

Preliminary Results of Ventricular Septal Defect Surgery in Festoc Center in Bamako

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ABSTRACT

Interventricular septal defects are dehiscences of the interventricular septum connecting the systemic and pulmonary circulations.

The aim of this study is to report the preliminary results of the first series of intraventricular septal defects managed at the Festoc centre in Bamako. This is a mono-centric, descriptive retrospective study taking place at the FESTOC Centre in the period from 10 September 2018 to 30 April 2023. Patients of any age and sex, operated for IVC were included. Patients operated abroad were not included.

We recorded 74 cases of IVC, i.e. 23.19% out of 300 cases. 61% of the patients were male, with a sex ratio of 1.56. The average age was 11 years. Symptoms were dominated by dyspnoea and recurrent bronchitis in 67.21% and 49.18% respectively. Peri-membrane and admission topography were dominant, with rates of 84% and 10% respectively. The mean duration of ECG was 122 min. In our series of 74 patients, there were 4 in-hospital deaths, representing a mortality rate of 5%.

Keyword: Surgery, Ventricular Septal Defect, Festoc Center, Bamako
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Introduction

Interventricular septal defect (VSD), one of the most common congenital heart defects, is the presence of a more or less large orifice in the interventricular septum, resulting in a high-pressure left-to-right shunt and the risk of pulmonary arterial hypertension [1]. Despite the difficulties of screening for congenital heart disease in sub-Saharan Africa, a number of patients are diagnosed and treated before irreversible complications occur [2,3].

In Mali, some work has been carried out on congenital heart disease, with prevalence reaching 56.7%, or 39.4% of CIV. [4,5].

Materials and Methods

This is a prospective and retrospective, mono-centric descriptive study that took place at the André FESTOC centre of the Mother and Child University Hospital Centre “le Luxembourg” in Bamako, Mali.

It took place over a 4-year period from 10 September 2018 to 30 April 2023.

Inclusion Criteria

Patients of any age and sex operated for IVC were included in the study.

Non-inclusion Criteria

The following were not included

- Patients admitted for non-operated IVC;
- Patients operated on for CIV operated on abroad.

Data analysis: Data were entered and analysed using EPI INFO software.

Results

A total of 80 patients underwent surgery during this period. Socio-demographic data Sixty-one percent (61%) of the patients were male and 39% female, with a sex ratio of 1.56. The 0-5 age group was the most affected, at 47.54%, with a standard deviation of 1.84. The 6-10 age group accounted for 34.43%, the 11-15 age group for 13.11%, and the over-16 age group for 4.92%. The mean age was 11 years, with extremes of 2 and 21 years. Clinical signs Circumstances of discovery. The circumstances of discovery were dominated by dyspnoea and recurrent bronchitis in 67.21% and 49.18% of cases respectively. The other circumstances of discovery were a murmur on cardiac auscultation (27.87%), cough (26.23%) and growth retardation (6.56%) (Figure 1).

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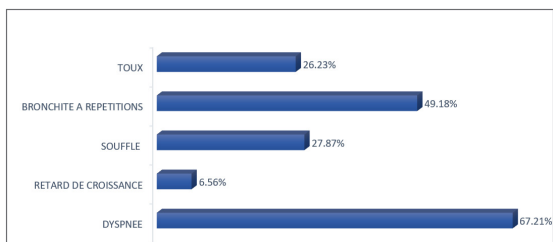


Figure 1: Breakdown by Circumstances of Discovery

Tachycardia and crepitus were the most common physical signs in 63.93% and 16% of cases respectively.

Paraclinical Signs

Cardiomegaly was found in 67.30% of cases and hypervascularised lung parenchyma in 92% of cases.

All patients had sinus rhythm, but 70.49% of these patients presented with tachycardia. Left ventricular hypertrophy was noted in 3.28% of cases and left atrial hypertrophy in 1.64%.

Perimembranous and admission topography were dominant, with rates of 84% and 10% respectively. It was just arterial in 6% of cases.

The majority of our patients had an interventricular septal defect with a diameter greater than 7 mm (87%) (Figure 2 and 3).

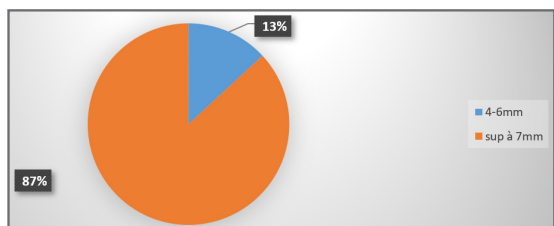


Figure 2: Distribution by Size of Ventricular Septal Defect

On pre-operative cardiac ultrasound, the left ventricular ejection fraction was preserved in all patients. Pulmonary hypertension was found in 50.04% of patients, pericardial effusion in 18% and dilated vena cava in 11.48%.

Ventricular septal defect was associated mainly with mitral insufficiency in 75.41% of cases. The other associated pathologies were atrial septal defect (11.47%), aortic insufficiency (75.41%), tricuspid insufficiency (36.06%), patent ductus arteriosus (9.83%), patent foramen ovale (11.7%) and subaortic diaphragm (19.67%) (figure 3).

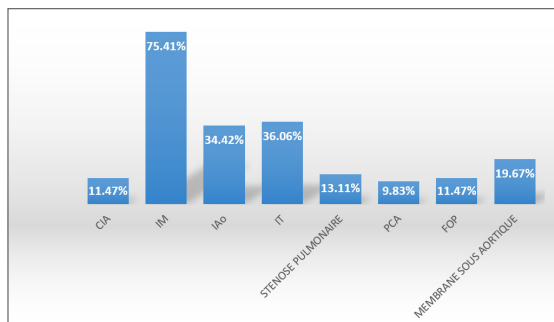


Figure 3: Distribution According to Associated Pathologies

The IVC was closed using either an autologous patch (62%), a heterologous patch (35%) or direct suture (3%). (Figures 4 and 5)

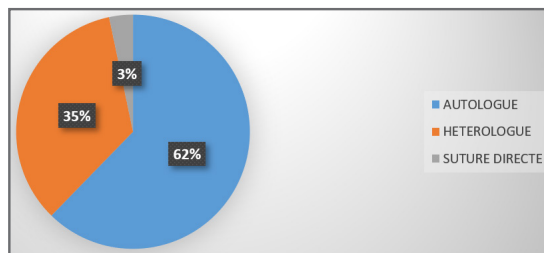


Figure 4: Distribution by Patch Type

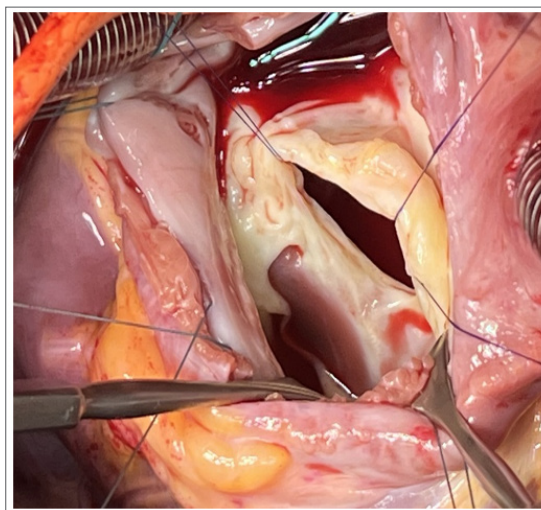


Figure 5: Périmembranus Ventriculair Septal Defect de 23 mm

Resection of the sub-aortic membrane was associated with cure of VSD (18.03%) and tricuspid plasty (16.39%) (Figure 6).

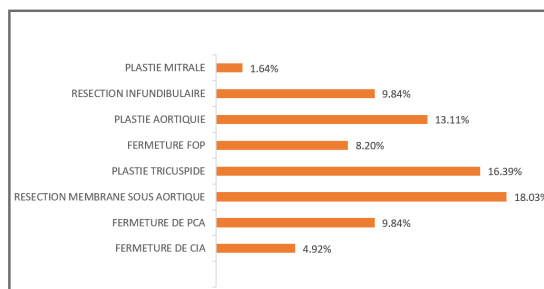


Figure 6: Distribution by Associated Disease

All procedures were performed under conventional extracorporeal circulation, with an average duration of 122 min (51min to 194min). In 9.84% of cases it was less than 60 minutes, in 67.21% between 60 and 140 minutes and in 22.95% of cases more than 140 minutes. The majority of patients underwent aortic clamping for 60 minutes or less (44.26%).

Table 1:

Clamp Time	Frequency	Percentage
< 60	37	44,26%
60-80	18	21,31%
> 80	25	34,43%
Total	80	100%

Right ventricular dysfunction was noted in 91.23% of cases and residual IVC in 54% of cases. There was minimal pericardial effusion in 47.54% of patients and minimal tricuspid insufficiency in 22.95% of patients.

Echocardiography performed one month after the operation showed right ventricular dysfunction in 87.27% of patients, 52.67% had residual IVC and 1 patient had endocarditis at 1 month post-op (table 2).

In our series of 80 patients, there were 4 in-hospital deaths, giving a mortality rate of 5%.

Table 2: Distribution of Transthoracic Echocardiographic Abnormalities at One Month Post-Operatively

Parameter	Fréquency	Percentage
Left ventricular Dysfunction	0	0%
Right ventriculaire Dysfunction	48	87,27%
NO pulmonary arterial hypertension	12	20,68%
Moderate pulmonary arterial hypertension	36	62,06%
hight pulmonary arterial hypertension	10	17,24%
CIV résiduel VSD	30	52,67%
Infective endocarditis	1	1,72%
Pericardial effusion	1	1,72%
Aortic regurgitation	11	18,96%
Mitral regurgitation	25	43,10%
Tricuspid regurgitation	10	17,24%

Two (2) patients died between 1 and 6 months, 1 after more than 6 months and 1 in intensive care after less than one month.

Deaths were due to sepsis in 2 cases, infective endocarditis in 1 case and low cardiac output secondary to a pulmonary hypertensive crisis in 1 case.

Discussion

Isolated IVC is the most common cardiac malformation, accounting for at least 30-40% of all cardiovascular malformations in infants. [7-10].

In our study we found a clear male predominance. The same deduction was made by Lupoglazoff et al [6]. However, other studies have found no gender predominance [6]. In our study, the age of diagnosis varied between 6 and 12 years, with an average age of 8 years. However, the majority of patients in KANGAH K.M were under 5 years of age [11]. In a study carried out in Paris between March 1988 and March 1993, the diagnosis was made early, and 84% of patients were less than one year old. In previous years, the diagnosis was made much later, with a mean age of diagnosis of 20 +/- 8 months for certain series [12]. It should be noted that the prevalence of VIC in premature newborns seems to be similar to that found in children born at term [13].

The cause of VIC is unknown in the majority of cases. A Finnish study showed that maternal alcohol consumption during the first trimester was the primary factor in inducing VIC, followed by occupational exposure to organic solvents [14]. However, the risk of developing VIC does not seem to be linked to maternal smoking habits, coffee, tea or cola consumption, or the use of aspirin or diazepam.

According to Hernández-Díaz folic acid antagonists, including trimethoprim, triamterene, carbamazepine, phenytoin, phenobarbital, and primidone, may increase the risk of IVC, whereas folic acid may reduce the risk [15].

Recent studies conclude that exposure to ACE inhibitors during the first trimester of pregnancy cannot be considered safe and should be avoided while others are investigating the influence of gene factors on VIC. At present, therefore, there is no consensus on the aetiopathogenesis of VIC [16,17].

It should be noted that in trisomy 21, VIC is the most frequent cardiac malformation after the atrioventricular canal. It should be noted that these patients develop PAH earlier, necessitating more rapid surgical management [14].

The indication for IVC surgery depends on: - the anatomical type, - the size of the defect, - the degree of shunt, - pulmonary vascular resistance, - functional tolerance, - associated anomalies such as aortic insufficiency, pulmonary infundibular stenosis, etc [14].

Surgical closure reduces the risk of infective endocarditis, reduces PAH, improves functional symptomatology and long-term survival [11]. Young age is no longer a limiting factor for a complete cure, which can be achieved even in the first six months of life, with results identical to those of patients operated on later in life [18].

Perimembranous VSMCs have a different evolutionary profile to that of trabeculated muscular VSMCs. They constitute the vast majority of large or medium-sized VICs requiring surgery before the age of 1 year but the proportion of perimembranous VICs operated on varies from 10 to 40% depending on the series [19-21]. In our study, perimembranous VICs were in the majority, representing 66% of VICs operated on.

The most commonly used approach is median sternotomy although some teams use thoracotomy [22,23].

In our series, a conventional median sternotomy was performed in all cases. The choice of approach to the lesion depends on the location and size of the IVC.

Most perimembranous septal defects and many trabeculated septal defects can be closed by the right atrial approach [24]. This approach significantly reduces the incidence of complete right bundle branch block, frequently encountered after ventriculotomy [25].

The IVC was approached by right atriotomy in 98.36% of cases in our series and by right ventriculotomy in 1.64% of cases.

In that of KANGAH K.M., the IVC was approached by right atriotomy in 87.4% and right ventriculotomy in 12.6% [26].

In our study, all the procedures were performed under conventional extracorporeal circulation, with a mean duration of 122 min and a range of 51 to 94 min.

Our results are consistent with those of KANGAH in ROI, where the mean duration was 113 min with a range of 45 to 330 min [26-28].

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