Does 2D Echocardiography Tally With Clinical Diagnosis In The Management Of Congenital Heart Disease?

J M Chinawa, E Obidike, J C Eze, F A Ujunwa, D Adiele

Citation

J M Chinawa, E Obidike, J C Eze, F A Ujunwa, D Adiele. *Does 2D Echocardiography Tally With Clinical Diagnosis In The Management Of Congenital Heart Disease?*. The Internet Journal of Cardiology. 2013 Volume 11 Number 1.

Abstract

Background: The objective of this study was to determine if clinical diagnosis of cardiac abnormalities tally with 2 D Echocardiography findings.
Methods: A cross-sectional retrospective study in which a review of the records of all children attending children outpatient clinics including cardiology clinic of the University of Nigeria Teaching Hospital (UNTH), Enugu over a five year period (January 2007-June 2012) was undertaken.
All children presenting with cardiac anomalies were included in the study and the cases were investigated using 2 D Echocardiographic studies.
Results: A total of 31,795 children attended the children outpatient clinics of the hospital over the study period. Of these, seventy one (71) had cardiac diseases. Among children with cardiac disease ,thirty five Percent (35%) of all the patients had their clinical diagnosis not tallying with 2 D Echocardiography while 21 (29.5%) had clinical diagnosis in tandem with 2 D Echocardiography. Thirty five and half percent had no 2 D Echocardiograph done for them for financial reasons.
Conclusions: Despite the fact that clinical diagnosis may not always tally with 2 D Echocardiography in the diagnosis of congenital heart disease ,it should not be downplayed.

INTRODUCTION

Cardiac disease is the leading cause of morbidity and mortality in the United States for the past 80 years. [1] This is may not be the same in developing countries, where malaria and malnutrition are major culprits. [2] Notwithstanding, mortality and morbidity from cardiac disease among children in developing countries is gaining recognizance. Heart disease also results in substantial health-care expenditures; for example, coronary heart disease is projected to cost an estimated $151.6 billion in 2007. [3] Among heart diseases in children, congenital heart defects are the most common congenital malformation, affecting 8 in every 1000 live births, and accounting for >20% of perinatal deaths.[4] Congenital heart defects (CHDs) are 6.5 times more common than chromosomal abnormalities and 4 times more common than neural tube defects.[5]
The necessity of accurate clinical diagnosis of congenital heart disease without necessarily relying on sophisticated equipments such as 3D Echocardiography cannot be overemphasize especially in resource poor country like ours. However more often than not some complex cardiac lesions are missed during routine clinical examination, this has led to the development and refinement of a series of techniques and diagnostic procedures such as 2D Echocardiography and angiocardiography.[6] Although these procedures are of great diagnostic value in the recognition of the cardiac malformation, they should also serve in the promotion of a better understanding of the clinical manifestations of such malformation .[6] Two-Dimensional echocardiography (2-D Echo) is well accepted for evaluation of cardiac function.[7] It is the most employed cardiovascular imaging modality for assessment of cardiovascular disease and is often performed in patients without history of coronary artery disease (CAD). It is well established that several echocardiograpahic measurements provide powerful prognostic information for cardiovascular outcomes such as presence of left ventricular hypertrophy, aortic sclerosis and LVEF. [7,8]
It is important to demonstrate an objective evidence of structural or functional abnormalities to explain patient's symptoms of heart anomaly since symptoms of such anomalies may be specific. It is noted that more than a third of patients with a clinical diagnosis of heart failure may not actually have heart failure. It is also interesting to note from the SHAPE study that only 3% of more than 7000 subjects surveyed from nine European countries recognized breathlessness, fatigue, and edema as symptoms of heart

failure.[9] Even as at that, when someone presents with typical symptoms of heart failure, a diagnostic test, most frequently an echocardiography examination, is required to establish the underlying etiology for an optimal management strategy.

The objective of this study is to find out if clinical diagnosis of congenital cardiac anomaly is in tandem with Echocardiographic findings. This study is important because of over diagnosis of cardiac anomalies using clinical findings alone and paradoxically, overreliance on 2 D Echo in the diagnosis of cardiac anomaly instead of clinical acumen.

PATIENTS AND METHODS

The aims and objectives of this study were to determine the prevalence of cardiac abnormalities among children attending the children outpatient clinic of the UNTH, Ituku-Ozalla, Enugu State; to describe the different forms of abnormalities seen among these children; to determine the various clinical profile, and outcome of cardiac abnormality among children in UNTH.

The study was conducted at the children outpatient clinic of the University of Nigeria Teaching Hospital UNTH), Ituku/Ozalla, Enugu. The hospital was located at her temporary site within the city (Enugu) centre. In January 2007, the hospital was re-located to its permanent site at Ituku/Ozalla, about 22 kilometers away from Enugu metropolis.

The Hospital provides care for children and also receives referrals from different parts of Enugu, the rest of Enugu State and surrounding states.

A cross-sectional retrospective study in which a review of the records of all children attending UNTH over a five year period (January 2007 and April 2012) was undertaken. The folders (case files) of these children were retrieved from the hospital records department. Data collection was done with structured forms designed for the study. The diagnosis of cardiac abnormality was based on clinical evaluation and 2 D-echocardiogram examination (as documented by doctors in the patients' folders). Patient's history, including antenatal history, history of exposure to teratogens and family history of consanguinity were obtained from these folders. The prevalence rate was estimated as a per cent of the total number of children attending children outpatient within the period of the study (Number of children with cardiac abnormalities /total number of children admitted in the hospital for the duration of study).

Data was analyzed using SPSS 13. Rates and proportions were calculated with 95% confidence intervals. The proportions were compared using students T-test. Level of significance was set at $P< 0.05$.

Ethical approval for this study was sought from the Ethics and Research Committee of UNTH.

RESULTS

Demography

A total of 31,795 children attended the children outpatient clinic of the hospital over the study period, of these; sixty one (71) had cardiac diseases, giving a prevalence of 0.22 per cent.

Out of the Sixty one children with cardiac disease; Thirty five were males while 36 were females giving a female: male ratio of 1. The children were aged 6 months to 12 years. The mean age of the children was 7.82±4.12 years. The most common age group in this study was the under five which represented 57.7% of children with cardiac disease. Majority of the parents of children with cardiac anomaly were of very low socioeconomic class as shown in Table I.

Among children who presented with cardiac disease, Ventriculoseptal defect (VSD) (29.6%) is the commonest cardiac disease overall and congenital acyanotic heart disease in particular, Tetratology of fallot (TOF) (19.8%) is the commonest congenital cyanotic heart disease while Rheumatic heart disease (RHD) (8.5%) is the commonest acquired heart disease. This is shown in Table II

It is noted in Table III that among children with cardiac disease ,thirty five Percent (35%) of all the patients had their clinical diagnosis not tallying with 2 D Echocardiography while 21 (29.5%) had clinical diagnosis in tandem with 2 d Echocardiography.

Table I

Demographic characteristics of respondents

	Frequency N = 71	Percent
Age range		
1 – 6	41	57.7
7 – 12	22	31.0
13 – 18	8	11.3
Sex		
Female	36	50.7
Male	35	49.3

Table II

Echocardiography findings

	Frequency N=71	Percent
	21	29.6
VSD	14	19.8
TOF	6	8.5
RHD	4	5.7
AVSD	3	4.2
TA	3	4.2
ASD	2	2.8
CS	2	2.8
DORV	2	2.8
ECD	2	2.8
NF	2	2.8
PDA	2	2.8
HRV	1	1.4
CMS	1	1.4
Dextrocardia	1	1.4
SV	1	1.4
Not Done	1	1.4
CPS	1	1.4
TAPVD	1	1.4
DC	1	1.4

Table III

Do Clinical findings tally with 2D echo findings

Clinical Findings	Frequency N=71	Percent
Did not tally	26	35.2
Tallied	21	29.5
2D Echo not done	24	35.3

DISCUSSION

It is noted with interest in this study, that more than a third of clinical diagnosis of cardiac disease did not conform to echocardiography findings. Two-Dimensional echocardiography (2-D Echo) is well accepted for evaluation of cardiac function. [10] It is the most employed cardiovascular imaging modality for assessment of cardiovascular disease, though several echocardiographic measurements provide powerful prognostic information for cardiovascular outcomes. [10, 11] However, the efficacy of echocardiographic findings in confirming congenital cardiac disease is not to be entirely depended on. This is even proven in some studies.[10-12]

Much reasons have been adduced as why clinical diagnosis are sometimes faulted by echocardiographic results, for instance some cardiac anomaly like cotritriatum sinistrum may be mistaken for a VSD because of the typical pansystolic murmur seen in this complex anomaly which also presents exactly like VSD clinically. [13] Other reasons could be due to lack of ingenuity in taking a good history and making accurate diagnosis. For example Isabel and colleagues in University of Toronto noted that diagnostic accuracy of clinical assessment of heart murmurs by office based paediatricians is suboptimal, and they proffered educational strategies as a tool to improve accuracy so as to reduce unnecessary referrals and misdiagnosis. [14]

For each patient examined, paediatricians were asked to select their most probable approach if they were seeing this child in their own practice for the first time. They selected physical examination alone for 35% of the observations, chest radiographs would have been ordered for 49%, ECGs for 48%, echocardiograms for 41%, and a cardiology consultation obtained for 46% of observations. Thus paediatricians would have referred for echocardiography or cardiology consultation in 105 of the 191 (54%) observations, including 39% of the patients who had innocent heart .[14] It is pertinent to know that because of

the importance of 2 D Echocardiography, clinical acumen among clinicians in the diagnosis of cardiac disease has been relegated to the background. For instance, some studies show that Programs with structured teaching among medical student in auscultation existed in only 27% of medicine and 37% of cardiology programs.[15] Samuel et al in a recent study witnessed the steady downgrading of bedside cardiology as it is constantly being replaced by modern technology. Many, if not most, cardiological diagnoses could be made by use of patient history and the physical examination. [16]

The ideal thing is to support clinical diagnosis of cardiac disease with 2 D Echocardiography. For instance it has been noted that the diagnostic value of cervical bruits as a marker distinguishing high-grade from moderately symptomatic carotid stenosis was evaluated in 1268 patients enrolled in NASCET, a randomized multicenter trial conducted in 57 centers across Canada and the United States from 1988 through 1991. [17] Patient history and physical examination, including auscultation of the orbits, supraclavicular area, and neck, were compared with computed tomography and bilateral angiography. An ipsilateral carotid bruit had a sensitivity of 60% and a specificity of 61% for high-grade stenosis, but when combined with other findings characteristics, such as carotid ultrasound scan suggesting >90% stenosis, a transient ischemic attack, and a retinal event, the high-grade stenosis ranged to 94%. [18] Hence, under some conditions, the physical findings require complementation.

Goldman and colleagues sympathetically noted that though newer noninvasive confirmatory techniques, such as nuclear medicine, ultrasonography, computed tomography, and magnetic resonance imaging should have further extended and honed clinician's clinical capabilities. Yet these impressive opportunities ultimately weakened transmission and acquisition of physical diagnostic skills. In 300 randomized subjects autopsied in 1960, 1970, and 1980, Harvard investigators reported that 20 years of sonography, scintigraphy, and computed tomography had not reduced the frequency of misdiagnosis. [19] What a paradox!

As noted in our study, almost a third of our patient had no 2 D Echo due to financial reasons. In this group, especially those presenting with failure, were managed based on clinical diagnosis alone and they did well.

CONCLUSIONS

Despite the fact that clinical diagnosis may not always tally with 2 D Echocardiography in the diagnosis of congenital heart disease ,it should not be downplayed. However The ideal thing is to support clinical diagnosis of cardiac disease with 2 D Echocardiography.

COMPETING INTEREST

The authors hereby declare no competing interests.

ACKNOWLEDGEMENTS

We acknowledge the Almighty God whose assistance and ideas through the course of this work were priceless. We are also grateful to all the doctors and nurses that work at the children outpatient clinic for their co-operation. Also appreciated are the hospital record keepers.

References

1.Greenlund KJ, Giles WH, Keenan NL, et al. Heart disease and stroke mortality in the 20th century. In: Ward J, Warren C, eds. Silent victories: the history and practice of public health in twentieth century America. Oxford, England: Oxford University Press; 2006.
2. Keith JD, Rowe RD, Vlad P. Heart Disease in Infancy and Childhood. 3rd ed. New York, NY: Macmillan Publishing Co; 1978:9.
3. Rosamond W, Flegal K, Friday G, et al. Heart disease and stroke statistics---2007 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation 2006; 113:69—171
4. Young ID, Clarke M. Lethal malformations and perinatal mortality: a ten year review with comparison of ethnic differences. Br Med J. 1987; 295:89-91.
5. Lian ZH, Zack MM, Erickson JD. Paternal age and the occurrence of birth defects. Am J Hum Genet. 1986; 39:648-660
6. Congenital heart disease:a clinical and physiologic correlation. Obtainable at annals.org/article.aspx?articleid=675100.assessed on 14/12/2012
7. Cheitlin MD, Armstrong WF, Aurigemma GP, Beller GA, Bierman FZ, Davis JL, Douglas PS, Faxon DP, Gillam LD, Kimball TR, Kussmaul WG, Pearlman AS, Philbrick JT, Rakowski H, Thys DM: ACC/AHA/ASE 2003 guideline update for the clinical application of echocardiography: summary article: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (ACC/AHA/ASE Committee to Update the 1997 Guidelines for the Clinical Application of Echocardiography). J Am Coll Cardiol 2003; 42:954-970
8.Chaves PH, Kuller LH, O'Leary DH, Manolio TA, Newman AB: Cardiovascular Health Study Subclinical cardiovascular disease in older adults: insights from the Cardiovascular Health Study. Am J Geriatr Cardiol 2004,;13:137-51
9. Remme W., McMurray J., Rauch B., Zannad F., Keukelaar K., Cohen-Solal A., et al. Public awareness of heart failure in Europe: first results from SHAPE. Eur Heart J 2005;26:2413-21
10.Nicod P, Gilpin E, Dittrich H, Chappuis F, Ahnve S, Engler R, Henning H, Ross J Jr: Influence on prognosis and morbidity of left ventricular ejection fraction with and

without signs of left ventricular failure after acute myocardial infarction. Am J Cardiol 1988; 61:1165-71.
11. Otto CM, Lind BK, Kitzman DW, Gersh BJ, Siscovick DS: Association of aortic-valve sclerosis with cardiovascular mortality and morbidity in the elderly.N Engl J Med 1999; 341:142-7.
12. Levy D, Garrison RJ, Savage DD, Kannel WB, Castelli WP: Left ventricular mass and incidence of coronary heart disease in an elderly cohort. The Framingham Heart Study. Ann Intern Med 1989;110:101-7.
13. Mclean MK,Kung GC,Poliomenakos A,Wells WJ,Reemstsen BL. Cor triatrium associated with ASD and common atrium in a 7 month old with tachypnoea and failure to thrive. Ann Thoracic Surg. 2008; 86:1999.

14.Isabel Haney, Moshe Ipp, William Feldman, Brian W McCrindle. Accuracy of clinical assessment of heart murmurs by office based (general practice) paediatricians. Arch Dis Child 1999 ;81:409–412

15. Mangione S, Peitzman SJ, Gracely E, Nieman LZ. Creation and assessment of a structured review course in physical diagnosis of medical residents. J Gen Intern Med. 1994;9: 213-18.
16.Samuel Z, David H S; Bedside Science Reduces Laboratory Art Appropriate Use of Physical Findings to Reduce Reliance on Sophisticated and Expensive Methods .Circulation. 1995; 91: 2089-92
17.Sauve SJ, Thorpe M, Math KE, Sackett DL, Taylor W, Barnett HJM, Haynes RB, Fox AJ. Can bruits distinguish high-grade from moderate symptomatic carotid stenosis? Ann Intern Med. 1994;120:633-37
18. Zoneraich S, Zoneraich O. Auscultation and graphic recording over arteries: phonoarteriography. In Zoneraich S, ed. Noninvasive Methods in Cardiology. Springfield, Ill: C.C. Thomas Publishers; 1974:128-51
19. Goldman L, Saison R, Robbins S, Cohn LM, Bettmam M, Weisberg M. The value of the autopsy in 3 medical eras. N Engl J Med. 1983;308:1000-5.

Author Information

Josephat M Chinawa, Dr, Lecturer/Consultant Paediatrician
Department of Paediatrics, University of Nigeria/Teaching Hospital
Enugu, Nigeria
josephat.chinawa@unn.edu.ng

Egbuna Obidike, Dr, Professor/Consultant Paediatrician
Department of Paediatrics, University of Nigeria/Teaching Hospital
Enugu, Nigeria
egbunaobidike@yahoo.com

John C Eze, Dr, Senior Lecturer/Consultant Cardiothoracic surgeon
University of Nigeria/Teaching Hospital
Enugu, Nigeria
john.eze@unn.edu.ng

Fortune A Ujunwa, Dr, Consultant Paediatrician
Department of Paediatrics, University of Nigeria/Teaching Hospital
Enugu, Nigeria
Fortane@yahoo.com

D Adiele, Dr, Consultant Paediatrician
Department of Paediatrics, University of Nigeria/Teaching Hospital
Enugu, Nigeria