

ETIOLOGY OF CONGESTIVE CARDIAC FAILURE IN CHILDREN FROM BIRTH TO 15 YEARS

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SUMMARY

Objective: - To study the various causes of congestive cardiac failure in children.

Study Design: - Prospective descriptive study.

Period of Study: - 1st November 2004 to 31st March 2005.

Setting: - Pediatric and cardiology Dept of LUH Hyderabad.

Patient and Method: -

During study period of 5 months all children between the age of 0-15 year presenting with symptom and sign suggestive of congestive cardiac failure were evaluated with relevant investigation for the underlying etiology. Those patients who expired during study before diagnosis was established were excluded.

Results: -

Out of total 55 patients 30(54.54%) were male and 25(45.45%) female and the commonest etiology of CCF was congenital heart disease. Seventeen patients (30.9%) were below one year of age and the commonest etiology was congenital heart disease of which eleven patients (64%) had VSD, seven (63%) of them had lower Respiratory tract infection. Other etiologies included myocarditis with pericardial effusion and gross Anemia. Eleven patients (64%) were between 1-5 years and the commonest cause of congestive heart failure was acute myocarditis other causes were congenital heart disease and Gross Anemia. Twenty seven (49%) patients were between 5-15 years and the commonest cause was Rheumatic carditis found in 12 patients (44%) other causes included congenital heart disease, myocarditis, dilated cardiomyopathy and Anemia, valvular vegetations was seen on preexisting Rheumatic value disease in 2 patients. Ten patients had non-cardiac causes of congestive cardiac failure commonest one was Anemia seen in 8 patients.

Conclusion: -

The cardiac failure could occur at any age and the predominant etiology during infancy was VSD while myocarditis is common in age group 1-5year. Rheumatic carditis was the commonest cause of congestive heart failure beyond 5 yr. Among non-cardiac cause Anemia is on the top

Key word. Congestive heart failure. Etiology. Children.

INTRODUCTION

Congestive cardiac failure means that the heart is not able to meet the body requirement for adequate blood flow. It may be transient due to precipitating cause, which mean after you fix what is causing it, it resolves or it may be terminal and progressive and treatment is just temporary and the condition is not

corrective. It may be due to primary cardiac disease either congenital or acquired. Non-cardiac causes of CHF include processes that increase the preload e.g. volume overload, increase in the after load. e.g. hypertension, decrease O₂ carrying capacity of blood e.g. Anemia, increase demand e.g. Sepsis. Most likely causes are age dependent; congenital heart defects are the commonest cause of cardiac failure in infancy and childhood 1. Acquired heart disease like Acute Rheumatic fever, Rheumatic heart disease and myocarditis are common cause of CCF after one year of age 2,3. Non cardiac causes of congestive heart failure may be due to disease of other organ or system of the body e.g. Anemia. Congestive heart failure is

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diagnosed clinically with a few differences in sign and symptoms with respect to the age and the underlying cause. Knowledge of causes of congestive heart failure at various age group will be helpful not only for proper management but also to define the best strategies for prevention of acquired infectious cardiac diseases and non cardiac conditions leading to CCF e.g. Anemia, which are frequent and effect mainly children in developing countries.

METHODOLOGY

This is a prospective observational study conducted on 55 patient of congestive cardiac failure from birth to 15 years of age. Patients were admitted in pediatric and cardiology department of LUH Hyderabad from 1st November 2004 to 31st march 2005. Diagnosis of CCF was based on detailed history, clinical manifestation, CVS and related systemic examination.

History & clinical finding used to suspect cardiac heart failure are, feeding difficulties (neonate infants), sweating, irritability, tachycardia, tachypnoea, cardiomegaly, gallop rhythm, hepatomegaly, edema, basal crepitation, raised JVP, cardiac murmur, poor peripheral perfusion and cyanosis.

These patients were further investigated for the underlying cause of CCF according to clinical status and suspected etiology. Following investigation was done CBC, CXR, ECG, echocardiography, ASO titer, cardiac enzyme, Hb electrophoresis, and Blood culture.

RESULT

From November 2004 to march 2005, 55 patients age 0-15 years with clinical diagnosis of congestive heart failure presented to pediatric and cardiology department of LUH Hyderabad. Among them 30(54.54%) were male and 25(45.45%) female. The minimum age was 17 days and maximum 15 years. Seventeen (30.90%) patients were below 1 year; eleven (20%) were between one to five years and twenty-seven (49%) between five to fifteen years. Out of the total the most common etiology leading to congestive heart failure was congenital heart disease 24 (43.6%) commonly VSD, seen in 14(25.45%)

patient. Eight patients with VSD had LRTI (57.14%). Other congenital cardiac defect were ASD seen in 3 patients, PDA, TOF with pulmonary hypertensions, TGA with ASD and VSD, bicuspid aortic valve, mitral valve prolapse, VSD with pulmonary stenosis and endocardial cushion defect each in 1 patient respectively. (Table 1) Acquired causes in order of frequency were Rheumatic carditis 12 (21.8%) myocarditis 9(16.36%), out of them 4(44.4%) had DCMP, severe anemia due to nutritional deficiencies and thalassemia 8(14.54%) and severe Pneumonia 2 (3.63%) (Table 2).

Seventeen patients (30.9%) were below one year of age out of which 10(58.82%) were males and 7(41.17%) were female. The commonest etiology leading to CCF in infancy was congenital heart disease, where out of 15(88.23%), 8(53.33%) were male and 7(46.6%) female. Among the CHD, VSD was seen in 11(73.33%) patients, 6 male and 5 female. Other CHD include ASD with Pulmonary hypertension in 1 male, PDA (congenital rubella) in 1 Female (6.66%), TGA with ASD & VSD in 1 female (6.66%) VSD with moderate pulmonary stenosis in one male patient (6.66%). Other causes were acute myocarditis with pericardial effusion seen in 1 male and gross anemia due to thalassemia seen in one male patient (5.88%). (Table 3)

Eleven out of 55 (20%) cases were between 1-5 year of age, 7 (63.63%) were males and 4 (36.36%) females. The commonest etiology in this age group was acute myocarditis, where male were 5 (45.45%) patients, 3(60%) female one with DCMP and 2 (40%) in male patients. Three patient (27.27%) 2 male and 1 female had CHD, which include VSD with pneumonia, TOF with pulmonary hypertension and endocardial cushion defect with dextrocardia. Other etiologies in this age group were gross Anemia in 2 male (18.18%) one of them had thalassemia and other had nutritional deficiency anemia, severe pneumonia with moderate anemia was seen in 1 (9%) male patient. (Table 4)

Twenty-seven (49%) out of 55 cases were between 5 year to 15 year of age; out of these 13(48.14%) were male and 14 (51.85%) females. The commonest etiology in this age group was rheumatic carditis that was diagnosed in 12(44.44%) patients, 3 (25%) male and 9(75%) females. Out of these 12 six patients

(50%)1 male and 5 female presented with acute rheumatic fever with mitral regurgitation while 4 female & 2 male with rheumatic recurrence both male had evidence of vegetation of 2-5 mm size on mitral valve with TR, MR, MS and pulmonary Hypertension on echo- cardiography, 2 female with rheumatic recurrence had tricuspid regurgitation with pulmonary hypertension while 1 female had mitral and aortic regurgitation and 1 had mitral stenosis with Pulmonary hypertension on echo-cardiography. Congenital heart disease was seen in 6 patient 5(83.3%) male and 1 (16.6%) female. These were VSD seen in 2 male (33.33%) ASD with pneumonia in 1 (16.66%) male and 1 female (16.66%), bicuspid aortic valve in 1 male and mitral value prolapse in one male with features of marfan syndrome. Myocarditis with dilated cardiomyopathy was seen in 3(11.11%) 2 (66.66%) were male and 1 (33.33%) female patient. Anemia was the major non-cardiac etiology in this age group seen in 5 patients (18.5%) 2 male(40%) one of them had thalassemia and 3 (60%) were female having nutritional anemia. Lower respiratory tract infection was seen in 1 male (3.70%). (Table 5)

Table 1
Distribution of Congenital Heart Disease

Disease	No of Cases	Male	Female
VSD	14	9	5
ASD	3	2	1
TGA with ASD, VSD	1	-	1
TOF with Pulmonary Hypertension	1	1	-
PDA	1	-	1
Bicuspid aortic value	1	1	-
Mitral valve prolapse	1	1	-
VSD with Pulmonary Stenosis	1	1	-
Endocardial cushion defect	1	-	1
Total	24	15	9

Table 2
Etiology of Congestive Heart Failure

Etiology	No of Cases	Male	Female
Congenital Heart Disease	24	15	9
Rheumatic Carditis	12	3	9
Myocarditis	9	5	4
Severe Anemia	8	5	3
Severe Pneumonia	2	2	0
Total	55	30	25

Table 3
Age wise Etiology of Congestive Heart Failure
Age<1 yr

Etiology	No of Cases	Male	Female
CHD	15	8	7
Pneumonia with VSD	7	5	2
Myocarditis with pericardial effusion	1	1	
Anemia	1	1	

Table 4
Age 1-5 yr

Etiology	No of Cases	Male	Female
Myocarditis	4	2	2
CHD	3	2	1
DCMP	1	-	1
Severe Anemia	2	2	-
Severe Pneumonia	1	1	-
Pneumonia with VSD	1	1	-

Table 5
Age>5 to 15 yr

Etiology	No of Cases	Male	Female
Rheumatic Carditis	12	3	9
CHD	6	5	1
Myocarditis with DCMP	3	2	1
Severe Anemia	5	2	3
SBE	2	2	-
LRTI	1	1	-

DISCUSSION

CCF is the inability of the heart to pump an adequate amount of blood needed by the body. It can present at any age. The clinical feature results from a combination of low cardiac output and compensatory response to increase it. In neonate and infant feeding difficulties, excessive sweating restlessness, tachycardia, tachypnoea and failure to thrive are the usual clinical feature. While in toddler and older children fatigue, exercise intolerance tachycardia, tachypnoea, poor appetite, wheezing, gallop rhythm, hepatomegaly, edema and growth failure are the features.

The etiology of CCF is different in developing countries than in western world where congenital

heart defects are the most common cause of cardiac failure in children⁴. In developing countries besides congenital heart defect myocardial diseases like myocarditis or dilated cardiomyopathy and rheumatic carditis are important causes of CCF in children and forms significant proportion of patients with acquired heart disease shown in various studies 2,3,5,6. In Africa Rheumatic heart disease is the most important cause of hospitalization for children as compared to congenital heart disease the ratio is 3:1. 7,8.

The etiology of CCF also varies with reference to age, during first year the commonest etiology is congenital heart disease and the commonest lesion is VSD 9,10. In our study out of 17 children under 1yr, 15 had failure due to congenital heart defect mostly VSD seen in 11 patients, other congenital cardiac lesion were ASD, PDA, TGA with ventricular and atrial septal defect and VSD with PS. Acquired myocardial disease like myocarditis was seen in one patient only with pericardial effusion. Severe Anemia due to thalassemia was present in one patient with heart failure and LRTI was seen in seven patients with VSD.

Among the 11 cases of CCF between 1-5 year acute myocarditis was the commonest cause seen in 5 patient and diagnosed by acute onset of symptoms of cardiac decompensation, muffled heart sound supported by enlarged cardiac shadow on CXR elevated cardiac enzymes in blood and global hypokinesia and reduced ejection fraction on echo cardiography. All seemed to be viral in etiology as we had no facility for antibody titer, viral culture or cardiac biopsy. Congenital heart disease rank second in this age group and the lesion were endocardial cushion defect with dextrocardia in a patient with features of down syndrome, Tetralogy of fallots with pulmonary hypertension and VSD complicated by pneumonia in a malnourished child with Anemia. This finding suggest that congestive heart failure after infancy is unusual in patients with congenital heart disease unless a complicating factor like Anemia, Pneumonia or a complex cardiac lesion is present 11. We had 2 cases of severe Anemia with Hb<3 gm % with CCF both are due to nutritional deficiencies while one patient had severe pneumonia with Hb <8 gm and presented with CCF.

In developing countries the prevalence of Rheumatic carditis is high despite its easy and effective prevention 12-15. In our study Rheumatic carditis was the commonest etiology of CCF in children after the age of 5 year seen in 12 out of 27 cases all with significant valvular involvement especially mitral and tricuspid valve. Out of 12 patient 6 had acute Rheumatic fever diagnosed by Jones Criteria, while 6 patients presented with Rheumatic recurrence with female predominance and 100% involvement of mitral valve followed by tricuspid and aortic value in 4 and 1 patient respectively. Mitral regurgitation was the commonest lesion in our study. Similar results were presented in other study 16. Five patients with Rheumatic recurrence had pulmonary hypertension and two of them had vegetation of 2-5 mm on mitral value seen on echocardiography with MR and TR. In both of these patients blood culture was negative because of prior antibiotic treatment in our set up. Infective endocarditis remains an important cause of mortality and morbidity in all age group due to the fact that Rheumatic heart disease is still prevalent in developing countries and antibiotic prophylaxis for surgical procedures is not a routine practice¹⁷.

CONCLUSION

That etiology in Pediatric heart failure may be cardiac or non cardiac and can occur at any age. The predominant etiology during infancy is congenital heart disease. VSD is the commonest defect presenting with heart failure. Myocardial disease especially myocarditis is commonest cause of heart failure in children under 5 year. Rheumatic fever and rheumatic heart disease continue to be an important cause of suffering and cardiac failure among children after the age of 5 yr. Among non-cardiac diseases severe anemia can be a contributor to cardiac decompensation at any age.

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