

Surgery of Patent Ductus Arteriosus: 73 Cases in Dakar

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Case Report

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Abstract: Reporting results of surgical treatment of the patent ductus arteriosus in Senegal. It's a retrospective study from December 2004 to November 2014, we reported 73 patients operated for patent ductus arteriosus (PDA). Mean age was 45 months (1-126). The sex ratio was 59%. The main reason for admission was repetitive bronchitis (63%; 46 patients). The left subclavian systolic and diastolic murmur was found in 69 patients (94%). The average cardiothoracic index was 64% (45-90%). Echocardiography showed a dilated left cardiac chambers. The mean diameter of the ductus was 6 mm (3-14 mm). Surgery consisted of a triple ligation among 3 patients (4%), suture followed by ligation among 33 patients (45%), and ligation with clip (34 patients; 51%). Three cases of aortic injury and an injury of the left pulmonary artery were repaired. During hospitalization, two cases of bronchitis, three cases of pneumonia and one case of dysphonia were noted. The mean duration in intensive care unit was 1,5 days (1-4), the mean duration of hospitalization was 5 days (1-19). The survival rates at 2 years and 5 years were respectively 90% and 83%. Surgery of the patent ductus arteriosus can be applied in most centers of surgery where open heart surgery is not practiced.

Keywords: Patent ductus arteriosus, surgery, ligation, section

INTRODUCTION

Patent ductus arteriosus is a frequent acyanotic congenital heart disease and represent 5-10% of congenital heart diseases in general [1]. It's a vascular connexion between the upper part of the descending aorta just after the take-off of the subclavian artery; and the beginning part of the pulmonary artery [1].

Related to embryology, patent ductus arteriosus come from the distal part of the left side of the 6th arcus aortae [2]. It's a fetal duct which is important and necessary in fetal or early neonatal period; but it becomes abnormal if it remains patent after neonatal period. The management of patent ductus arteriosus has improved since the practice of interventional cardiology which is progressively developed in our country. We report the case of 73 patients operated in our center

METHODS

We conducted a retrospective analysis from December 2004 to November 2014 in patients with patent ductus arteriosus. Inclusion criteria were all patients operated for patent ductus arteriosus. Age, gender, symptoms, surgical management, complications and survival were studied. All statistical analyses were performed using SPSS 17 software; the survival rate was calculated by Kaplan-Meier. In univariate analysis, correlation between the patent ductus arteriosus diameter and left atrium; left systolic and diastolic ventricular diameter was calculated by Pearson method.

Correlation was statistically significant if P is inferior to 0, 05.

RESULTS

Mean age was 45 months (1-126 months). Females represented 63% (46 patients). The common symptoms was repeated bronchitis (63%; 46 patients), followed by dyspnea type II of the New York Heart Association (60%; 44 patients). Ten patients (14%) had a down syndrome (Table 1). Twenty two patients (30%) was born from a consanguineous union. One patient was 7 months premature born. Mean Weight was 13 kg (3-50 kg). A systolic and diastolic murmur in infra clavicular area was found in 69 patients (94%). All patients had a cardiomegaly with mean cardio thoracic index 64% (45-90%). Heart rate was 116 beats per minute (60-178). One patient had a first degree auriculo ventricular bloc. In the Echocardiography with Doppler, mean systolic and diastolic diameter of the left ventricle were respectively 39 cm (14-76 cm) and 25 cm (4-56 cm). The mean diameter of the left atrium was 27cm (8-40 cm). The mean diameter of the ductus was 6 mm (3-14 mm) and the flow was a left to right shunt in 71 patients (97%) and the mean gradient between the aorta

and the left pulmonary artery was 61 mmHg (2-180 mmHg). A pulmonary hypertension was not founded in 40 patients (55%). The mean ejection fraction of the left ventricle was 70,5% (50-96). Was associated with patent ductus arteriosus, atrioventricular canal defect, (2 patients), infra valvular aortic membrane (1 patient), atrial septal defect (3 patients), ventricular septal defect (5 patients), supra valvular aortic membrane (1 patient), patent foramen ovale (1 patient). All patients were operated. Surgical approach was a posterior and lateral thoracotomy (93%; 68 patients), through the 4th intercostal space (65 patients; 89%), 3th intercostal space (3 patients; 4%), and 5th intercostal space (5 patients; 7%). An anterior thoracotomy was the approach for the others patients. The ductus was closed with triple ligations in 3 patients (4%), section followed by suture in 33 patients (45%), closure with 1 surgical medium clip (1 patient ; 1,4%), 2 clips (5 patients ; 7%), 3 clips (27 patients ; 37%), 4 clips (4 patients ; 5,5%). The chest was closed after insertion of a chest tube with suction.

The mean operation duration was 80 minutes (40-240 min). All patient were extubated in the operating room. We encountered 3 cases of aortic injury and 1 case of left pulmonary artery injury which were

well managed. In one case, the ductus was ruptured unfortunately and a suture was done without any complication. No operative death was found. During hospitalization, 2 patients suffered from bronchitis and 3 patients developed pneumonia in the left lung. They were doing well after antibiotic treatment. One patient got dysphonia which disappeared 2 days after without any medication. Mean duration stay in intensive care unit was 1,5 day (1-4 day), Mean duration of hospitalization in the other units was 5days (1-19 days). After a mean follow-up of 30 months (1day-123days), 7 deaths occurred over all after a mean of 14 months after surgery (1 day-62 days). Only one patient died one day after surgery related to heart failure. Two other deaths was occurred in patients who got pulmonary artery banding related to ventricular septal defect with pulmonary hypertension. The remaining 4 deaths occurred a long time after surgery; any reason was found. The survival rates at 2 years and 5 years were respectively 90% and 83%. (Figure1). A statistical significant correlation was noted between the ductus diameter and the systolic and diastolic diameter of the left ventricle; Correlation was not significant between the ductus diameter and the left atrium diameter (Table 2)

Table-1: Signs and Symptoms in 73 patients.

Symptoms, Signs	Number	rate (%)
Bronchitis	46	63
dyspnea	44	60,3
Other related signs		
syncope	1	1,4
hemoptysis	1	1,4
Fever	5	6,8
Retrosternal pain	1	1,4
Failure to get weight	3	4,1
vomiting	2	2,7

Table-2: Correlation related to PDA diameter

	Left atrium diameter	Left systolic ventricle diameter	Left diastolic ventricle diameter
Ductus diameter	P=,998	P=,001	P=,003

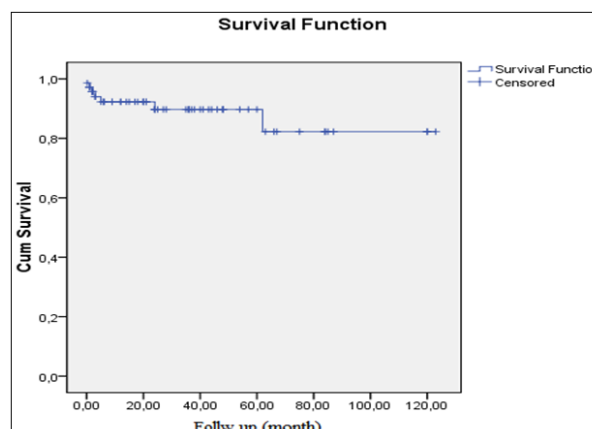


Fig-1: Survival of 73 patients

DISCUSSION

Prevalence of patent ductus arteriosus is 7,3% in Senegal [3], 14,7% in Nigeria [4] and 11,9% in Zimbabwe [5]. Many patients suffering from congenital heart disease in particular the patent ductus arteriosus are admitted lately. Indeed the mean age in this study is 45 months. It's related to the lack of cardiac surgeons in our country [3]. Females are predominant in the most cases series and in ours [4,6,7] etc. A mutation of the gene TFAP2B which is in the neural crest cells during embryogenesis is associated with the patent ductus arteriosus [8]. We noted 30% of consanguineous unions. Patent ductus arteriosus can be asymptomatic or a congestive heart disease can be the first sign. Because blood flow is increased in the lungs, patient can have bronchitis and pneumonia at repetition [1]. The main signs and symptoms were dyspnea and repetitive pulmonary infections in this series. Diagnosis is made by echocardiography and Doppler; it measure le diameter of the ductus, left heart chambers diameter and can find other congenital heart diseases [1,9]. In this series, the left systolic and diastolic diameter of the heart evolved parallel to the ductus diameter ($p=00, 1$ and $00, 3$). Without treatment, patent ductus arteriosus evolve in pulmonary hypertension at first and secondary in Eisenmenger syndrome for the big ductus with a lot of left to right shunt [10]. Open surgery was done in this series because endovascular treatment of patent ductus arteriosus in the cath lab is not developed in our country and usually we don't have any residual shunt after open surgery [11]. It's the approach of choice in Africa because interventional cardiology is not well developed [12,13]. Surgery of patent ductus arteriosus is routinely done in our center without major complications. In this series we didn't have any death and major morbidity. We used the classic left postero lateral thoracotomy through the 4th inter-costal which is the goal standard in the literature [1,12,14].

CONCLUSION

Surgery of patent ductus arteriosus is well done in our country. The approach we used in this series can be used in most centers where open heart surgery is not practiced. Nowadays interventional cardiology is well developed in developed country; it's why patent ductus arteriosus is closed in the cath lab. Interventional cardiology is being developed in our country.

Disclosures

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