

Research Article

Open heart surgery in Nigerian children the need for international and regional collaboration: The Bayelsa and Enugu experience

Ujunwa FA¹, Ujuanbi AS², Chinawa JM^{1*}, Allagoa DO² and Onwubere B¹

¹National Cardiothoracic Center of Excellence UNTH, Ituku, Ozalla Enugu, Nigeria

²Open Heart Surgery Centre, Federal Medical Centre, Yenagoa, Nigeria

Abstract

Background: Children with congenital heart diseases (CHD) often require palliative or definitive surgical heart interventions to restore cardiopulmonary function. Lack of early cardiac intervention contributes to large numbers of potentially preventable deaths and sufferings among children with such conditions.

Objectives: The aim of this study was to highlight our experience and the importance of international and regional collaboration for open heart surgery in children with CHD and capacity building of local cardiac teams in Bayelsa and Enugu States.

Methodology: In November 2016, a memorandum of understanding (MOU) was signed by the managements of FMC, Yenagoa, Bayelsa State, UNTH, Enugu and an Italian-based NGO- Pobic Open Heart International for collaboration in the area of free open heart surgery for children with CHDs and training of local cardiac teams from both institutions either in Nigeria or in Italy. Patients for the program were recruited from Bayelsa and Enugu States with referrals from all over the country with combined screening and selection done in UNTH. Selected patients were operated on and funded free of charge by the Italian NGO. Hands on training of the local cardiac teams and cardiac intervention was done twice yearly in Nigeria.

Result: From inception of the program in November, 2016 to May, 2019 a total of 47 children (21 Males, 26 Females; age range 6 months to 14 years) with various types of congenital heart defects had free open heart surgery from the program with 41 surgeries done in UNTH & 6 in Italy (complex pathologies). Also, home cardiac teams from UNTH and FMC, Yenagoa gained from on-site capacity training & retraining from the Italian cardiac team both in Nigeria and in Italy. The Success rate was 95.7% (44) and Case Fatality rate was 4.3% (2)..

Conclusion: There is a great efficacy in early cardiac intervention. This is with respect to a high success rate and minimal Case Fatality seen in this study. This was achieved through Regional and international collaboration.

Introduction

Congenital heart disease (CHD) are of public health concern worldwide, as they contribute to childhood morbidity and mortality [1]. Congenital heart disease contributes about 261,247 deaths globally in 2017 and most of these deaths occurred in low and middle income countries [1].

These children with congenital heart diseases often require palliative or definitive surgical intervention in order to restore cardiopulmonary function [2,3]. Congenital heart diseases imposes a huge economic burden to the households, health system and the society, leading to catastrophic expenditure for the families and productivity losses for the care givers and society [4]. This huge cost of illness constitute a huge barrier to

More Information

***Address for Correspondence:**

Chinawa Josephat, Department of Paediatrics, National Cardiothoracic Center of Excellence, UNTH, Ituku, Ozalla Enugu, Nigeria, Email: Josephat.chinawa@unn.edu.ng

Submitted: June 13, 2021

Approved: July 08, 2021

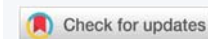
Published: July 09, 2021

How to cite this article: Ujunwa FA, Ujuanbi AS, Chinawa JM, Allagoa DO, Onwubere B. Open heart surgery in Nigerian children the need for international and regional collaboration: The Bayelsa and Enugu experience. J Cardiol Cardiovasc Med. 2021; 6: 044-047.

DOI: 10.29328/journal.jccm.1001117

Copyright: © 2021 Ujunwa FA, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Keywords: Open heart surgery; International; Regional collaboration; Experience; Bayelsa; Enugu





access to cardiovascular services leading to late presentation to health facilities with the attendant complications.

The surgical interventions for congenital heart defects are not readily available in most low and middle income countries [4], where the facilities are available, the cost to patients are usually catastrophic, because of dearth of health insurance and social welfare services [4]. Such that households and individuals borrow funds or adopt certain lifestyles in order to be able to afford the cost of cardiovascular services [5]. Lack of early cardiac intervention contributes to a large number of potentially preventable deaths and morbidity among children with congenital heart disease especially in resource poor countries [6]. In addition the challenge for cardiac surgery in most low and middle income countries are poor resources, lack the adequate manpower and facilities to manage these conditions [4-6].

Most of the children affected by congenital heart diseases in Nigeria are either referred to foreign countries for cardiac surgery prior to 2013, or have their surgery done in Nigeria during periodic cardiac mission by foreign cardiac teams during visits to local hospital [6,7]. These teams are usually Non-governmental organizations that bring in both human and material resources to undertake cardiac surgery at a subsidized or no cost to patients in the country [7].

In places where cardiac surgery and other cardiovascular health care services are available the cost is usually too high for the households and individuals due to poor government funding, lack of health insurance shortage of full complement of skilled personnel such that the health facilities usually pay high user fees in order to procure the services [8]. This affects the number and outcome of cardiac surgery in the country. Pooling of resources via regional and international collaboration to compliment the missing resources in order to provide affordable cardiovascular care for the local population may be important in overcoming some of these challenges.

According to the national conditions of different countries, although the level of medical treatment will be different, free treatment is the goal of the regional and international corroboration. Furthermore, this article is aimed to buttress the need for early intervention in subjects with congenital heart disease as this will help immensely in improving the quality of life. This could be achieved for now through regional and international corroboration.

We undertook an audit of a collaboration involving the University of Nigeria Teaching Hospital Enugu, Federal Medical Center Yenagoa Bayelsa to highlight our experience and importance of international and regional collaboration in open heart surgery among children with congenial heart diseases and capacity building of Local teams in Enugu in South-East Nigeria and Bayelsa in South-South Nigeria.

Methodology

In November 2016, a Memorandum of Understanding (MOU) was signed by the managements of Federal Medical Centre, Yenagoa, Bayelsa State, University of Nigeria Teaching Hospital (UNTH), Enugu State and the governing body of an Italian-based Non-Governmental Organization (Open Heart POBIC International) for collaboration in the area of free open heart surgery for children with CHDs and training of local cardiac teams from both institutions either in Nigeria or in Italy and offering free cardiac surgery in UNTH or Italy for children with congenital heart defects in Nigeria.

Cardiac interventions and training of the local teams in Nigeria were done during cardiac missions twice a year. Patients for the program were recruited from Bayelsa State and Enugu State, with referrals from all over the country. Screening and selection were done in the cardiothoracic Unit of UNTH Enugu by the foreign and local teams. Selected patients were operated on and funded free of charge by the Italian NGO. The surgery and post-operative management of the patients were done by both the local and foreign teams

Records of the children with CHD operated on since inception of the program in November, 2016 till May, 2019 were retrieved. Information sought included; age, sex, underlying congenital heart defects, type of intervention/procedure they received, the outcome immediate post-surgery state and 6 months after intervention.

Ethical approval was obtained from the ethical review committee of UNTH and FMC Yenagoa.

Results

Since inception of the program till date, 289 children have been screened. A total of 46 children have benefited from surgical interventions. A total 40 children with various forms of congenital heart defects had surgery in Enugu. While 6 children with complex congenital heart defects had their interventions in Italy. There were 24 Males and 22 Females in a ratio of 1.1:1 respectively. Their age ranged from 5 months to 14 years.

The Success rate was 95.7% (44) and Case Fatality rate was 4.3% (2) Tables 1,2. The case of VSD that died- had comorbidities like severe PEM, and heart failure, compassionate surgery was done with risk explained to parents! Prior to intervention. The patient that had Tetralogy of Fallot (TOF) that died was found to have peripheral pulmonary stenosis and developed right heart failure/arrhythmias immediate post up which is a known complication of TOF with peripheral pulmonary stenosis

During the missions the category of local health personnel that receive on-site training include Paediatric cardiologist, cardiothoracic surgeons, perfusionists, cardiac anaesthesiologists, intensive care nurses, cardiothoracic

**Table 1:** Pattern of Cardiac defects, surgical intervention and outcome in Enugu.

S/N	Types of congenital heart defects	Number (%)	Procedure (s)	Outcome
1	PDA	8 (20.0%)	PDA Ligation	Successful
2	TOF + PS	7 (17.5%)	Total Repair	Successful
3	VSD, PDA	7 (17.5%)	VSD Closure & PDA Ligation	Successful
4	VSD	4 (10.0%)	VSD Closure	3 Successful, 1 death immediate post op (Compassionate surgery)
5	ASD	3 (7.5%)	ASD Closure	Successful
6	Partial AVCD	2 (5.0%)	AVCD Closure	Successful
7	Transitional AVCD	2 (5.0%)	AVCD Closure	Successful
8	PDA, Subaortic Membrane	2 (5.0%)	PDA Ligation + Resection of membrane	Successful
9	ASD, PS	1 (2.5%)	ASD Closure + Pulm Arterioplasty	Successful
10	VSD, Subaortic membrane	1 (2.5%)	VSD & ASD Closure + Membrane Resection	Successful
11	Partial AVCD & PDA	1 (2.5%)	AVCD Closure + PDA Ligation	Successful
12	VSD & Subaortic membrane	1 (2.5%)	VSD Closure, membrane Resection	Successful
13	ASD, PS, PLSVC to Coronary Sinus	1 (2.5%)	ASD Closure + Commisurotomy	Successful

VSD: Ventricular Septal Defect; ASD: Atrial Septal Defect; PDA: Patent Ductus Arteriosus; TOF: Tetralogy Of Fallot; PS: Pulmonary Stenosis; PA: Pulmonary Atresia; AVCD: Atrioventricular Canal Defect; LSVC: Persistent Left Superior Vena Cava

Table 2: Pattern of Complex Congenital Heart Defects, interventions and outcome in Italy.

S/N	Types of Congenital Heart Defects	Number (%)	Procedure	Outcome immediate post op	6months post-surgical follow up.
1.	TOF with severe infundubular stenosis/ peripheral pulmonary stenosis	2 (33%)	Catheterization; Total repair, transannular patch	Successful	Both stable
2.	VSD, ASD, PDA with pulmonary hypertension	2 (33%)	Catheterization, pulmonary pressure study, total repair.	Successful	Both stable
3.	Aortic Isthmus Aneurysm	1 (16.7%)	Catheterization; angiography Cardiac MRI and stenting	Successful	Stable for future stent review
4.	DORV, AS, PS	1 (16.7%)	Total intra-cardiac repair-subaortic resection and miectomy	Successful	Stable with residual stenosis.

AS: Aortic Stenosis; PS: Pulmonary Stenosis; ASD: Atrial Septal Defect; DORV: Double Outlet Right Ventricle; PDA: Patent Duct Arteriosus; TOF: Tetralogy Of Fallot

nurses, biomedical engineers nutritionists and resident doctors.

Discussion

The audit shows that a total of 46 children has benefitted from the program so far with none of the patients or household incurring any direct medical cost of illness. The surgery was done free either in Nigeria or Italy, this buttresses the fact that pooling of resource both human and material resources in a resource poor country can improve service delivery and prevent financial barriers of health demand. The collaboration provided an opportunity for high-cost surgery to be delivered to the patients at no direct medical cost to the caregivers through well designed funding program for cardiac surgery in children. Hence this shows that cardiac surgery treatment which is usually catastrophic for household can be delivered via effective resource pooling, support and collaboration, this has also been noted by other authors [1,9].

The number of patients may be small compared to the high prevalence of congenital heart disease in children and also below the World Health Organization defined optimal pediatric cardiac access of one surgical center per 2 million people performing 300-500 paediatrics cases annually, however the case mix represents the prevalent congenital heart defects in the country [9]. The study also supports that Ventricular Septal Defect is the commonest acyanotic congenital defect and Tetralogy of Fallot the commonest

cyanotic heart defects [10], thus effort in developing local capacity to treat this common congenital heart defects should be encouraged such that about 60% of the congenital heart defects can be treated locally. However, the number of patients that may benefit from the surgery can increase if there is improved government funding and support, similar findings have been noted by Falase, et al. [4].

During the period more complex congenital cardiac diseases were successfully managed in Italy which is a high-income country, this is probably due to dearth of highly specialized facilities, availability of support intensive care units for prolong hospital stay and required manpower which may not be readily available in the resource poor environment, thus buttresses the need for collaboration both internationally and regionally in order to provide effective cardiovascular services. Similar report has been given by previous authors [11,12].

Different categories of health personnel were trained during the program and this was more beneficial to the local teams however the foreign teams were also exposed to the peculiarities of congenital heart defects in resource poor environment which is usually complicated by their late presentation, alternative medical intervention, malnutrition, pulmonary hypertension and sepsis. These complications are usually rare in the developed countries. The collaboration provided a basis for exchange of ideas in the area of best practice for management of cardiac and extra cardiac complications of congenital heart diseases in children.



The audit shows that regional and international collaboration helps to reduce the burden of surgically correctable cardiac defects among Nigerian children and also limits the direct medical cost borne by caregivers of patients with congenital heart defects through pooling of resources. The collaboration contributed immensely in the area of capacity building and skill transfer to the home based cardiac teams, similar findings were also noted by earlier authors [9,13].

Despite the foreign aid available to the children with cardiac defects in our centers, there are still a lot of children who require surgery or intervention but either limited by the cost or availability of centers with the capacity of performing open heart surgery. Thus, it is recommended that more open-heart surgery centers in Nigeria with regional and international collaborations should be encouraged. Government funding, equipping of surgical facilities, & training & retraining of medical personnel are needed to further increase access to sustainable pediatric surgical care for Nigerian children with congenital heart diseases.

National capacity in CHD treatment

The members of pediatric cardiology and cardiothoracic unit need to acquire some skill to perfect on open heart surgery in this locale. Currently, in our country, there is no elaborate or well-equipped training center for the cardiologists, cardiothoracic surgeons or perfusionist in Nigeria that will produce manpower who operate independently without the help of international corroboration.

Conclusion

There is a great efficacy in early cardiac intervention. This is with respect to a high success rate and minimal Case Fatality seen in this study. This was achieved through Regional and international collaboration.

Acknowledgement

The authors wish to acknowledge the Italian Cardiac Team from Open Heart International NGO, the whole local cardiac teams and management of UNTH, Enugu and FMC, Yenagoa for this laudable program.

Conflict of interest: No conflict of interest

References

- Zimmerman MS, Smith AGC, Sable CA, GBD 2017 Congenital Heart Disease Collaborators. Global, regional and national burden of congenital heart disease, 1990-2017: a systematic analysis for the global burden of disease study 2017. *Lancet*. 2020; 4: 185-200. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/31978374/>
- Ekure EN, Okoromah CN. In-hospital outcome of children referred for cardiac surgery abroad from a developing country. *Niger J Paediatr*. 2009; 36: 80-86.
- Vervoort D, Meuris B, Meyns B, Verbrugghe P. Global cardiac surgery: Access to cardiac surgical care around the world. *J Thorac Cardiovasc Surg*. 2020; 159: 987-996. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/31128897/>
- Falase B, Sanusi M, Majekodunmi A, Ajose I, Idowu A, et al. The cost of open heart surgery in Nigeria. *Pan Afr Med J*. 2013; 14: 61. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/23565308/>
- Raj M, Paul M, Sudhakar et al. Microeconomic impact of congenital heart surgery: results of a prospective study from a limited –resource setting. *PLoS One*. 2015; 10: e0131348. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/26110639/>
- Omokhiodion SI, Adegboye VO, Ogunkunle OO. Treatment of structural heart disease through International collaboration: The Ibadan Experience. *Niger J Cardiol*. 2005; 1: 39-46.
- Bode-Thomas F. Overcoming challenges in the management of structural heart diseases in children. *J Med Trop*. 2011; 13: 3-10.
- Sadoh WE, Nwaneri DU, Owubu AC. The cost of outpatient management of chronic heart failure in children with congenital heart diseases. *Niger J Clin Pract*. 2011; 14: 65-69. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/21493995/>
- Reichert HA, Rath TE. Cardiac Surgery in Developing Countries. *J Extra-Corpor Technol*. 2017; 49: 098-106. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/28638158/>
- Chinawa JM, Eze JC, Obi I, Arodiwe I Ujunwa F Adiele DK Obu H. Synopsis of congenital heart disease among children attending University of Nigeria Teaching Hospital Ituku Ozalla. *BMC Res Notes*. 2013; 6: 475.
- Mocumbi AO. The challenges of cardiac surgery for African children. *Cardiovasc J Afr*. 2012; 23: 165-167. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/22555641/>
- Falase B, Sanusi M, Animasahun A, Mgbajah O, Majekodunmi A, et al. The challenges of cardiothoracic surgery practice in Nigeria: a 12 years institutional experience *Cardiovasc Diagn Ther*. 2016; 6: S27-S43. **PubMed:** <https://pubmed.ncbi.nlm.nih.gov/27904842/>
- Salami MA, Akinyemi OA, Adegboye VO. Early results of open heart surgery for acquired hear diseases in Ibadan, Nigeria. *Niger J Cardiol*. 2018; 15:14-19.