

Study of echo cardiography in patients of congestive heart failure

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Abstract

Background: Heart failure is commonly misdiagnosed despite symptomatology mainly because of the non specificity of the clinical symptoms and the non sensitivity of the clinical signs. **Aims and Objectives:** To study the Echo cardiography in patients of Congestive heart failure. **Materials and Method:** In the present study total 60 patients of congestive cardiac failure were selected. All the patients fulfilled the Framingham's Criteria for Congestive Heart Failure (CHF) were selected. A structured proforma was designed to capture information on clinical profile of the patients and validated in the pilot study. The proforma consisted information on demographic, anthropometric and clinical data. Details of major cardiovascular risk factors such as smoking, alcohol intake, diabetes mellitus (DM), hypertension (HTN), ischemic heart disease (IHD), and hyperlipidemia were recorded. The physical examination included measurement of height, weight, waist-hip ratio (WHR) and blood pressure (BP). Echocardiography was performed in all the study patients. Echocardiography was read by cardiologist experienced in echocardiography. LVEF (Left ventricular ejection fraction) was estimated based on the visual assessment of LV contractile performance and wall motion in two dimensional views. Subjects were classified as having normal LV systolic function (EF \geq 50%), Mild systolic function (EF 40% to 50%) or Moderate systolic function (EF 30% to 40%) and Severe systolic function (EF $<$ 30%). **Results:** Total 60 patients were included in the study were diagnosed to have congestive cardiac failure based on Framingham's Criteria. 40 were males and 20 were females. Majority of the patients (33.33%) were having moderate Left ventricular ejection fraction followed by $>$ 50% Left ventricular ejection fraction (26.67%). Mild and severe Left ventricular ejection fraction was seen in 20% patients each. Moderate Left ventricular ejection fraction was more among male patients while Left ventricular ejection fraction was common in female patients. Out of 60 patients 39 were diagnosed of Diastolic dysfunction. It was seen that Diastolic dysfunction was diagnosed in 69.23% male and 30.77% female patients. It was seen that both Systolic and diastolic dysfunction was seen in 55% patients while systolic dysfunction in 24% patient and diastolic dysfunction in 23% patients. **Conclusion:** Thus we conclude that majority of the patients with heart failure in the present study were having moderate Left ventricular ejection fraction. Moderate Left ventricular ejection fraction was more among male patients while Left ventricular ejection fraction was common in female patients. Both Systolic and diastolic dysfunction was seen in 55% patients while systolic dysfunction in 24% patient and diastolic dysfunction in 23% patients.

Key Words: Echo cardiography, Congestive heart failure, ejection fraction

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INTRODUCTION

Heart failure is commonly misdiagnosed despite symptomatology mainly because of the non specificity of the clinical symptoms and the non sensitivity of the clinical signs. Not surprisingly, the validity of a clinical diagnosis of heart failure in primary care is poor. Rates of misdiagnosis when patients are assessed against objective criteria range from 25-50%. In another series only 26% of patients with suspected heart failure had a diagnosis of LVSD. Caruana and colleagues⁸ reported that of the 159 patient referred to hospital with suspected heart failure,

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109 had preserved LV function of which only seven did not have an alternative explanation for their significance of heart failure.^{3,6,7,8} Clinical symptoms, sign of heart failure are insensitive too for e.g. in 14507 patients in the CASS registry, a third heart sound or pulmonary rales had a respective sensitivity of 9% and 5% for the detection of significant LV dysfunction on contrast ventriculography. Although a completely normal ECG or even a narrow QRS complex ECG excludes left ventricular dysfunction, on abnormal ECG has low predictive value for left ventricular systolic dysfunction (LVSD). Recent studies suggest that diastolic dysfunction is a major cause of CHF.^{1,2,10} Echocardiography helps us in differentiating systolic versus diastolic heart failure: between various types of cardiomyopathic heart failure viz. dilated vs.hypertrophic vs.restrictive; between restrictive and conductive diseases of the heart; between ischemic and non ischemic causes of cardiomyopathic heart failure, between high output and low output heart failure and between right sided and left sided heart failure. These differences are extremely important to the clinician in deciding the type of therapeutic intervention to be undertaken and in prognostication.^{5,6}

MATERIALS AND METHOD

The present study was conducted in the department of medicine of the tertiary care institute to evaluate the Clinical profile in congestive heart failure patients. In the

present study total 60 patients of congestive cardiac failure were selected. All the patients fulfilled the Framingham's Criteria for Congestive Heart Failure (CHF) were selected. A structured proforma was designed to capture information on clinical profile of the patients and validated in the pilot study. The proforma consisted information on demographic, anthropometric and clinical data. Details of major cardiovascular risk factors such as smoking, alcohol intake, diabetes mellitus (DM), hypertension (HTN), ischemic heart disease (IHD), and hyperlipidemia were recorded. The physical examination included measurement of height, weight, waist-hip ratio (WHR) and blood pressure (BP). Height was measured in centimeters and weight in kilograms using a calibrated spring balance. The supine waist girth was measured at the level of the umbilicus (during quite breathing) and the standing hip girth was measured at the inter-trochanteric level. Echocardiography was performed in all the study patients. Echocardiography was read by cardiologist experienced in echocardiography. LVEF (Left ventricular ejection fraction) was estimated based on the visual assessment of LV contractile performance and wall motion in two dimensional views. Subjects were classified as having normal LV systolic function (EF \geq 50%), Mild systolic function (EF 40% to 50%) or Moderate systolic function (EF 30% to 40%) and Severe systolic function (EF<30%).

RESULTS

Table 1: Distribution according to Age and Gender of cases

Age group (yrs)	Male	Female	No of cases
0-10	0	0	0 (0.00%)
11-20	1	0	1 (1.67%)
21-30	0	2	2 (3.33%)
31-40	0	2	2 (3.33%)
41-50	3	2	5 (8.33%)
51-60	12	6	18 (30.00%)
61-70	14	6	20 (33.33%)
71-80	9	2	11 (18.33%)
>80	1	0	1 (1.67%)
Total	40	20	60 (100%)

Total 60 patients were included in the study were diagnosed to have congestive cardiac failure based on Framingham's Criteria. 40 were males and 20 were females. It was seen that number of patients increases as the age increases for both male and female sex. Maximum number of cases occurred in fifth and sixth decade.

Table 2: Distribution of left ventricular ejection fraction (LVEF)

Left ventricular ejection fraction (%)	No. of patients	Percentage population (%)
>50	16	26.67
Mild (40-50)	12	20.00
Moderate (30-40)	20	33.33
Severe (<30)	12	20.00

It was seen that majority of the patients (33.33%) were having moderate Left ventricular ejection fraction followed by >50% Left ventricular ejection fraction (26.67%). Mild and severe Left ventricular ejection fraction was seen in 20% patients each.

Table 3: Gender distribution in each category of systolic dysfunction

Left ventricular ejection fraction (%)	Male (%)	Female (%)
>50	35	65
Mild (40-50)	41.66	58.34
Moderate (30-40)	75	25
Severe (<30)	41.66	58.34

It was seen that moderate Left ventricular ejection fraction was more among male patients while Left ventricular ejection fraction was common in female patients.

Table 4: Distribution according to Diastolic dysfunction

Gender	Percentage population
Male	27 (69.23%)
Female	12 (30.77%)
Total	39 (100%)

It was observed that out of 60 patients 39 were diagnosed of Diastolic dysfunction. It was seen that Diastolic dysfunction was diagnosed in 69.23% male and 30.77% female patients.

Table 5: Distribution of systolic and diastolic dysfunction

2D Echo findings	Percentage distribution
Systolic + diastolic dysfunction	53%
Systolic dysfunction	24%
Diastolic dysfunction	23%

It was seen that both Systolic and diastolic dysfunction was seen in 53% patients while systolic dysfunction in 24% patient and diastolic dysfunction in 23% patients.

DISCUSSION

HF is associated with significant mortality and morbidity.⁹ Furthermore, healthcare expenditures are only expected to increase due to ageing of the population.¹⁰ In the present study it was seen that age and gender distribution in patients undergoing study with congestive cardiac failure shows, number of cases increases as age increases. Maximum number of occurring above the age of 50. Among the study population male: female distribution was 2:1. The results of TM Reddy¹¹ also clearly indicate that the most susceptible for developing HF was > 60 years. The results were in best agreement with the findings from Framingham study.¹² It was seen that the use of 2D ECHO and colour Doppler echocardiography to categorise patients into 4 grades according to left ventricular ejection fraction LVEF <50% considered systolic dysfunction which are categorized further into mild (40-50%), moderate (30-40%), severe (<30%) systolic dysfunction seen in 20%, 33% and 20% of patients respectively. 26% of patients had LVEF >50%. In Euro heart failure survey, 61% of men and 35% of women had LVEF reported as moderate and severe systolic dysfunction. 45% of women and 22% of men had LVEF reported as normal (LVEF > 50%). It was seen that moderate Left ventricular ejection fraction was more among male patients while Left ventricular ejection fraction was common in female patients. Visual estimation of EF is widely used, and for many years it has been known that the eye of an experienced observer is comparable to the performance of a trackball.¹³ However, this approach may be misleading when the rhythm is

irregular (requiring capture of multiple cardiac cycles), when the LV size is very large or very small, and when the extremes of heart rate are present. There are numerous quantitative approaches with echocardiography. Fractional shortening and the Teicholtz method for estimation of EF from M-mode imaging have been superseded by measurements of LV volumes in apical views using the biplane method of Simpson.¹⁴ Nonetheless, even with 2D imaging, the likelihood that repeated images will cut through the same 3D plane is small, and therefore repeated testing has a high likelihood of producing variable volume and EF results. When EF is close to the criteria assigned for electrical device insertion, variation may have important implications. The use of 3D echocardiography provides analogous EF results¹⁵ but has the advantage of less test-retest variation¹⁶. EF has a central role in the management of HF, identifying patients who are likely to respond to therapy for HF with reduced EF as well as patients who will benefit from device therapy, either implanted defibrillators or cardiac resynchronization. Indeed, the reason for outcome benefit in patients undergoing echocardiography at the time of HF presentation is likely connected to the importance of EF in selecting prognostically beneficial therapy.^{17,18} Although the limitations of this technique related to geometric assumptions may be avoided by 3D imaging, EF measures by either method are susceptible to inaccurate tracing, load dependence, poor test-retest reliability, and limited prognostic value when the measure is close to the reference range.¹⁹ It was observed that the percentage of systolic dysfunction (20%) and diastolic dysfunction

(23%) and both (53%). European study group on diastolic heart failure found annual mortality rate in patients diastolic dysfunction was 8% is less as compared to other forms of heart failure with an annual mortality rate of 19%. In the study conducted at Albert Einstein College of Medicine affiliated hospitals, to study relations between LVEF and clinically diagnosed CHF by clinical criteria in 407 patients, mean left ventricular ejection fraction to patients with congestive heart failure as present or absent according to the Framingham criteria was 0.45 ± 0.018 vs 0.53 ± 0.0014 . The echocardiographic evaluation of diastolic function is dependent on transmitral flow, annular tissue Doppler, LA volume, and pulmonary vein flow.²⁰ Echocardiographic techniques for this assessment are imperfect, with the most widely used being E/e' (the ratio between early mitral inflow velocity and mitral annular early diastolic velocity). A particular limitation of this parameter is susceptibility to loading conditions²¹. Further, categorization of diastolic dysfunction into mild (delayed relaxation), moderate (pseudonormal), and severe (restrictive) offers prognostic staging. Unfortunately, there is only limited concordance between observers in the characterization of these entities²².

CONCLUSION

Thus we conclude that majority of the patients with heart failure in the present study were having moderate Left ventricular ejection fraction. Moderate Left ventricular ejection fraction was more among male patients while Left ventricular ejection fraction was common in female patients. Both Systolic and diastolic dysfunction was seen in 55% patients while systolic dysfunction in 24% patient and diastolic dysfunction in 23% patients.

REFERENCES

- Caruana L, Petrie MC, Davie AP *et al.* Do patients with suspected heart failure and preserved left ventricular systolic function suffer from "diastolic heart failure" or from misdiagnosed? A prospective descriptive study. *BMJ* 2000; 321: 215-218.
- Butman SM, Ewy GA, Standen JR *et al.* Bedside cardiovascular examination in patients with severe chronic heart failure: importance of rest or inducible jugular venous distension. *J.A., Coll Cardiol* 1983; 22: 968-974.
- Cleland JGF, Khand A, Clerk AC. The heart failure epidemic: exactly how big is it? *Eur Heart J* 2001; 22(8): 623-6.
- Cleland JGF, Swedberg K, Poole-Wilson PA. Success and failure of current treatment of heart failure. *Lancet* 1998; 352: st 19-st 28.
- Adams, Zanna JF. Clinical definition and epidemiology of advanced heart failure. *Am Heart J* 1998; 135:5204-5215.
- Braunwald E. Heart failure : an overview. In: Fishma AP, ed. *Heart failure*. New York : McGraw Hill; 1977.
- Khot UN, Jia G, Moliterno DJ *et al.* Prognostic importance of physical examination for heart failure in not ST-elevation acute coronary syndrome: the enduring value of Killip classification. *JAMA* 2003; 290:2174-2181
- Cleland JGF, Gemmel I, Khand A *et al.* Is the prognosis of heart failure improving? *Eur J Heart Fail* 1999; 1: 229-41.
- Roger VL. Epidemiology of heart failure. *Circulation Research* 2013 113 646-659.
- Heidenreich PA, Albert NM, Allen LA, Bluemke DA, Butler J, Fonarow GC, Ikonomidis JS, Khavjou O, Konstam MA, Maddox TM, *et al.* Forecasting the impact of heart failure in the United States: a policy statement from the American Heart Association. *Circulation: Heart Failure* 2013 6 606-619.
- TM Reddy and MS Sridhar. "A Study on Clinical Profile of the Patients with Congestive Heart Failure". *Acta Scientific Medical Sciences* 2.7 (2018):38-43.
- Ho KKL., *et al.* "The epidemiology of heart failure: the Framingham study". *Journal of the American College of Cardiology* 22.4A (1993): 6A-13A.
- Foster E, Cahalan MK. The search for intelligent quantitation in echocardiography: "eyeball," "trackball" and beyond. *J Am Coll Cardiol.* 1993;22:848-850.
- Lang RM, Bierig M, Devereux RB, *et al.* Recommendations for chamber quantification. *J Am Soc Echocardiogr.* 2005;18:1440-1463.
- Doros JL, Lezotte DC, Weitzkamp DA, Allen LA, Salcedo EE. Performance of 3-dimensional echocardiography in measuring left ventricular volumes and ejection fraction: a systematic review and meta-analysis. *J Am Coll Cardiol.* 2012;59:1799-1808.
- Thavendiranathan P, Grant AD, Negishi T, *et al.* Reproducibility of echocardiographic techniques for sequential assessment of left ventricular ejection fraction and volumes: application to patients undergoing cancer chemotherapy. *J Am Coll Cardiol.* 2013;61:77-84.
- Senni M, Rodeheffer RJ, Tribouilloy CM, *et al.* Use of echocardiography in the management of congestive heart failure in the community. *J Am Coll Cardiol.* 1999;33:164-170.
- Tribouilloy C, Rusinaru D, Mahjoub H, *et al.* Impact of echocardiography in patients hospitalized for heart failure: a prospective observational study. *Arch Cardiovasc Dis.* 2008;101:465-473.
- Marwick TH. Methods used for the assessment of LV systolic function: common currency or tower of Babel? *Heart.* 2013;99:1078-1086.
- Nagueh SF, Appleton CP, Gillebert TC, *et al.* Recommendations for the evaluation of left ventricular diastolic function by echocardiography. *J Am Soc Echocardiogr.* 2009;22:107-133.
- Park JH, Marwick TH. Use and limitations of E/e' to assess ventricular filling pressure by echocardiography. *J Cardiovasc Ultrasound.* 2011;19:169-173.
- Unzek S, Popovic ZB, Marwick TH. Effect of recommendations on inter-observer consistency of diastolic function evaluation: an international multicenter study. *JACC Cardiovasc Imaging.* 2011;4:460-467.

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