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EFFECT OF LONG TERM BETA-BLOCKING THERAPY ON ECHOCARDIOGRAPHIC VARIABLES IN PATIENTS WITH DILATED CARDIOMYOPATHY

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Congestive heart failure is associated with activation of the sympathetic nervous system. Circulating levels and urinary excretion of norepinephrine are increased, whereas myocardial stores of norepinephrine are depleted [3,4]. Evidence exists that ventricles from patients with heart failure and in particular dilated cardiomyopathy (DCM) show reductions to β-adrenoceptor density and contractile responses [2]. Subsensitivity to β-adrenergic simulation in patients with heart failure may be related to long-term catecholamine exposure [2,3].

Clinical trials have revealed the apparent positive effect of β-adrenergic blocking drugs in the treatment of congestive heart failure [1,6].

The purpose of our study was to evaluate the effect of long-term atenolol therapy on left ventricular systolic and diastolic functions in patients with dilated cardiomyopathy as assessed by echocardiographic method.

Material and Methods

The study was performed in 38 patients with DCM, 21 men and 17 women. The mean age of patients was 41 years ranging from 23 to 54. Patients with the clinical diagnosis of idiopathic DCM only were included into the study. Criteria for inclusion included the ejection fractions (EF) < 0,45 and the absence of clear etiology. Patients in whom the clear cause for cardiomyopathy was identified or suspected (for example, coronary artery disease) were excluded.

It was a single-blind placebo-controlled study. 18 patients were assigned to placebo period of three months. 16 of them reached the month target, 2 were prematurely crossed to active therapy because of clinical deterioration, 20 patients enrolled received cardioselective β-blocker atenolol.

Atenolol at the initial dose 12,5 *mg/day* was used in the most severely sick patients. The dose was gradually increased until either the heart rate fell below 70 *beats/min* or the maximum dose of 150 *mg* daily was achieved. The particular combination of conventional medications including digoxin, diuretics, vasodilators and anticoagulants was maintained and not changed during the treatment protocol.

Comprehensive two-dimensional and Doppler echocardiography examinations were performed in all patients. Left ventricular end-diastolic and end-systolic dimensions were measured below the tips of mitral leaflets. Fractional shortening [FS] of the left ventricle was calculated as LVD_d-$LVD_s/LVD_d \times 100$, where LVD_d and LVD_s are left ventricular end-diastolic and end-systolic dimensions, respectively. Mean rate of circumferitial shortening [V_{cf}], was calculated as $[LV_d\text{-}LV_s]/[LV_d \times LVET]$, where LVET is left ventricular ejection time. Ejection fraction [EF] was calculated by Teicholz L. method [7]. Transmitral Doppler flow velocity profiles were digitized using the Image-Vue Worcstation. A minimum of 3 spectral envelopes were analysed and averaged for each measurement. The peak early inflow velocity (M_1), peak atrial velocity (M_2) were measured.

Data were analysed by using Student's criteria by variance lines method.

Results and Discussion

Beta blockade was administered to 20 patients for periods of 6 months. In terms of NYHA functional classification criteria, 11 patients improved, 3 remained unchanged. We have revealed a greater improvement of left ventricular ejection fraction after 6 months of therapy in patients with higher peak systolic pressure and heart rate. The ejection fraction (EF) and fractional shortening (ΔS) were increased in all functional groups after atenolol therapy (Table). In patients of III-IV NYHA functional class we have observed diastolic dysfunction with a restrictive type filling pattern [5], which probably reflects higher early diastolic left atrial – left ventricular gradient. After atenolol therapy no significant changes of diastolic function were found in patients with restrictive type of diastolic filling.

Thus diastolic dysfunction features, depending on the stage of disease, suggest that mitral inflow Doppler echocardiographic patterns add important information to the hemodynamic characterization of patients with DCM. In patients with increased late diastolic dysfunction β-blockade therapy was most effective, which means that in early stages of cardiac failure administration of β-blockers is indicated. Therapy with atenolol in our studies led to the decrease of late diastolic peak velocity. This change was favourable for intracardiac hemodynamics. It is possible that this mechanism may be also involved in the following improvement of myocardial contractility after long-term treatment with β-blockers.

Table

Hemodynamic Indices Improvement in Ventricular Function After Treatment with Atenolol (X±SE)

Baseline Characteristic	Control	I NYHA Functional Class			II NYHA Functional Class			III-IV NYHA Functional Class		
		Before Treatment	After Treatment	Δ%	Before Treatment	After Treatment	Δ%	Before Treatment	After Treatment	Δ%
Peak systolic pressure (*mm Hg*)	13,4 ± 5,6	128,9 ± 5,5	118,9±5,4*	-7,6	118,1 ± 3,6	101,2 ± 3,2**	-15,3	91,8 ± 1,3	89,6 ± 2,1*	-2,4
End-diastolic pressure (*mg Hg*)	71,1 ± 3,4	83,4 ± 3,9	83,4 ± 3,9	-7,8	79,7 ± 4,5	68,7 ± 2,9**	-15,4	63,4 ± 1,04	70,5 ± 2,6	10
Heart rate (*beats/min*)	69,9 ±3,1	94 ± 4,1	76,1 ± 3,7*	-191	106,1 ± 5,9	84,3 ± 5,2**	-20,5	93,0 ± 3,5	90,1 ± 2,1*	-3,3
End-systolic dimension (*cm*)	3,0 ±0,9	4,4 ± 0,2	4,1 ± 0,2**	-16	5,3 ± 0,3	4,4 ± 0,2**	-17	6,0 ± 0,3	5,6 ± 1,1	-6,6
End-diastolic dimension (*cm*)	4,6 ±0,2	6,1 ± 0,2	5,7 ± 0,2**	-6	6,4 ± 0,2	6,0 ± 0,1	-6,3	6,9 ± 0,9	6,6 ± 1,3	-4,3
Ejection fraction (%)	71,3 ±3,5	40,8 ± 2,0	55,1±1,7***	35	35,1 ± 2,4	49,6 ± 1,8***	41	23,1 ± 2,2	28,4±1,8**	18,7
Fractional shortening (%)	38,2 ±5,6	20,6 ± 1,1	29,1±1,1**	42	17,5 ± 1,1	26,3 ± 1,2***	47	13,0 ± 1,8	17,3±2,1*	24
Mean rate of ircumferential shortening (S^{-1})	1,0 ±0,04	0,5 ± 0,03	0,8±0,03**	60	0,5 ± 0,1	0,7 ± 0,03***	40	0,4 ± 0,02	0,5±0,003**	20
Early diastolic max. velocity (*cm/s*)	81,7 ±13,7	56,4 ± 15,8	59,0 ± 15,1	4,9	57,1 ± 15,1	75,8 ± 11,9**	24,7	75,8 ± 11,9	69,3 ± 0,1*	-7,6
Late diastolic max. velocity (*cm/s*)	68,2 ±8,7	82,0±14,5	67,9±15,0*	-17,2	71,3 ± 10,3	54,4 ± 16,1**	23,4	67,6 ± 16,3	66,4 ± 9,6*	-1,8
Filling velocity ratio (M_1/M_2)	1,21±0,8	0,71±0,024	0,98 ± 0,3	27,6	0,82 ± 0,18	1,28 ± 0,34	35	1,17 ± 0,35	1,04 ± 0,33	-6,1
Diastolic filling deceleration time (ΔT)	175 ±37	229 ± 73	184 ± 37	-17,7	213 ± 51	185 ± 50	-13,2	185 ± 44	187 ± 31	-1,1

* - $p < 0,05$; ** - $p < 0,01$; *** - $p < 0,001$

Results of the study show that the use of beta-blockade combined with standard therapy with diuretics and digitalis in patients with DCM may significantly improve myocardial function. Improvement of systolic function in patients with DCM may be predicted by baseline peak systolic pressure and heart rate. It should be also noted that patients with increased late diastolic filling were those, who had the most expressed diastolic improvement after atenolol therapy. Although patients with low ejection fraction and peak systolic pressure at baseline did not respond as well hemodinamically, they may still have had some improvement due to beta-blockade therapy.

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ԴԻԼԱՏԱՑԻՈՆ ԿԱՐԴԻՈՄԻՈՊԱԹԻԱՅՈՎ ՀԻՎԱՆԴՆԵՐԻ ԷԽՈԿԱՐԴԻՈԳՐԱՖԻԿ ՑՈՒՑԱՆԻՇՆԵՐԻ ԴԻՆԱՄԻԿԱՆ β-ԲԼՈԿԱՏՈՐԱՅԻՆ ԵՐԿԱՐԱՏԵՎ ԲՈՒԺՄԱՆ ՊԱՅՄԱՆՆԵՐՈՒՄ

Լ.Ն.Նազարյան, Հ.Ս.Սիսակյան

Ուսումնասիրվել է դիլատացիոն կարդիոմիոպաթիայով հիվանդների սրտի կառուցվածքային և ֆունկցիոնալ տեղաշարժերի դինամիկան β-բլոկատոր՝ աթենոլոլով բուժման ընթացքում:

Ցույց է տրված, որ աթենոլոլով վեցամսյա բուժման ընթացքում արյան շրջանառության անբավարարության I և II ֆունկցիոնալ դասերով հիվանդների կլինիկական վիճակը և սրտամկանի կծկողական ունակությունը զգալիորեն լավանում է, պակասում է ձախ փորոքի դիլատացիայի աստիճանը: Արյան շրջանառության խրոնիկական անբավարարությամբ տառապող հիվանդների բուժման սկզբնական շրջանում աթենոլոլի ազդեցությունը դիաստոլիկ ֆունկցիայի վրա արտահայտվում է արյան հոսքի արագության փոփոխության բացակայությամբ և նախասրտերի պիկի զգալի նվազմամբ, որոնք համապատասխանում են կլինիկական վիճակի աստիճանական լավացման շարժընթացին:

ДИНАМИКА ЭХОКАРДИОГРАФИЧЕСКИХ ПОКАЗАТЕЛЕЙ У БОЛЬНЫХ ДИЛАТАЦИОННОЙ КАРДИОМИОПАТИЕЙ В УСЛОВИЯХ ДЛИТЕЛЬНОГО ЛЕЧЕНИЯ β-БЛОКАТОРАМИ

Л.Н.Назарян, А.С.Сисакян

Изучено действие длительной терапии атенололом на структурные и функциональные показатели миокарда левого желудочка (ЛЖ) у больных дилатационной кардиомиопатией с помощью метода эхокардиографии. После 6-месячной терапии атенололом у больных НК ФК I и II отмечалось усиление клинического статуса, уменьшение степени дилатации ЛЖ. Повышение показателей сократимости миокарда было отмечено у больных всех ФК, но более выраженным после терапии атенололом у больных ФК I и II. Действие атенолола на трансмитральный диастолический поток у больных на начальной стадии хронической недостаточности кровообращения проявлялось отсутствием изменения скорости потока в период быстрого наполнения и значительным снижением предсердного пика, что соответствовало степени улучшения клинического статуса больных.

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