

INCIDENCE OF THE ATRIAL FIBRILLATION IN PATIENTS WITH DILATED CARDIOMYOPATHY

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Keywords: atrial fibrillation, heart failure, dilatative cardiomyopathy

Abstract: Chronic heart failure is considered the most costly cardiovascular disease, which is also valid in Romania's case. One of the most frequent aggravation and death causes in the case of CHF is dilated cardiomyopathy (DCM) rhythm disorders. The aim of the present paper is to assess the prevalence of atrial fibrillation (AF) in DCM patients hospitalized in the Rehabilitation Hospital of Cluj-Napoca. Material and method: 164 patients diagnosed with DCM based on ESC criteria were included in the study, out of a total of 470 patients suffering from NYHA I-IV CHF functional class, hospitalized in the Rehabilitation Hospital between 2003 and 2004. They were divided in two study groups: group I- including 136 patients with cardiac rhythm disorders and group II- including 28 patients suffering from DCM, however with no rhythm disorders. CHF was defined based on European Society for Cardiology criteria set in 2008 (3). We analyzed the types of rhythm disorders in group I, the recommended antiarrhythmic drugs, as well as the comparative characteristics of the two study groups from age, sex, cardiovascular risk factors, CHF aetiology, ECG and echocardiography parameters, ECG Holter/24 hours monitoring viewpoints. The statistic analysis was based on t-Student test. Results: The prevalence of the rhythm disorders in the 470 CHF patients was of 82.9%. The arrhythmia with the highest prevalence in group one was atrial fibrillation, in 45.6% (62 patients). The distribution of arrhythmias in patients with sinus rhythm at rest (27.94%-38p) was paroxysmal AF episodes -57.89% (22 p) and different types of extra systolic arrhythmia -41.10% (16p). At the same time, 36 patients (26.4 %) exhibited atrioventricular blocks of various degrees, major LBBB, sinus tachycardia and paroxysmal supraventricular tachycardia. In conclusion, the arrhythmia with the highest prevalence in DCM patients is represented by ischemic and toxic AF.

Cuvinte cheie: fibrilație atrială, insuficiență cardiacă, cardiomiopatie dilatativă

Rezumat: Insuficiența cardiacă congestivă (ICC) este considerată cea mai costisitoare condiție cardiovasculară, lucru valabil și în cazul României. Una dintre cauzele cele mai frecvente de agravare și de deces în ICC este reprezentată de tulburările ritm din cardiomiopatia dilatativă (CMD). Scopul studiului: evaluarea prevalenței fibrilației atriale (FiA) la bolnavii cu CMD internați în Clinica de Cardiologie Recuperare-Cluj Napoca. Material și metodă. Au fost luați în studiu un număr de 164 pacienți cu CMD, dintr-un total de 470 pacienți cu ICC clasa funcțională I-IV internați în Clinica Cardiologie - Recuperare, în perioada 2003-2004. Aceștia au fost împărțiți în două loturi: lotul I- 136 bolnavi care au prezentat tulburări de ritm cardiac și lotul II-28 pacienți cu CMD fără tulburări de ritm. ICC a fost definită conform criteriilor Societății Europene de Cardiologie din 2008 (3). S-au analizat tipurile de tulburări de ritm din lotul I, medicația antiaritmică recomandată, precum și caracteristicile comparative ale celor două loturi din punct de vedere al vârstei, sexului, factorilor de risc cardiovasculari, etiologiei ICC, parametrilor ECG și ecocardiografici, monitorizării ECG Holter/24 de ore. Pentru analiza statistică s-a utilizat testul t Student. Rezultate: Prevalența tulburărilor de ritm la cei 470 pacienți cu ICC a fost de 82,9%. Realizând în lotul I o analiză a tulburării de ritm obiectivate prin ECG de repaus și Holter-ECG/24 de ore am constatat următoarele: 45,6% (62 p) au prezentat fibrilație atrială (FiA) cronică, iar la 27,94% (38p) pacienți aflați în RS pe ECG de repaus, 57.89% (22 p) au fost diagnosticați cu fibrilație atrială paroxistică, precum și cu diverse tipuri de aritmie extrasistolice - 41.10% (16p). Totodată 36 pacienți (26,4 %) au prezentat BAV de diferite grade, BRS major, tahicardie sinusală, tahicardie paroxistică supraventriculară. În concluzie, aritmia cu prevalența cea mai crescută diagnosticată la bolnavii cu CMD este reprezentată de fibrilația atrială, etiologia cea mai frecventă a acesteia fiind cea ischemică și toxică.

INTRODUCTION

Dilated cardiomyopathy (DCM) is the third etiologic cause of heart failure and the main cause of cardiac

transplantation (1). Congestive heart failure (CHF) is the only major cardiovascular disease whose incidence and prevalence is gradually increasing, the prognostic being that it will reach

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pandemic proportions soon. Within the European Union, there are 15 million patients diagnosed with HF, out of which 2-3% are suffering from CHF (2).

Heart failure management takes up 2% of the National Health Insurance budget, both in the USA and in Europe, these costs being on the rise due to population aging (2). Consequently, CHF is considered the most costly cardiovascular disease, which is also valid in Romania's case. The Framingham Study has shown that this disease accounts for the death of 62% of the men and of 42% of the women, increasing the risk of a sudden cardiac death by 5 times (3). One of the most frequent aggravation and death causes in the case of CHF is dilated cardiomyopathy rhythm disorders.

AIM OF STUDY

The aim of the present paper is to assess the prevalence of atrial fibrillation (AF) in DCM patients hospitalized in the Rehabilitation Hospital of Cluj-Napoca.

MATERIAL AND METHOD

164 patients diagnosed with DCM based on ESC criteria were included in the study, out of a total of 470 patients suffering from NYHA I-IV CHF functional class, hospitalized in the Rehabilitation Hospital, Cardiology Department between 2003 and 2004. They were divided into two study groups: group I- including 136 patients with cardiac rhythm disorders and group II- including 28 patients suffering from DCM, however with no rhythm disorders. CHF was defined based on European Society for Cardiology criteria set in 2008 (3). We analysed the types of rhythm disorders in group I, the recommended antiarrhythmic drugs as well as the comparative characteristics of the two study groups from the perspective of age, sex, cardiovascular risk factors, CHF aetiology, ECG and echocardiography parameters, ECG Holter/24 hours monitoring. The statistic analysis was based on t-Student test.

RESULTS

The prevalence of the rhythm disorders in the 470 patients suffering from CHF was 82.9%. In group I (136 p), 98 patients were men (72%) and 38 women (28%), patient's mean age being 66.28±55. Average age of the 28 patients included in group II was 64.87±54 years. Table 1 synthesizes cardiovascular risk factors in the patients belonging to groups.

Table no. 1. Cardiovascular risk factors in the patients belonging to the 2 groups

Risk factors	Group I- 136p (%)	Group II- 28p (%)
HBP	88 (64)	12 (48)
DM	26 (19)	3 (10.7)
Dyslipidaemia	72 (52)	10 (35)
Alcohol consumption	56 (41.17)	4 (14.29)
Smoking	46 (33.82)	8 (28.57)

As far as DCM aetiology, in group I it was ischemic in 33.6 % (46), toxic in 41.4 % (56) and idiopathic in 25% (34) of the patients. DCM aetiology in group II was ischemic in 28.2 % (8), toxic in 14.8 % (4) and idiopathic in 57% (16) of the patients. 76% of the patients benefited from ECG Holter/24h monitoring. The ischemic aetiology was identified in 66.4% of the patients with rhythm disorders and DCM.

When reanalyzing group 1 from rhythm disorder viewpoint, established through repose ECG and Holter-ECG/24h, we noted that:

- 45.6% (62 p) exhibited chronic atrial fibrillation (AF)

- The distribution of arrhythmias in patients with sinus rhythm at rest (27.94%-38p) was paroxysmal AF episodes - 57.89% (22 p) and different types of extrasystolic arrhythmia -41.10% (16p). At the same time, 36 patients (26.4 %) presented atrioventricular blocks of various degrees, major LBBB, sinus tachycardia and paroxysmal supraventricular tachycardia. Table 2 presents the distribution of rhythm disorders in the 2 sexes.

Table no. 2. Distribution of the rhythm disorders in the 2 sexes

Sex (%)	AF (%)	Sinus rhythm at rest, but with rhythm changes upon Holter/24 h monitoring (%)	AV block, LBBB, Premature supraventricular beats (%)
Women - 38 (27.94%)	8 (21%)	28 (47.5%)	12 (31.5%)
Men - 98 (72.05%)	46 (47%)	22 (22.5%)	30 (30.5%)

Figure 1 and 2 present the grouping of patients suffering from DCM and CHF in NYHA functional classes.

Figure no. 1. Patients in group 1 based on NYHA functional class

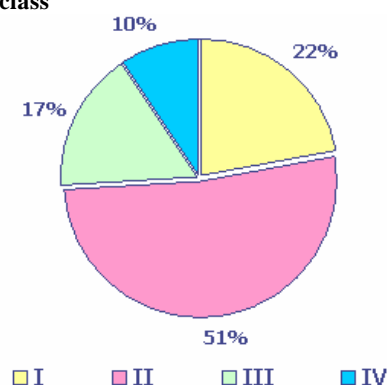
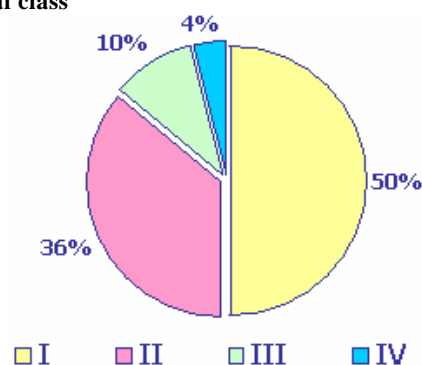


Figure no. 2. Patients in group 2 based on NYHA functional class



From the ejection fraction (EF) standpoint, patients were grouped in 3 subclasses:

1. with severely altered systolic function EF<30% (18 patients group I and 4 patients group II);
2. with moderately altered systolic function EF<40% (72 patients group I and 12 patients group II);
3. slightly altered systolic function EF>40% (52 patients group I and 12 patients group II).

The distribution of the rhythm disorders based on the ejection fraction was as follows: among patients with EF<30%, 66.66% (18p) exhibited AF, among those with EF 30-40%,

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52.77% (38p) had AF and 25% (18p) were suffering from other rhythm disorders. From 52 patients with EF>40%, only 7.69% (4p) had AF and 46.15% (24p) were suffering from other rhythm disorders.

66.6% (36) of the patients with AF were diagnosed by echocardiography with intracavitary thrombosis (32 men and 4 women). These were encountered in only 30% (12) of the patients in NRS (10 men and 2 women).

Functional mitral failure of various degrees was discovered in 77.7 % (42) of the patients suffering from AF, 45% (18) of the patients suffering from NRS and 33.3 % (14) of the patients suffering from rhythm disorders. Table 3 presents main ultrasound parameters calculated for the two groups.

Table no. 3. Ultrasound parameters calculated for the two groups

Ultrasound parameters	Group I	Group II	p
Ascending aorta (mm)	40	36	NS
LA (mm)	49.5	40	P<0
IVS (mm)	11.8	10.8	NS
LVPW (mm)	10.6	9.6	NS
LVTD (mm)	68	64.2	p<0
RVTD (mm)	59	51.2	p<0
EF (%)	38	42	p<0
RV (mm)	26,8	22	p<0

The ultrasound examination revealed that 72% (98) of the patients in group I presented one of the following parameters: increased LV, low EF (ejection fraction), intracavitary thrombi. 44% (60 p) of the patients presented three of these alterations.

DISCUSSIONS

DCM and AF are two cardiovascular diseases that frequently coexist and their coexistence associates with negative prognosis. They share cardiovascular risk factors and the presence of one may cause the aggravation of the other, therefore nowadays are considered a real public health issue.

Atrial fibrillation is the most common arrhythmia encountered in CHF and DCM, as well as the most common type of arrhythmia (4). In the USA there are over 2.2 million patients diagnosed with this disease and it accounts for half a million cases of hospitalisation/yearly, the cost of each being assessed at 7312 dollars (5). 1 of 4 adults over the age of 40 present the risk of developing this disease (6) and according to the Framingham study, AF accounts for 14% of the mortality cases within 4 months from the time of diagnosis of heart failure (7).

In fact, this study demonstrated that HF is a significant predictor of AF, increasing the risk of developing AF by 5 times at men and by 6 times at women (8). AF prevalence in patients suffering from pre-existing HF is directly associated with seriousness of heart failure.

The presence of heart failure may lead to alterations of atrial physiological structure, inducing and maintaining AF (4). Volume and atrial pressure increase in HF results in triggering atrial "stretching" mechanisms. Studies on animals have shown that this atrial "stretching" phenomenon associates with increase of atrial irritability, decrease of refractory atrial period, prolongation of atrial induction time favouring the appearance of sustained or non-sustained tachyarrhythmia. At the same time, the implication of the renin-angiotensin-aldosterone system in CHF pathogenesis, contributes to the triggering and preservation of AF (9, 10). Patients with CHF display a high level of catecholamine associated with a high-rated ventricular

response. At the same time, in CHF, the increase of Ag II production contributes to the promotion of interstitial atrial fibrosis which is structurally remodelled (11). In CHF, electrophysiological remodelling of atrial cells responsible for the arrhythmogenic effects of post depolarization and the alteration of action potential is also a distinct mechanism that may lead to atrial tachycardia. On the other hand, one must not forget that atrial tachyarrhythmia may cause the so called "tachycardia induced cardiomyopathies" (12). Studies on animals demonstrated that the seriousness of CHF directly correlates with increase of the cardiac rhythm and the extent of tachycardia (13). Atrial systole may contribute to 25-50% decrease of the cardiac flow especially in patients suffering from pre-existing valves diseases or from ventricular failure (14, 15). In turn, irregular ventricular contractions also lead to flow decrease, increase of the right pulmonary capillary and atrial pressure, independently from the cardiac rhythm (16).

The present paper is based on the study of 164 patients suffering from DCM, out of a total of 470 patients suffering from CHF, hospitalized in the Clinic of Cardiology Rehabilitation Hospital in the period between 2003 and 2004, 82.9% displaying rhythm disorders. In the specialty literature, the prevalence of rhythm disorders in patients suffering from DCM ranges between 52.6% and 58.4%, differences emerging as a result of DCM early diagnosis and early basic prevention measures (17). The possibility of evidencing rhythm disorders with Holter-EKG recording in patients with no alterations of the repose evolution is a very important issue. It is worth mentioning that 76% of the patients included in the present study benefitted from Holter monitoring, a percentage close to that reported in the literature (18). The prevalence of AF amounted to 45.6% for group I and to 37.80% if compared with the total of 164 patients suffering from DCM included in the study. Generally speaking, the prevalence of AF reported in the literature amounts to 21% (19).

The average age of the patients in group 1 was 66.28 years and 64.87 years in group 2, with a significantly higher number of male patients in both groups. The data were similar with those reported in literature, where, the number of male and female patients affected is more balanced (19).

Unlike normal sinus rhythm, atrial fibrillation associates with a risk increase of embolic events and sudden death (20). However, no prospective studies to prove that atrial fibrillation is an independent risk factor are available.

Similarly with the literature, from DCM aetiology point of view, 74.2% of the patients in group I displayed ischemic and toxic aetiology, however we must say that certain authors included toxic aetiology in the group of idiopathic DCM (1). Idiopathic aetiology amounting to 35.8% was more frequently discovered to affect women (most probably as a result of lower prevalence of toxic factors). Ischemic aetiology was identified in 66.4% of the patients presenting rhythm disorders upon DCM diagnosis. Unlike ischemic DCM (4), non-ischemic DCM associates with 3 times probability increase to develop AF. Toxic aetiology mainly accounted for the onset of the rhythm disorders during monitoring periods of patients suffering from DCM. A significant percentage of the patients with DCM displayed functional mitral failure (of at least 2 degree), out of which 77.7% were suffering from AF, upon repose EKG or upon Holter-EKG monitoring, which does not correspond with those reported in the literature, where only 32.5% of the patients suffering from mitral failure were reported with AF (4). At the same time, decrease of the ejection fraction of the left ventricle was discovered to be directly proportional with the development of rhythm disorders, as 84 patients in group I (62%) presented a moderately/severely altered ejection

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fraction. The data collected are similar to those published, as 58% of the patients with EF<40% also displayed rhythm disorders, however, their percentage is in fact much smaller when set against the total number of patients suffering from DCM, namely 37.4% as compared to 62% - which constitutes a negative prognosis criterion.

Similarly, we may argue that the patients included in our study presented a triple association (increased VS, presence of intracavitary thrombi, decrease of the ejection fraction) amounting to 44%, as compared to 26% reported in the literature (21).

Although it may appear contradictory, in as far as systolic failure is concerned, the ejection fraction of the left ventricle is one of the strongest independent markers of the risk for sudden death. The limit is currently admitted to be 30%, but it is clear that an ejection fraction of 25% presents a significantly higher risk than one of over 35% (22). Damage of the left ventricular function associates with a significant increase in the frequency, complexity, seriousness of the rhythm disorders and especially with increase of sudden death incidence. According to one theory, EF <30% is a more reliable predictor factor of death occurrence within 6 months, while the presence of ventricular arrhythmia is a more reliable prognosis for death occurrence after a period of 6 months (23).

Prevalence of AF according to the NYHA class is reported to be 4% for patients with NYHA I (24), 10-27% for NYHA II-III (25, 26, 27, 28) and 50% for NYHA IV (28), results which correspond on the whole with those obtained in the present study. Similarly with the published reports, the incidence of HBP in the patients included in the study was 53% (29). Another observation is that type II DM in patients in group I amounts to 19% as opposed to 10.7% in patients belonging to group II. Dyslipidaemia was also found in a significant number of patients with rhythm disorders (52% vs. 32%).

Over the past two decades, the life of patients suffering from dilated cardiomyopathies has significantly extended due to use of an efficient medication for the treatment of HF. However, this has led to an increase in the number of cases of rhythm disorders, responsible for 50% of the deaths of these patients, as well as of patients suffering from heart failure in general. In the same time, evolutionary profile as well as therapeutic one has changed, justifying new research in order to establish rhythm disorders' types, severity and possibilities of treatment.

CONCLUSION

The arrhythmia of highest prevalence diagnosed in patients suffering from DCM is ischemic and toxic AF.

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