Clinical researches

FUNCTIONAL CLASS OF CHRONIC HEART FAILURE AND CLINICAL FEATURES OF PATIENTS WITH PERMANENT PACEMAKERS

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The study included 162 patients (89 men and 73 women) aged 69 ± 10 years who underwent permanent pacing about atrio-ventricular block, permanent atrial fibrillation and sick sinus node syndrome with pacing modes DDD/DDDR and VVI/VVIR as well as chronic heart failure (CHF) with cardiac resynchronization therapy (CRT-P and CRT-D). Clinical features of patients were evaluated according to the functional class (FC) CHF. Patients with pacemakers the most frequent had II and III CHF FC which more often associated with myocardial infarction, stable angina, diabetes mellitus, atrial fibrillation, stage IIA and IIB CHF. It is concluded that patients with ECS require optimization of medical interventions.

KEY WORDS: permanent pacing, chronic heart failure, functional class of chronic heart failure

ФУНКЦІОНАЛЬНИЙ КЛАС ХРОНІЧНОЇ СЕРЦЕВОЇ НЕДОСТАТНОСТІ ТА КЛІНІЧНІ ОСОБЛИВОСТІ ПАЦІЄНТІВ З ПОСТІЙНОЇ ЕЛЕКТРОКАРДІОСТИМУЛЯЦІЄЮ

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Обстежені 162 пацієнта (89 чоловіків і 73 жінки) у віці 69 ± 10 років, які піддалися постійної електрокардіостимуляції (ЕКС) з приводу атріо-вентрикулярної блокади, постійної форми фібриляції передсердь і синдрому слабкості синусового вузла з режимами стимуляції DDD/DDDR і VVI/VVIR, а також хронічної серцевої недостатності (ХСН) з кардіоресінхронізуючою терапією (CRT- P і CRT- D). Клінічні ознаки пацієнтів оцінювалися в залежності від функціонального класу (ФК) ХСН. У пацієнтів з ЕКС найбільш часто зустрічалися II і III ФК ХСН, з якими найчастіше асоціювалися постінфарктний кардіосклероз, стабільна стенокардія, цукровий діабет, фібриляція передсердь, IIA і IIБ стадії ХСН. Робиться висновок, що пацієнти з ЕКС вимагають оптимізації медикаментозних втручань.

КЛЮЧОВІ СЛОВА: постійна електрокардіостимуляція, хронічна серцева недостатність, функціональний клас хронічної серцевої недостатності

ФУНКЦИОНАЛЬНЫЙ КЛАСС ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТИ И КЛИНИЧЕСКИЕ ОСОБЕННОСТИ ПАЦИЕНТОВ С ПОСТОЯННОЙ ЭЛЕКТРОКАРДИОСТИМУЛЯЦИЕЙ

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Обследованы 162 пациента (89 мужчин и 73 женщины) в возрасте 69 ± 10 лет, подвергшихся постоянной электрокардиостимуляции (ЭКС) по поводу атрио-вентрикулярной блокады, постоянной формы фибрилляции предсердий и синдрома слабости синусового узла с режимами стимуляции DDD/DDDR и VVI/VVIR, а также хронической сердечной недостаточностью (ХСН) с кардиоресинхронизирующей терапией (CRT-P и CRT-D). Клинические признаки пациентов оценивались в зависимости от функционального класса (ФК) ХСН. У пациентов с ЭКС наиболее часто

встречались II и III ФК ХСН, с которыми чаще ассоциировались постинфарктный кардиосклероз, стабильная стенокардия, сахарный диабет, фибрилляция предсердий, IIA и IIБ стадии ХСН. Делается вывод, что пациенты с ЭКС требуют оптимизации медикаментозных вмешательств.

КЛЮЧЕВЫЕ СЛОВА: постоянная электрокардиостимуляция, хроническая сердечная недостаточность, функциональный класс хронической сердечной недостаточности

INTRODUCTION

Pacemaker implantation doesn't remove the problem of the therapeutic management of patients [1]. One of the most important clinical syndromes is chronic heart failure (CHF) that requires medical support [2].

The main criterion for the effectiveness of both the pacing and pharmacological interventions for chronic heart failure is a functional class (FC CHF).

At all the urgency of the problem, we haven't found any studies in which patients with clinical features of pacemaker due to FC CHF would have been investigated.

OBJECTIVE

The aim of this work is to analyze the clinical features of patients with implanted pacemakers depending on FC CHF.

MATERIALS AND METHODS

On the basis of the department of ultrasonic and instrumental diagnostics with miniinvasive interventions of SI «Zaytsev V.T. Institute of General and Urgent Surgery NAMS of Ukraine» there were examined 162 patients (89 men and 73 women) aged 69 ± 10 years, who underwent permanent pacing. Among the indications for pacemaker implantation there were atrio-ventricular block (AV block) – 89 patients (55 %), permanent atrial fibrillation (AF) – 25 patients (15 %), sick sinus node syndrome (SSNS) - 32 people (20 %) with pacing modes DDD/DDDR and VVI/VVIR, and chronic heart failure and dilated cardiomyopathy - 16 patients (10 %) with cardiac resynchronization therapy (CRT-P and CRT-D). In the early postimplantation period (3-5 days) medical therapy with angiotensin converting enzyme inhibitors, beta -blockers, calcium channel blockers, antiplatelet agents, anticoagulants of direct action.

There were estimated sex (male, female), age, forms of ischemic heart disease (IHD) – postinfarction cardiosclerosis and stable angina (FC I, II, III and IV), arterial hypertension (AH) – stages I, II, III and degrees 1, 2, 3, diabetes mellitus (DM) – types I and II, atrial fibrillation (AF) – permanent, persistent or paroxysmal, initially identified and long-term persistent and CHF stages – I, IIA, IIB and III. Depending on the clinical symptoms, patients were divided into 4 groups – FC I, II, III and IV CHF. To determine the FC CHF there were used guidelines of the Ukrainian Association of Cardiology (2012) [3].

Evaluation was made of the incidence of clinical features in patients with pacemaker and FC CHF in the early postimplantation period.

The results obtained are processed after forming the database. Statistical evaluation was performed using Microsoft Excel (for parametric data: M - mean value, sd - standard deviation; for nonparametric data: absolute (n, the number) and relative (p, %) of the unit). The probability of differences between groups was determined using a nonparametric U - Mann -Whitney test. The expected result was determined by level of reliability $p < 0,05$ and $p < 0,01$.

RESULTS AND DISCUSSION

The table shows the distribution of patients with permanent pacing into groups in accordance with FC CHF.

In all groups FC CHF, the average age of patients was not significantly different ($p > 0,05$). The oldest were in the group FC II CHF, and the younger ones – in groups FC I and III CHF.

In subgroups of men and women highest number of patients was in group FC II CHF. Rarely in both groups patients with FC I and III CHF was found. The least number of patients in the subgroups of men and women was found in the group FC IV CHF.

In patients with postinfarction cardiosclerosis and stable angina most often FC II CHF was found. The least number of patients in these subgroups were in the group FC IV CHF. In contrast to the subgroup of stable angina, in the subgroup with postinfarction cardiosclerosis patients with FC I CHF were absent.

Table

Clinical features of patients with cardiac pacemakers

Clinical data			Total	FC CHF			
				FC I	FC II	FC III	FC IV
Age, years (M ± sd)			162	69 ± 10	70 ± 11	69 ± 8	66 ± 10
Sex (n,% ± sp)		Male	89	7 (8 ± 3)	41(46 ± 5)	39 (44 ± 5)	2 (2 ± 1)
		Female	73	12 (16 ± 4)	40 (55 ± 6)	15 (21 ± 5)	6 (8 ± 3)
IHD (n,% ± sp)	Postinfarction cardiosclerosis		27	-	18 (67 ± 9)	8 (29 ± 9)	1 (4 ± 4)
	Stable angina	Total	56	6 (11 ± 4)	24 (43 ± 7)	22 (39 ± 7)	4 (7 ± 3)
		FC I	15	1 (7 ± 7)	9 (60 ± 13)	4 (26 ± 11)	1 (7 ± 7)
		FC II	24	2 (8 ± 6)	9 (37 ± 10)	10 (42 ± 10)	3 (13 ± 7)
		FC III	14	3 (21 ± 10)	5 (36 ± 13)	6 (43 ± 13)	-
		FC IV	3	-	1 (33 ± 27)	2 (67 ± 27)	-
AH (n,% ± sp)	Total		142	18 (13 ± 3)	76 (53 ± 4)	41 (29 ± 4)	7 (5 ± 2)
	Stage	I	4	2 (50 ± 25)	1 (25 ± 22)	1 (25 ± 22)	-
		II	86	14 (16 ± 4)	45 (52 ± 5)	25 (29 ± 5)	2 (3 ± 2)
		III	52	2 (4 ± 3)	30 (58 ± 7)	15 (29 ± 6)	5 (9 ± 4)
	Degree	1	52	8 (15 ± 5)	24 (46 ± 7)	17 (33 ± 7)	3 (6 ± 3)
		2	62	9 (14 ± 4)	36 (58 ± 6)	14 (23 ± 5)	3 (5 ± 3)
		3	28	1 (4 ± 4)	16 (57 ± 9)	10 (35 ± 9)	1 (4 ± 4)
DM (n,% ± sp)	Type	I	-	-	-	-	-
		II	26	3 (12 ± 6)	17 (65 ± 9)	5 (19 ± 8)	1 (4 ± 4)
AF (n,% ± sp)	Total		55	9 (16 ± 5)	21 (38 ± 7)	25 (46 ± 7)	-
	Paroxysmal and persistent		25	6 (24 ± 9)	11 (44 ± 10)	8 (32 ± 9)	-
	Permanent		25	3 (12 ± 6)	9 (36 ± 10)	13 (52 ± 10)	-
	Initially identified		2	-	1 (50 ± 35)	1 (50 ± 35)	-
	Long-term persistent		3	-	-	3 (100 ± 0)	-
CHF stage (n,% ± sp)	Total		162	19 (12 ± 3)	81 (50 ± 4)	54 (33 ± 4)	8 (5 ± 2)
	I		20	14 (70 ± 10)	6 (30 ± 10)	-	-
	IIA		93	4 (4 ± 2)	67 (72 ± 5)	21 (23 ± 4)	1 (1 ± 1)
	IIB		47	1 (2 ± 2)	8 (17 ± 5)	33 (70 ± 7)	5 (11 ±5)
	III		2	-	-	-	2 (100 ± 0)

Legend: * p<0,05, ** p<0,01- in current values between groups.

In the subgroups of patients with the FC II, III and IV of stable angina there observed the highest number of patients with FC III CHF. In the subgroup of FC I highest number of stable angina patients was observed in group FC II CHF, rarely patients with FC III CHF was found. In subgroups FC II and III of stable angina the fewest number of patients was in group FC I CHF, in the subgroup with FC I of stable angina the fewest number of patients was in groups FC I and IV CHF. In contrast to the subgroups FC I and II of stable angina, in the subgroup FC III and IV of stable angina patients with FC IV CHF were absent, while in the subgroup FC IV of stable angina patients with FC I CHF were also absent.

Among patients with hypertension there were observed the largest number of patients in group FC II CHF. The least of all patients was in group FC IV CHF. The greatest number of patients in the subgroup with stage I hypertension were observed in group with FC I CHF, in subgroups with stages II and III hypertension – in groups with FC II CHF. The least number of patients in selected subgroups of stages hypertension occurred in different groups of FC CHF: so, in the subgroup with stage I hypertension there was the least of all patients in group FC II and III CHF, in the subgroup with stage II hypertension – in group with FC IV CHF, in the subgroup with stage III hypertension – in group with FC I CHF. In the subgroup with stage I hypertension patients with FC IV CHF were absent. In selected subgroups degrees 1, 2 and 3 of hypertension were the highest number of patients in group with FC II CHF. The fewest number of patients in subgroups 1 and 2 degrees of hypertension

were observed in group FC IV CHF, and in the subgroup degree 3 of hypertension the fewest number was in groups FC I and IV CHF.

Patients in the subgroup with type I diabetes were absent. Among patients with type II diabetes the most frequent was found in group FC II CHF. The least number of patients in this subgroup was observed in the group FC IV CHF.

Among patients with AF the most frequent there were found patients in group CHF FC III. The least number of patients observed in group with FC I CHF. In group FC IV CHF patients were absent. The greatest number of patients with paroxysmal and persistent AF was observed in group FC II CHF, with permanent AF – in group FC III CHF. The least number of patients with paroxysmal and persistent, as well as with permanent AF was observed in group FC I CHF. In the subgroup with initially identified there was observed an equal number of patients in group FC II and III CHF and in group FC I CHF patients were absent. In the subgroup with long-term persistent AF patients were observed only in FC III CHF.

In the subgroup of patients with CHF the most frequent patients with FC II CHF were found. The least of all patients in this subgroup was observed in the group with FC IV CHF. The greatest number of patients in selected subgroups of stages CHF occurred in different groups of FC CHF: in subgroup of stage I CHF the most frequent patients in group FC I CHF were found, in the subgroup of stage IIA CHF – in group FCII CHF, in subgroup of stage IIB CHF – in group FC III CHF, in the subgroup of stage III CHF patients were found only in group FC IV CHF. The least number of patients also occurred in different groups FC CHF: in subgroup of stage I CHF there were observed in the group FC II CHF, in the

subgroup of stage IIA CHF – in group FC IV CHF, in a subgroup of stage IIB CHF – in group FC I CHF. In the subgroup of stage I CHF patients in the group FC III and IV CHF were absent.

Data [1, 4, 5, 6] about the importance of assessing the impact of FC CHF in permanent pacing and medical support are confirmed in our study. Our data on higher FC CHF in patients with atrial fibrillation and implantable pacemaker indirectly correspond to the data [7, 8] for its constant and [9] - persistent forms.

Our data about the frequency of postinfarction cardiosclerosis, arterial hypertension and diabetes mellitus in patients with implanted pacemaker in different FC CHF weren't found in the literature and are the new ones.

Significant frequency of occurrence and relations of high CHF FC with studied clinical features of patients with implanted pacemaker shows the need for optimization of their medical treatment.

CONCLUSIONS

1) Patients with a permanent pacemaker were found the most frequently with FC II and III CHF, which often associated with myocardial infarction, stable angina, diabetes mellitus, atrial fibrillation, stage IIA and IIB CHF.

2) The high frequency of FC II and III CHF occurrence in patients with permanent pacing requires optimization medical interventions.

PROSPECTS FOR FUTURE STUDIES

It seems to be reasonable to study medical optimization of chronic heart failure in clinical features of patients with permanent pacemaker.

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