

HEART FAILURE WITH PRESERVED EJECTION FRACTION IN DAILY MEDICAL PRACTICE

CRISTINA MIHAELA CHIRCU¹, IOAN MANIȚIU², MINODORA TEODORU³, ANDRA BEBEȘELEA⁴, NICOLETA CĂLUȚIU⁵

¹PhD candidate "Lucian Blaga" University of Sibiu, ^{2,3}"Lucian Blaga" University of Sibiu, ⁴Clinical County Emergency Hospital of Sibiu, ⁵Town Hospital Onești

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Abstract: Determining the ejection fraction of the left ventricle (LV) divides the patients with clinical and objective features of heart failure into two classes: patients with altered/reduced ejection fraction (HFREF) and patients with preserved ejection fraction (HFPEF). For a long period of time, the attention was focused on HF with reduced ejection fraction, but epidemiological studies have shown that 50% of the patients with signs and symptoms of heart failure have the ejection fraction in normal limits. In our study, we wish to make a characterization of the profile of the patients with heart failure as it appears in daily practice and not in the case of carefully selected population as it happens in trials. This study is useful for emphasizing the current reality existing in the case of patients with heart failure.

Cuvinte cheie: Insuficiență cardiacă. Insuficiență cardiacă diastolică. Insuficiență cardiacă cu fracție de ejeție păstrată (ICFEP). Insuficiență cardiacă cu fracție de ejeție redusă (ICFER)

Rezumat: Determinarea fracției de ejeție a VS împarte pacienții cu tablou clinic și obiectiv de insuficiență cardiacă în două clase: pacienți cu fracției de ejeție alterată și pacienți cu fracției de ejeție păstrată. Mult timp atenția a fost concentrată asupra IC cu funcție sistolică redusă, dar studiile epidemiologice au pus în evidență faptul că 50% dintre pacienții cu manifestări de insuficiență cardiacă au fracția de ejeție în limite normale. În studiul nostru dorim să caracterizăm profilul pacienților cu insuficiența cardiacă așa cum apare el în practica zilnică și nu în cazul unei populații atent selecționate cum se întâmplă frecvent în trialuri. Acest studiu este util pentru evidențierea realității practicii curente existente în cazul pacienților cu insuficiența cardiacă.

INTRODUCTION

HFPEF has become increasingly studied because of the will to elucidate the complex mechanisms involved in the development of this pathology.(1) There have been different opinions related to the way of defining this form of HF: "Diastolic Heart Failure", "HF with preserved systolic function" or "HF with preserved ejection fraction". The ACC/AHA Heart Failure guide recommends the latter – HF with preserved ejection fraction (HFPEF), statement which has also been adopted by the European Society of Cardiology.(2,3)

Presently, there still exist controversial discussions related to this concept: whether there exists a HFPEF as an own standing entity or if it is in fact an early stage of HF with systolic dysfunction.(4,5,6)

Some studies have shown that there can co-exist the altering of the systolic function determined throughout Tissue Doppler Echocardiography (TDE) even though the hemodynamic pump function is preserved in HF through a prevailing diastolic mechanism, and the ventricular-arterial coupling is abnormal.(4,5,6) Other studies have shown that in some forms of heart failure with a predominant diastolic mechanism (hypertensive cardiomyopathy, hypertrophic cardiomyopathy), progressive ventricular remodeling can determine in time the decline of the EF.(7) Another concept would be the one that considers HF as a unique entity which manifests throughout different phenotypes and in which different grades of diastolic and systolic dysfunctions combine.(8) Heart failure is a health problem with a growing financial impact. In spite of its

importance and its effects in survival, there are few randomized studies that follow patients with HFPEF from what concerns the investigations made and the efficiency of the therapies given.

PURPOSE

The study has focused on analyzing the predominance of the type of HF – HFPEF or HFREF in patients hospitalized during 4 months and their clinical and paraclinical profile.

METHODS

The study is a retrospective one made on patients hospitalized in the Monzino Cardiologic Centre in Milan for 4 months, during the period June - September 2013. The selection of the patients was prospective and was made by analysing the electronic database of the Cardiologic Clinic of Monzino. The selection process consisted in identifying the patients discharged with the main diagnosis of congestive heart failure. The statistic processing was made using the programs Microsoft Excel from the package Microsoft Office 2010 and SPSSv.22. The inclusion criteria were the existence of the diagnosis of congestive heart failure on discharge. There were excluded from the present study the patients who did not have an evaluated ejection fraction of the LV and the ones who had suffered major cardiac events in the last 3 months, had congenital cardiac diseases or oncologic diseases.

RESULTS

Therefore, out of 206 patients diagnosed with

¹Corresponding author: Cristina Mihaela Chircu, B-dul. Corneliu Coposu, Nr. 2-4, Sibiu, România, E-mail: cristinamihaela.chircu@yahoo.com, Tel: +40743 066970

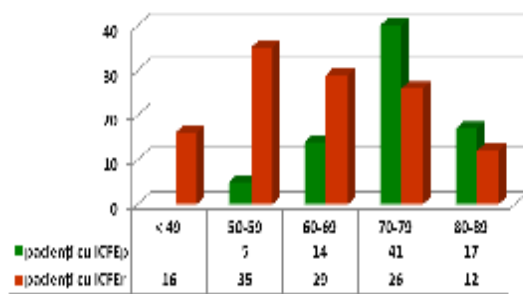
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CLINICAL ASPECTS

congestive heart failure hospitalized in the mentioned period, there have been selected 195 patients who complied with the mentioned criteria and whose data has been analyzed and processed. Subsequently, the patients have been divided into two groups taking into consideration the EF: group 1 – the ones with HF and EF > 45% (HFPEF) and group 2 – the ones with EF < 45% (HFREF) and we followed the demographic and clinical characteristics, as well as the BNP cardiac marker evaluated at admission and afterwards, after receiving treatment.

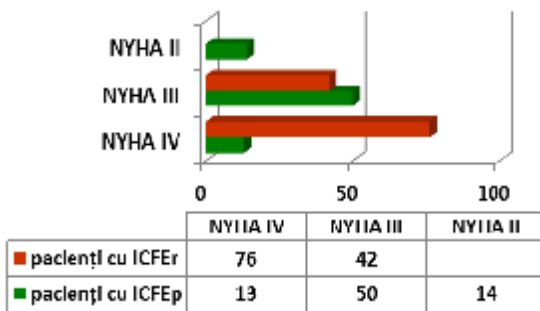
In group 1, there are 77 patients with the prevalence of the feminine gender (45 women versus 32 men), in group 2, there are 118 patients, with the prevalence of the masculine gender (83 versus 35). The age (table no. 1) in group 1- elderly patients prevailed (41% patients aged 70-89 years old), and group 2 – younger patients (35% patients aged 50-59 years old).

Figure no. 1. Distribution on age decades



In what concerns Blood Pressure (BP) values on admission, the patients from both groups have had raised values and in what concerns the symptoms expressed throughout NYHA functional class, patients have had a similar profile, without having statistically major differences.

NYHA III Class was more frequent in group 1, reflecting moderate affecting of symptomatology and in group 2, NYHA IV CLASS was more frequently encountered (figure no. 2)



The BNP values present a significant growth corresponding to the altering of the cardiac function. There have been observed significantly higher values in group 2. BNP presents prognostic importance and, in the case of patients with HFPEF there have been anterior studies showing that there is a correlation between the increased values of BNP and the severity of diastolic dysfunction. In our study as well, the values of BNP have been significantly correlated with the values of the E/E' fraction, which is the expression of the LV filling pressure and the diastolic function. Therefore, there has been observed a positive correlation between BNP values and the growth of the LV filling pressures. On the other hand, our study did not take notice of the existence of significant correlations between BNP and LVEF. The explanation would be that the mechanism

through which the BNP is produced by the heart implies a rise of the ventricular and atrial filling pressure, which in fact represents the diastolic ventricular function and not the systolic one. In each patient from group 1, the ones who were in sinus rhythm, after integrating the data taken from the pulse wave tissue Doppler of the diastolic trans mitral flow, respectively from the tissue Doppler at the mitral valve ring, the diastolic dysfunction was framed into one of the three stages: I – altered relaxation (16 patients), II – pseudonormal (14 patients) and III – restrictive (20 patients). In these patients who presented diastolic dysfunction there has been followed the right systolic function (RV) with the echocardiography throughout the systolic excursion of the tricuspid ring method (TAPSE) and throughout Tissue Doppler (S) in apical 4 rooms at the free wall of the LV and the excursion of the mitral ring in systole (MAPSE). There was considered to be present a systolic dysfunction if TAPSE was under 18 mm, S under 10 cm/sec or MAPSE < 15 mm. All the patients with diastolic dysfunction had a systolic alteration of the RV and LV after the mentioned criteria. The blood value of BNP was obviously bigger in the group with associated diastolic dysfunction stage III, regarding of how severe the HF was or which was the etiology, comparing to the ones in stages II or I. Patients with associated diastolic dysfunction stage III had a longer period of hospitalization.

DISCUSSIONS

HF is a frequent condition among the elderly people and its incidence continues to grow as age advances. In our study the percentage of the hospitalized patients was higher among the ones with HFREF (60,20% versus 39,28%), and HFPEF were the elderly, with an age average of more than 70 years and predominantly feminine gender. A prospective study of 5 years made in France analyzing the hospitalized patients with HF has proved that 55,6% have presented HFPEF with an average age of 76 years. Both advanced age and the feminine gender represent important risk factors in HFPEF, which prevalence is significantly growing with the aging of women, unlike HFREF which is more frequent in men; this situation being sustained by many studies (the Framingham study – 73% women versus 33% men; data from the New York Heart Failure Registry that analyzed 619 patients with HFPEF hospitalized in 24 medical centres in New York, and out of these 73% were women).⁽⁹⁾ The reason of the prevalence of the feminine gender in this pathology is not known and is still being debated.⁽¹⁰⁾ The augmentation of the vascular stiffness and the decrease of compliance are more pronounced in women comparing to men, with aging; ventricular hypertrophy without dilation is more likely to appear in women.^(12,13,14) Besides, middle aged women and elderly ones develop an acute hemodynamic response to mental stress more pronounced than men, expressed by the exaggerated increase of the HR, BP, cardiac output and vascular systemic resistance.⁽¹⁵⁾ Blood levels of BNP are raised in patients with HFPEF comparing to patients without HF but are smaller than the ones observed in patients with HFREF. In patients with HFPEF, the increase of BNP is strictly correlated to the rise of the diastolic filling pressure of the LV and with the end diastolic stress of the wall.

A number of authors have shown that the speed of the systolic excursion of the mitral ring (MAPSE) and the top systolic speed of the mitral ring (S') are significantly smaller in patients with diastolic cardiac failure than in same aged patients from the control group, even though they are higher than of the ones with systolic heart failure.

In this research there have been followed the three systolic indices in all patients and we have established that in patients with HFPEF with diastolic dysfunction MAPSE,

CLINICAL ASPECTS

TAPSE as well as S' were significantly smaller showing in incipient alteration of the systolic function. Speeds S' were smaller in patients with diastolic dysfunction stage II and III, with increased filling pressure, (proven with lateral $E/E' \geq 12$ and the Valsalva manoeuvre in patients with lateral $E/E' = 8-12$) comparing to the ones with diastolic dysfunction stage I. A study made by Italian researchers communicated in 2009 similar results with the one obtained in this study relating to the MAPSE and S' values in patients with high BP, concluding that in patients with hypertension and severe diastolic dysfunction, with increased filling pressures (E/E' average ≥ 13) there is a longitudinal diastolic dysfunction of the left ventricle associated and that there exists an association between concentric LV hypertrophy and the decrease of the longitudinal systolic function in this category of hypertensive patients.

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