital heart disease according to age.

Table 1. Distribution of cases of congenital heart disease according to echocardiographic data.

Type of congenital heart disease	Frequency	Percent%
Interventricular Communication	15	75
Inter-Atrial Communication	1	5
Atrio-Ventricular Canal	2	10
Persistent ductus arteriosus	2	10

Table 2. Distribution of the different types of heart disease according to age.

Heart disease type	Age group (months)			
	[5 - 30]	]30 - 60]	>60	TOTAL
Ventricular communication	**8**	4	3	15
Persistent ductus arteriosus	**0**	0	2	2
Atrioventricular channel	**1**	0	1	2
Inter atrial communication	**0**	0	1	1
TOTAL	**9**	4	7	20

Table 3. The nosological distribution of the 20 cases of congenital heart disease according to sex.

Heart disease type	sex		**Total**
	M	**F**	
Ventricular communication	5	10	15
Persistent ductus arteriosus	0	1	1
Atrioventricular channel	0	2	2
Inter atrial communication	2	0	2
TOTAL	7	**13**	**20**

Table 4. Distribution of reasons for requesting echocardiography.

Reasons for request	Frequency	Percent%
Heart murmur	13	65
Respiratory distress	4	20
Growth retardation and heart murmur	2	10
Heart failure	1	5
TOTAL	**20**	**100**

3. Discussion

Overall results

Frequency: our study, out of 370 echo cardiac Doppler ultrasound examinations carried out, we objectified 20 cases of congenital heart disease with a prevalence of 5.40%. Several studies reported by different authors show variable

frequencies. However, these series all concordantly underscore the worrisome nature of congenital heart disease in Africa. Table 5 gives the comparative results of the prevalence of congenital heart disease from different African series. These differences in prevalence could be linked to the following factors: difference in the selection criteria for pediatric series in certain studies [5]-[12] and finally ultrasound series [4].

Distribution of patients by sex

The female sex predominated in our study with a sex ratio of 0.54. This disagrees with the results of Kinda, Kokou, Ould Zein, Touré, Diop, M'pemba-Loufoua, Acrachi [4] [7] [9] [10] [11] [12] [13] which noted a preponderance of the male sex. This difference can be explained by the nature of our study which looked at patients under the age of 16.

For most authors, gender was not implicated in the genesis of congenital heart disease and there was no clear predominance.

Distribution of patients by age

The mean age of our patients in our series was 96.95 months with extremes of 5 months and less than 16 years. The 5 to 30 month age group was the most represented with 9 cases (45%); followed by more than 60 months with 7 cases (35%). This is in agreement with Abéna [9] and Cloarec [14] who noted that most congenital heart disease was diagnosed from an early age between 0 and 2 years old respectively 70% and 61%. This high rate of congenital heart disease is explained by the lack of technical facilities in many African countries and the high cost of evacuation to an appropriate center. However, the intake was symptomatic and purely medical.

Certain congenital heart diseases such as Interventricular Communications, Inter-atrial Communications and Persistence of the Ductile Arterial, which represented 90% of cases in our study, progress spontaneously towards closure [15] [16] [17]; late onset congenital heart disease is most often benign and compatible with an almost normal life.

Indications for echocardiography

Murmurs were the predominant reason for performing a cardiac Doppler echo with 65% followed by respiratory distress in 20% of cases. These results could be explained by the intense character and irradiation in radius of a wheel of the murmur in the interventricular communication an almost constant sign [18]. With regard to respiratory distress, it is most often recurrent bronchopneumopathies as a revelation of congenital heart disease favored on the one hand by precarious hygienic conditions, immunodeficiency in newborns or children and on the other hand by flooding and pulmonary hypersecretion.

The different heart diseases encountered

The heart disease most frequently found in our study and in most studies in Africa [4] [9] [10] and in the world [16] [19] was Interventricular communication with a preponderance of the peri-membranous form: 98, 4%) or associated with other heart disease (Table 6).

Table 5. Comparative table of the prevalence of congenital heart disease from different African series.

Studies	Prevalence	Place of study
Kinda, Burkina [4]	0.98%	Studies carried out in a cardiological environment
Mayanda, Congo-Brazzaville [5]	5.09%	
Niakara, Burkina-Faso [6]	6%	
Georges Kinda, Burkina-Faso [7]	0.98%	Studies carried out in pediatric settings
Samandoulougou, Burkina-Faso [8]	0.78%	
Our study Tombouctou-Mali	**5.40%**	
Abena-Obama, Cameroun [9]	0.64%	
M'pembaLoufoua Lemay, Congo-Brazza [10]	0.5%	
Amon-Tanoh-Dick, Côte d'Ivoire [11]	0.1%	
KokouOutcha, Togo [13]	0.48%	

Table 6. Comparative table of the frequency of VICs in the world.

Country	Authors	VIC frequency (%)
Togo	KokouOutcha [10]	24.4
Sénégal	Acrachi [9]	38
Burkina-Faso	Kinda [4]	23.33
France	Joly *et al.* [16]	30 à 40
Etats-Unis	Sables [19]	30
Mali notre étude	Mariko S	75

4. Conclusions

Congenital heart disease is a reality in Africa. It is described in Africa where interventricular communication is frequent. Its frequency is probably underestimated due to the unavailability of echocardiography in certain regions, the lack of financial means and the growing insecurity in Africa.

Its management requires:

- equipping our cardiology and radiology departments with efficient diagnostic means;
- opening of cardiovascular surgery units.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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