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Original Research Article

Most common cause of cardiomegaly without significant murmur in pediatric age group at tertiary care hospital, Hyderabad, India: a prospective observational study

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ABSTRACT

Background: Following the invention of monaural stethoscope by Laennec and X ray by Roentgen in 18th century there was spectacular advancements in cardiology. The myocardium can be affected by various disease process unrelated to abnormal pressure or volume loads. These processes may be inflammatory, metabolic, infiltrative, ischemic or primary with significant overlap. These diseases usually present as cardiomegaly. In pediatric age group cardiac diseases will present early, sometimes without any signs and symptoms like sudden death due to less cardiac reserve. Few cases of sudden death also showed huge cardiomegaly in postmortem X rays. authors want to carry out this study to find out most common cause of cardiomegaly with silent chest as authors usually miss the diagnosis and these cases may present as sudden death without giving much time to intervene. The aim of the study is to know the most common cause of cardiomegaly without significant murmur in pediatric age group above one year.
Methods: Prospective observational study done at a tertiary care hospital Hyderabad over a period of one year from January 2018 to January2019.
Results: Most common cause of cardiomegaly without significant murmur was cardiac beriberi. It is mostly prevalent in rural areas of Telangana, mostly occurring in breastfed babies and below six years. All cases were recovered after proper treatment. Fortunately, it is associated with nil mortality, if timely treatment was initiated.
Conclusions: Cardiac beriberi which is easily preventable and if treated in proper time it will associated with nil mortality. As it was occurring commonly breastfed babies supplementation of Thiamine to mothers was very useful as a preventive strategy.

Keywords: Beriberi, Cardiomegaly, Myocardium, Pediatrics, Thiamine

INTRODUCTION

Myocardial disease with cardiomegaly may present acutely with signs of congestive heart failure, tachypnea, rales, tachycardia or enlarged quite heart. These diseases mostly cause sudden death.[1] As there is no significant murmur likely to miss serious diseases. Therefore, it is necessary to study the causes of cardiomegaly without significant murmur, in order to find out possible causes and to prevent sudden death. Cardiomegaly is radiological finding rather than clinical finding often missed by only percussion findings particularly in

children. Measurement of CT (cardio thoracic) ratio is the simplest way to estimate the heart size in children.[2-4]

Vibrations with frequencies of 50-100db per second registered between heart sounds are called murmurs.[5] Murmurs graded into 6 types according to intensity-barely audible, soft but easily audible, moderately loud but not accompanied by a thrill, louder and associated with thrill, audible with stethoscope barely on chest and audible with stethoscope off the chest. Murmurs arise from cardiovascular structures in the absence of anatomical abnormalities are called innocent murmurs.[6] All innocent murmurs accentuated or brought out in a high output states and they have special characters. Here authors studied only cases of cardiomegaly with quite heart. authors excluded all significant murmurs associated with congenital, acquired heart diseases, innocent murmurs and hemic murmurs.

METHODS

This is a prospective observational study done at Niloufer Hospital, Hyderabad during period from 2018 January to 2019 January.

Inclusion criteria

- Authors included all admission cases both intramural and extramural babies above 1 year of age and below 18 years of age.

Exclusion criteria

- Authors excluded cases under one year of age and known congenital heart diseases and with significant murmur causing heart defects.
- Hemic murmur (Anemia) and innocent murmur cases were excluded.

Selection criteria based on the cardiothoracic ratio of posterior-anterior erect view during inspiration. X-ray taken and CT ratio calculated by unknown persons not involved in study to decrease the bias. In Beriberi cases blood sampling done along with routine samples before the thiamine administration.

Objectives of study were to know the clinical profile of cardiomegaly and to know the most common cause of cardiomegaly without a significant murmur.

Statistical analysis

Sample size calculated as 60 at alpha error 0.05 and power of 80 by Open Epi software. Authors used simple statistical methods to analyze the data for that authors used SPSS version 25 and Microsoft X l to create graphs and tables. Authors attached present study proforma over case sheets and collected at the time of discharge or death.

RESULTS

During period of study, cases of cardiomegaly without significant murmur diagnosed in 60 cases. Incidence of cases of cardiomegaly without significant murmur was 0.3 per 1000 per year.

Table 1: Different causes of cardiomegaly without significant murmur.

Etiology	Number of cases (n=60)	Percentage
Beriberi	15	25
Dilated cardiomyopathy	6	10
Myocarditis	9	15
Scorpion string	5	8.3
Bronchiolitis	7	11.6
Connective tissue diseases (SLE)	2	3.33
Protein energy malnutrition	3	5
Renal parenchymal disease	4	6.6
Status epileptics	2	3.3
Others	7	11.6

Most common causes were Beriberi (25%), Myocarditis (15%) and followed by Bronchiolitis (11.6%) among others (11.6%) include storage diseases (3.3%), pericardial effusion (1.6%), SVT (1.6%), Diphtheria (1.6%), Idiopathic (3.3%) (Table 1).

Table 2: Demographic profile of cardiomegaly.

	Number of patients (n=60)	Percentage
Sex		
Male	36	60
Female	24	40
Age		
1-2 years	15	25
2-4 years	8	13.3
4-6 years	7	11.6
6-8 years	8	13.3
8-10 years	8	13.3
10-12 years	6	10
12-14 years	6	10
14-16 years	1	1.66
16-18 years	1	1.66
Area		
Urban	12	20
Rural	48	80

Cardiomegaly cases more in male gender than female and majority of cases presented in 1-2 years of age (25%), most cases were come from rural areas (Table 2). All of these Cases presented with clinical features of CCF (congestive cardiac failure).

Overall most common presenting symptoms of cases of cardiomegaly without significant murmur is breathlessness present in 95% of cases, next common symptom fatigue present in 66.66%, irritability, palpitations present in 48.35%, 43.3% respectively. Orthopnea present in 33.3% cases.

Most common presenting symptom of beriberi is breathlessness seen in all cases, fatigue and vomiting in 66.6% cases. Beriberi associated with cheilitis in 60% cases. Convulsions present in 10% cases. The most common symptom of cardiomyopathy is breathlessness and fatigue found in all cases, palpitation seen in 71.4% and chest pain in 35% cases of cardiomyopathy.

Commonest symptom of myocarditis is breathlessness seen in all cases; second common is chest pain found in 66.6% cases. Fever associated with myocarditis found in 55.55% cases; Bronchiolitis commonly presented by cough and breathlessness. Other less common signs and symptoms of cardiomegaly cases are sweating, cyanosis, edema, orthopnea, PND (Paroxysmal nocturnal dyspnea).

Table 3: Distribution of cardiomegaly cases as per CT ratio.

CT (cardio thoracic) ratio	Number of cases (n=60)	Percentage
0.5-0.6	2	3.33
0.6-0.7	34	56.66
0.7-0.8	20	33.33
0.8 and above	4	6.66

Beriberi mostly present with a mild cardiomegaly (CT ratio 0.5-0.6), Dilated cardiomyopathy present with a Moderate to severe cardiomegaly. Acute conditions like myocarditis, bronchiolitis present with a Mild cardiomegaly (Table 3).

Treatment: Most of the cases (60%) received conservative treatment. Some of cases (20%) required ventilation; most of these were of cardiomyopathies and Scorpion sting. Many cases of cardiac beriberi did not require ventilation.

Table 4: Mortality in different cases of cardiomegaly.

Etiology	Number of cases	Deaths	Percentage
Beriberi	15	1	1.66
Dilated cardiomyopathy	6	3	50
Myocarditis	9	2	22.22
Scorpion sting	4	0	0
SLE	2	1	50
Others	7	3	42.8

No mortality found due to Scorpion sting and least in Beriberi, though Scorpion sting cases were lesser than Beriberi. Mortality is higher in cases with dilated cardiomyopathy and SLE (Table 4).

DISCUSSION

Many diseases may cause cardiomegaly. Myocardial inflammatory diseases caused by Adeno, Coxsakie, parvoviruses, mycoplasma, diphtheria, rickettsia, toxoplasma, Kawasaki, SLE (Systemic lupus erythematosus), metabolic causes like electrolyte disturbances, hypoglycemia, thiamine deficiency, selenium deficiency, carnitine deficiency, hypothyroidism, uremic cardiomyopathy, storage diseases like pompes, fabry, mucopolysaccharidosis, cystinosis, amyloidosis, sarcoidosis primary myocardial diseases like cardimyopathies, Friedreich ataxia, endocardial fibroelastosis, coronary artery diseases resulting in myocardial insufficiency like ALCAPA (anomalous left coronary artery from the pulmonary artery). Congenital heart diseases with severe heart failure like critical aortic stenosis, coarctation of aorta, systemic arteriovenous fistulas, ebstein anomaly miscellaneous conditions like CHF secondary to respiratory conditions bronchiolitis, SVT, pericardial effusion, malnutrition.

CT ratio is obtained by measuring ratio of the largest diameter of the heart above diaphragm to widest diameter of chest in X ray PA view in expiratory film. To determine the presence or absence of cardiomegaly lateral view of heart also required, as isolated right ventricle and left atrial enlargement may not be obvious on PA film but obvious on a lateral film. CT ratio consists of transverse diameter of the heart to maximal internal width of the chest. The transverse of heart is the sum of maximum mid left and mid right diameters. These are determined by drawing a horizontal line from the midline to the farthest left and farthest right borders of heart. In infants CT ratio more than 0.6 and in children's more than 0.5 is considered as cardiomegaly.[7] Stills murmur, pulmonary ejection murmur, pulmonary flow murmur, venous hum and carotid bruit are innocent murmurs, except pulmonary flow murmurs others will persistent in pediatric age group, as pulmonary flow murmur will disappear by six months of age. A cardiac or valvular murmur heard in anemic persons who has no valvular lesion is called hemic murmur. it is caused by reduction in viscosity of blood usually occur in conditions like blood loss and anemia. The murmur is soft and waxes and wanes with respiration. It is loudest at the peak of inspiration. Typically, it is grade 1 or 2 murmur high pitched ejection systolic murmur best heard in aortic and pulmonary area. There were fewer studies, done previously about the common causes of cardiomegaly without significant murmur. Venugopalan et al, Jarallah et al, noticed that cardiomyopathy was the most common cause of cardiomegaly without murmur but in present study, wet beriberi was the most common cause and cardiomyopathy was the second most common cause. It was explained by following fact as most of the cases of

present institute come from the nearby endemic areas for beriberi such as Nalgonda, Mahaboobnagar and Medak. The incidence and mortality of Venugopalan study comparable to present study.[8,9] Results of Hong YM, Lip Shultz SE studies on cardiomyopathy were almost similar to present study.[10,11] Batra AS, Drucker NA studies on pediatric myocarditis results were similar to present study.[12,13]

Cardiac beriberi is one of the severe forms of thiamine deficiency causes fatty degeneration of cardiac muscle. The child with Wet beriberi is undernourished pale edematous. Dyspnea, tachycardia, hepatomegaly loss of consciousness and convulsions may develop rapidly. Dramatic improvement occurs immediately after treatment, but complete recovery requires several weeks of treatment. Low blood levels of Transketolase is the best indicator of thiamine deficiency.

Treatment of child is IV thiamine hydrochloride followed by oral therapy. A rapid improvement is usually recognized after parenteral thiamine administration in the wet form of thiamine deficiency.[14] Infantile beriberi treated by giving thiamine to mother, which is then passed on to the infant through breast milk. Thiamine deficiency can develop within 2–3 months from a deficient intake and can cause illness and death.[15] In present study also some of the cases about 25% presented below 1 year of age, recognized the importance of maternal nutrition in prevention of infantile Beriberi. Mortality and response to thiamine therapy in present study comparable to Naidoo DP, Davis RA studies.[16,17] Less conventional whole blood thiamine diphosphate (TDP) concentrations have been used in the field to assess thiamine deficiency.[18] Infantile thiamine deficiency outbreaks have recently been described in Israel in the French island of Mayotte in the past in many African countries.[19]

Limitations: Definitive diagnosis of Myocardial diseases particularly myocarditis and cardiomyopathies like viral markers and gene studies not done due to financial constraints.

CONCLUSION

In present study most common cause of cardiomegaly without significant murmur was cardiac beriberi. It usually presents below 1 years of age. It is associated with good prognosis, if timely treated. It is preventable by maternal nutrition and thiamine supplementation.

Recommendations

Education of people particularly in rural areas about the importance of parboiling and good cooking practices. Supplementation of thiamine with other complex vitamins as they are interdependent unlike fat-soluble vitamins to all pregnant women to prevent infantile beriberi. To promote the growth of thiamine rich staple Cassava, which is economical.

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REFERENCES

1. Alvarez JA, Orav EJ, Wilkinson JD, Fleming LE, Lee DJ, Sleeper LA, et al. Competing risks for death and cardiac transplantation in children with dilated cardiomyopathy: results from the pediatric cardiomyopathy registry. Circulation. 2011;124(7):814-23.
2. Raphael MJ. Cardiac enlargement. In: Grainger RG, Allison JD, eds. Diagnostic Radiology. 4th ed. Great Britain: Churchill Livingstone; 1987:551-564.
3. Keats Theodore E. Heart size measurements: The cardiovascular system. In: Keats TE, Lusted LB, eds. Atlas of Roentenographic measurement. 5th ed. Chicago: Year Book Medical Publishers Inc; 1985:268-269.
4. Oladipo GS, Okoh PD, Kelly EI, Arimie COD, Leko BJ. Normal heart sizes of Nigerians within Rivers State using cardiothoracic ratio. Scientia Africana. 2012;11(2):9-21.
5. Braunwald E. Heart disease: A textbook of cardiovascular medicine. 6th ed. Philadelphia: Saunders; 2001:63.
6. Abdurrahman L, Bockoven JR, Pickoff AS, Ralston MA, Ross JE. Pediatric cardiology update: Office-based practice of pediatric cardiology for the primary care provider. Curr Probl Pediatr Adolesc Health Care. 2003;33(10):318-47.
7. Raphael MJ, Donaldson RM. The normal heart: methods of examination. In: Sutton D, Allan PL, eds. A Textbook of Radiology and Imaging. 4th ed. Great Britain: Churchill Livingstone; 1987:538-556.
8. AL Jarallah AS, AL Abdulgader AA, Saadi MM, Nasser AA, Zahraa JN. Outcome of dilated cardiomyopathy (DCM) in Saudi children: a survey over a decade. J Saudi Heart Assoc. 2008;20:1-5.
9. Venugopalan P, Agarwal AK, Akinbami FO, El Nour IB, Subramanyan R. Improved prognosis of heart failure due to idiopathic dilated cardiomyopathy in children. Int J Cardiol. 1998;65:125-8.
10. Hong YM. Cardiomyopathies in children. Korean J Pediatr. 2013;56(2):52-9.
11. Lipshultz SE, Sleeper LA, Towbin JA, Lowe AM, Orav EJ, Cox GF, et al. The incidence of pediatric cardiomyopathy in two regions of the United States. N Engl J Med. 2003;348(17):1647-55.
12. Batra AS, Lewis AB. Acute myocarditis. Curr Opin Pediatr. 2001;13:234-9.
13. Drucker NA, Newburger JW. Viral myocarditis: diagnosis and management. Adv Pediatr. 1997;44:141-71.

14. Soukaloun D, Kounnavong S, Pengdy B, Boupha B, Durondej S, Olness K, et al. Dietary and socio-economic factors associated with beriberi in breastfed Lao infants. Ann Trop Paediatr. 2003;23:181-6.
15. WHO. Thiamine deficiency and its prevention and control in major emergencies. 1999.
16. Naidoo DP. Beriberi heart disease in Durban: a retrospective analysis. S Afr Med J. 1987;72:283-5.
17. Davis RA, Wolf A. Infantile beriberi associated with Wernicke's encephalopathy. Pediatrics. 1958;21:409-20.
18. Keating EM, Nget P, Kea S, Kuong S, Daly L, Phearom S, et al. Thiamine deficiency in tachypnoeic Cambodian infants. Paediatr Int Child Health. 2015;35(4):312-8.
19. Mimouni-Bloch A, Goldberg-Stern H, Strausberg R, Brezner A, Heyman E, Inbar D, et al. Thiamine deficiency in infancy: long-term follow-up. Pediatr Neurol. 2014;51:311-6.

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