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Short-Term Outcomes of Surgery for Grown-Up Congenital Heart Disease

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Abstract

Introduction: Congenital heart disease (CHD) diagnosed and treated in adulthood is a growing public health problem in resource-limited countries. Surgical management poses specific challenges related to the natural progression of lesions and associated complications. **Objective:** To describe the epidemiological, clinical, paraclinical, and therapeutic characteristics of congenital heart disease operated on in adulthood at the Fann University Hospital. **Patients and Methods:** A retrospective descriptive study of all patients aged 16 years or older who underwent surgery for congenital heart disease at the CUOMO pediatric cardiac surgery department. **Results:** Twenty-eight patients were included. The mean age was 24 years, with a slight female predominance (gender ratio of 0.87). Non-cyanotic heart defects accounted for the majority of cases, dominated by left-to-right shunts, particularly atrial septal defects (32.1%). Cyanotic heart defects were rare (3.6%). The mean duration of CPB was 103.1 minutes and the aortic cross-clamp time was 73.4 minutes. The results of surgical treatment show an overall mortality rate of 10.7% (n = 3). The mean follow-up time was 9.3 months [1 - 60 months]. **Conclusion:** Surgery for congenital heart disease in adults is feasible and yields good results in our setting. Late diagnosis remains common, highlighting the need for earlier screening and improved care pathways.

Keywords

Congenital Heart Disease, Adult, Cardiac Surgery, Senegal

1. Introduction

Congenital heart disease in adults (CHDA), commonly referred to as Grown-Up Congenital Heart Disease (GUCH), includes all patients with congenital heart de-

fects who have reached adulthood. This includes not only heart conditions diagnosed and treated during childhood, which may progress to secondary decompensation, but also malformations that remain asymptomatic for a long time and only become clinically apparent in adulthood. These patients have specific pathophysiological and progressive characteristics that require specialized care and long-term follow-up [1].

Congenital heart disease is the most common congenital malformation, with an estimated global prevalence of between 8 and 10 per 1,000 live births [2].

Due to advances in diagnosis and pediatric cardiac surgery, a growing proportion of patients are now reaching adulthood, giving rise to the concept of grown-up congenital heart disease (GUCH) [3].

In resource-limited countries, many congenital heart diseases remain undiagnosed during childhood and are only diagnosed in adulthood, often at an advanced stage [4].

Late surgery then poses specific challenges related to anatomical changes, pulmonary hypertension, and associated comorbidities.

In Senegal, data on the surgical treatment of congenital heart disease in adults remains limited. This study aims to describe the experience of the CUOMO cardiac surgery department at the Fann University Hospital Center.

2. Materials and Methods

This is a retrospective, descriptive, longitudinal study conducted in the CUOMO pediatric cardiac surgery department at the Fann National University Hospital Center in Dakar from January 2017 to April 2023, over a period of 6 years and 4 months.

All patients aged 16 years or older who underwent surgery for confirmed congenital heart disease during the study period and had a usable medical record were included. All incomplete records and patients under the age of 16 were excluded.

The data were analyzed descriptively using frequencies, percentages, and means. Statistical analysis was performed using RSTUDIO version 2025 software. During the study period, 1,743 patients were treated at this center, and congenital heart disease in adults accounted for 1.6%, or 28 patients. Of these 28 patients, 13 were male and 15 were female, giving a sex ratio of 0.87. The average age of our patients was 24 years [16 - 53 years].

3. Results

3.1. Non-Cyanotic Congenital Heart Disease (NCCD)

Left-to-right shunts accounted for the majority of CHD: 71.4% of the total cohort, dominated by atrial septal defect (ASD): 32.1%, followed by ventricular septal defect (VSD): 25.9% and atrioventricular canal defect (AVCD): 14.8%. Obstructive malformations, mainly subaortic membranes, accounted for 25.9% of NCCDs.

1. Atrial septal defect (ASD)

ASD mainly affected women (77.8%), with a mean age of 22.7 years. Dyspnea was the main symptom. Echocardiography showed exclusively ostium secundum

ASDs, often associated with right-sided repercussions. Surgery, performed under cardiopulmonary bypass (CPB), was mainly based on closure using a pericardial patch. Follow-up showed an overall favorable outcome, with some minimal residual leaks. Mortality was 11.1% (n = 1), occurring late, 5 years after surgery.

2. **Ventricular septal defect (VSD)**

VSDs mainly affected men (71.4%), with a mean age of 24.4 years. Perimembranous forms were the most common. Surgery was performed under CPB, most often by patch closure. Postoperative complications mainly included anemia and bleeding. Follow-up showed good clinical progress, with some minimal residual leaks. There were no deaths.

3. **Atrioventricular canal defect (AVCD)**

AVCDs accounted for 14.8% of CCNCs, with a predominance of females. Partial forms were the most common. All patients underwent complete correction under CPB. Notable postoperative complications included arrhythmias, ischemic stroke, and pneumothorax. Mid-term clinical results were positive, despite some residual valve insufficiency. There were no deaths.

4. **Obstructive malformations (subaortic membranes)**

These accounted for 25.9% of CCNCs, with a slight male predominance. Surgery mainly consisted of resection of the subaortic membrane, sometimes combined with valve procedures. Short-term clinical results were positive with some transient hemodynamic complications.

One postoperative death occurred due to cardiogenic shock.

3.2. Cyanotic Congenital Heart Disease

Only one case of tetralogy of Fallot was operated on (3.6%). The patient had a severe form with marked infundibular stenosis. Complete surgery was performed under CPB with an initially favorable postoperative course, complicated secondarily by endocarditis. The patient died 5 years after the operation from unknown causes (Table 1).

Table 1. Distribution of heart diseases are listed in Table 1.

Type of heart defect	Number (n)	Percentage
ASD	9	32.1%
VSD	7	25%
AVCD	4	14.3%
Subaortic membrane	7	25%
Tetralogy of Fallot	1	3.6%

Note: ASD: atrial septal defect; VSD: ventricular septal defect; AVCD: atrioventricular canal defect.

3.3. Other Data

The average cardiopulmonary bypass time was 103.1 minutes [43 - 238 min]. The

average cross-clamp time was 73.4 minutes [13 - 177 min].

The average duration of assistance is 17.6 minutes [6 - 50 min]. Modified Del Nido crystalloid cardioplegia was administered in 26 patients, or 92.9% of cases, making it the most commonly used solution. Finally, cold blood cardioplegia was used in 2 patients, representing 7.1% of cases. Normothermia was the most frequently adopted strategy, used in 15 patients, or 53.6% (n = 15) of the sample. Moderate hypothermia was performed in 13 patients, corresponding to 46.4% of cases. Hemofiltration was used in 20 patients, or 76.9%. modified ultrafiltration (MUF) was used in 6 patients, representing 23.1%.

3.4. Mortality

Operative mortality was 3.6% (n = 1). This involved one patient who had undergone subaortic membrane resection and presented with refractory cardiogenic shock.

Late postoperative mortality (beyond 30 days) was 7.1% (n = 2), with one case occurring 4 years after surgery and the other 5 years after surgery. No cause was found in either case.

3.5. Morbidity

The most common complications found were Anemia and minimal residual VSD (Table 2).

Table 2. Complete list of complications.

Type of complications	Observation
Anemia	5 cases (17.8%). especially in VSDs
Postoperative bleeding	2 cases. including 1 case of reoperation for hemostasis
Isolated hyperthermia	2 cases (7.1%)
Pericardial effusion requiring drainage	1 case (3.6%)
Pneumothorax	2 cases (7.1%)
Neurological complications	2 cases (1 case of seizures without signs of neurological localization and 1 case of ischemic stroke with sequelae of hemiplegia)
Endocarditis on pericardial patch	1 case (3.6%): Tetralogy of Fallot
Minimal residual VSD	3 cases (10.7%)
Minimal residual ASD	1 case (3.6%)
Reoperation for aortic valve replacement	1 case (3.6%)

4. Discussion

In our study, the hospital prevalence of congenital heart disease operated on in adulthood was 1.6%, confirming the relative rarity of these conditions in African

hospitals compared to developed countries. Non-cyanotic congenital heart disease (NCCD) accounted for the vast majority of cases (96.4%), dominated by left-to-right shunts (71.4%), while cyanotic heart disease remained rare (3.6%).

These results are comparable to those reported in the international literature, particularly in Europe and North America, where improved screening and early management have changed the epidemiological profile of congenital heart disease in adults [1] [5] [6].

In sub-Saharan Africa, we have a prevalence of 0.75 % however, this figure is likely underestimated due to limited access to healthcare [7].

The study population was young, with a mean age of 24, lower than that reported in Western series, where the mean age often exceeds 40 [6] [8].

This difference is mainly explained by late diagnosis and reduced life expectancy in the absence of early surgical correction.

A slight female predominance was observed, in line with several studies [1] [7].

Dyspnea was the main presenting symptom (82.1%), most often classified as NYHA class II. This finding is consistent with data reported in the African and international literature, where dyspnea remains the predominant symptom revealing undiagnosed congenital heart disease during childhood [9].

ASD was the most common heart disease (32.1%), with a clear female predominance. The average age at the time of surgery was relatively young compared to other series [10].

The clinical manifestations were dominated by exertional dyspnea, and the paraclinical data confirmed right-sided heart failure.

Surgical management was based primarily on complete correction under cardiopulmonary bypass, with closure using a pericardial patch in most cases. Postoperative results were satisfactory, with low morbidity (10.7%) and zero mortality, in line with large international series [10] [11].

VSD was the second most common heart disease. The majority of patients were male, with dyspnea being the predominant symptom. Perimembranous forms were predominant, in line with classic data in the literature [2].

Surgery, performed under cardiopulmonary bypass, resulted in effective correction with zero mortality and favorable short-and medium-term outcomes, despite longer operating times than those reported in some series [11].

AVCD accounted for 14.3% of cases, with a predominance of females. Partial forms were the majority. Clinical manifestations were dominated by dyspnea and auscultatory abnormalities. Surgery, although technically demanding, yielded good functional results and no postoperative mortality in our series, confirming the encouraging results reported in the literature [11].

Tetralogy of Fallot was the only cyanotic heart disease observed. The late diagnosis can be explained by the fact that the condition was relatively well tolerated by the patient. Despite an initially favorable postoperative course, late mortality was observed, highlighting the potential severity of these conditions when treated in adulthood, which is consistent with data reported in large international series [12].

Overall, postoperative morbidity was low, dominated by transient complications (anemia, residual shunts, etc.). Early mortality was virtually zero, confirming the safety of congenital heart surgery in adults when performed in specialized centers [13].

Short-and medium-term follow-up showed significant clinical improvement in the majority of patients, with an improved quality of life. However, the rare late complications observed highlight the importance of prolonged and structured follow-up [14].

5. Conclusions

This study highlights that surgery for congenital heart disease in adults is feasible with good functional outcomes and low mortality, even in a resource-limited setting. The predominance of non-cyanotic forms, the young age of patients, and good postoperative outcomes underscore the importance of early diagnosis and specialized care [1] [15].

The development of dedicated facilities and the strengthening of long-term follow-up remain essential to further improve the prognosis for these patients.

Conflicts of Interest

The authors report no conflicts of interest in relation to this work.

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