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Clinical characteristics of patients with dilated cardiomyopathy and bradyarrhythmias

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Summary

The clinical characteristics of patients with dilated cardiomyopathy and bradyarrhythmias were studied. Among 50 patients with dilated cardiomyopathy, 6 had bradyarrhythmias. Among these patients were one with sinus bradycardia, one with atrial fibrillation and slow ventricular responses and sick sinus syndrome (SSS), one with SSS with advanced AV block, and 3 with advanced AV block. The average age at the onset of their cardiac symptoms (60.3 ± 12.1 years (mean $\pm$ SD)) was significantly ($p < 0.01$) higher than that of 43 patients without bradyarrhythmias (40.0 ± 17.6). The left ventricular diastolic dimension and ejection fraction were similar among patients with and without bradyarrhythmias. In 31 follow-up patients without bradyarrhythmias, 8 (25.8%) died of cardiac causes; whereas, in 5 patients with bradyarrhythmias, 4 had been implanted with pacemakers and 3 (60.0%) died of cardiac causes. Furthermore, the age at the onset of cardiac symptoms in patients with any kind of conduction disturbance, except tachyarrhythmia, was 50.4 ± 16.5 years ($n = 25$), which was significantly higher ($p < 0.02$) than that of patients without conduction disturbances (37.7 ± 19.3 years, $n = 23$).

We concluded that bradyarrhythmias are not rare complications in patients with dilated cardiomyopathy, and the mortality rate tends to be higher in patients with bradyarrhythmias than in those without them. Furthermore, the risks of conduction disturbances and bradyarrhythmias were higher in the elderly patients.

Key words

Dilated cardiomyopathy | Sick sinus syndrome | Bradyarrhythmias | Elderly patients

Introduction

Dilated cardiomyopathy (DCM) is a myocardial disease with a poor prognosis and a mortality reportedly of about 50% during 3 years.[1~4] The mode of death includes intractable congestive heart failure (CHF), pulmonary and systemic thromboembolisms, and

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sudden deaths.[1,2,5,6] The main cause of sudden death is believed to be ventricular tachyarrhythmia.[7~9] However, high degree conduction disturbances with DCM have been reported.[9~13] But the morbidity and mortality from bradyarrhythmias in patients with DCM have not been clarified. In the present study, we observed the prognosis, anatomical and other clinical characteristics in DCM patients with bradyarrhythmias.

Patients and methods

Fifty patients with DCM who were admitted to our hospital from 1973 to 1988 were studied. Patients in the present study necessarily fulfilled the following criteria: 1) the presence or history of, left or both sided heart failure; 2) a dilated left ventricle with a reduced left ventricular ejection fraction on echocardiogram and/or left ventriculogram; 3) absence of specific muscular disease, coronary artery disease, general systemic disease affecting the cardiovascular system, history of hypertension, congenital heart disease and alcoholic cardiomyopathy.

Among the 50 patients, there were 41 (82%) males and 9 (18%) females, and their ages on admission ranged from 15 to 82 years (**Table 1**). Family history of DCM was obtained in 14 patients. Thirty-six patients, 30 (83.3%) males and 6 (16.7%) females, were followed up (mean follow-up period; 10.8 years). Eleven patients (30.4%) died of cardiac causes and 3 (8.3%) died of noncardiac causes during the follow-up period.

There was no significant difference between the mean age at onset of 11 patients who died from cardiac causes and that of 22 who were alive, i.e., 41.1±9.2 years and 38.1±12.6 years, respectively.

The age of onset was defined as the age at the first appearance of CHF or arrhythmia, or that when cardiomegaly or arrhythmia was found incidentally. Follow-up information was obtained by telephone interviews with the patients or their families or by reviewing outpatient files.

It was proved that in no case was bradyarrhythmia related to digitalis therapy.

Table 1. Patients' profiles

Items	Number	%
Total patients	50	
Male	41	82
Female	9	18
Family history (+)	14	28
Follow-up patients	36	
Male	30	83.3
Female	6	16.7
Deceased	14	38.8
Cardiac	11	30.6
(age at onset; 41.1±9.2 (14~71))*		
Noncardiac	3	8.7
Alive	22	61.1
(age at onset; 38.1±12.6 (8~73))*		

* mean±SD (range).

Clinical data: Chest radiography, echocardiography, and Holter electrocardiography (ECG) were performed for all patients during their first admissions to our hospital. For 15 patients, cardiac catheterization was performed. The left ventricular dimensions and left ventricular ejection fractions were determined by echocardiography or from data of cardiac catheterizations. Bradyarrhythmias were classified according to the data obtained from the Holter ECGs or electrophysiological studies during cardiac catheterizations.

Items studied: Between patients with and without bradyarrhythmias, the age of onset of cardiac symptoms, in cardiothoracic ratio, left ventricular ejection fraction, left ventricular diastolic dimension and their prognosis were compared.

The ages at onset of cardiac symptoms and prognoses were also compared between the patients with and without conduction disturbances. Conduction disturbances in this study included any degree of AV block, left bundle branch block (LBBB), right bundle branch block (RBBB) and intraventricular conduction defect.

Statistical analysis: The data were expressed

as mean value±standard deviation. Parametric data were analyzed by the unpaired t-test, and nonparametric data by the chi-square test, each with a level of significance of 0.05.

Results

1. A profile of patients with bradyarrhythmias

Electrocardiographic findings of 50 patients during their hospitalizations are summarized in **Table 2**. Bradyarrhythmias were observed in 6 patients; sinus bradycardia below 50 beats per min in one patient, atrial fibrillation with a ventricular rate below 50 beats per min in one patient, sick sinus syndrome (SSS) with bradycardia in 2 patients, and advanced or complete atrioventricular (AV) block in 4 patients.

Data for each individual are presented in **Table 3**. In Case 1, advanced AV block, complete RBBB, and left anterior hemiblock (LAH) were observed on ECG when he consulted a physician because of dyspnea. He refused pacemaker implantation and suddenly died 8 years after discharge. The initial symptom of Case 2 was general fatigue, and bradycardia with atrial fibrillation. He refused pacemaker implantation and died within one year. Case 3 was a 56-year-old man. He experienced dyspnea and bradyarrhythmia. A pacemaker was implanted without success to alleviate symptoms of congestive heart failure. In Case 4, the patient visited a hospital because of orthopnea. When he was 78 years old, a pacemaker was implanted because of advanced AV block. He died of cancer 4 years later. Case 5 was lost from follow-up. Case 6 had a complete AV block and atrial fibrillation when he came to the hospital because of fatigue. A pacemaker was implanted. He is the only patient who is presently alive in our study. Cases 3, 4, and 5 had family histories of DCM.

2. Comparison of patients with and without bradyarrhythmias

There was no significant difference between patients with and without bradyarrhythmias, in cardiothoracic ratios (62.2±7.3% vs 57.7±7.5%), left ventricular ejection fraction (30.8±10.1% vs 34.5±14.1%), and left ventricular diastolic dimension (62.0±3.5 mm vs 60.7±8.7 mm) (**Table 4**). The ages at onset of their cardiac symptoms are presented in **Fig. 1**. In the bradyarrhythmia group, the onset age was 60.3±12.1 years (range; 45~78), which was significantly ($p<0.01$) higher than in the

Table 2. Arrhythmias and conduction disturbances (N=50)

	Number	%
1. Rhythm abnormalities		
Atrial fibrillation	14	28
Sick sinus syndrome	2	4
Idioventricular rhythm	1	2
Sinus tachycardia	1	2
Sinus bradycardia	1	2
Lower atrial rhythm	1	2
Paroxysmal supraventricular tachycardia	3	6
Frequent APCs	2	4
2. Ventricular arrhythmias		
VPCs (more than Lown's 3 degree)	7	14
Ventricular tachycardia	23	46
Ventricular fibrillation	2	4
3. Blocks		
Atrioventricular block		
First degree	5	10
Second degree	1	2
Advanced or complete	4	8
Right bundle branch block		
Incomplete	2	4
Complete	6	12
Left bundle branch block		
Anterior hemiblock	5	10
Complete	8	16
Intraventricular		
Conduction defect	3	6
4. WPW syndrome	1	2

APCs=atrial premature contractions; VPCs=ventricular premature contractions.

Patients with VPCs do not include those with ventricular tachycardia (VT) with VPCs. Patients with ventricular fibrillation do not include those with VPCs or VT.

Table 3. Profiles of patients with bradyarrhythmias

Case	Sex	Age at onset	Outcome	Follow up years	Family history	Pacemaker	ECG findings (Conduction disturbances)
1	M	47	Death	8	(−)	(−)	Adv. AVB, CRBBB, LAH
2	M	71	Death	1	(−)	(−)	Af (brady), SSS, VPCs
3	M	56	Death	11	(+)	(+)	Sinus brady, APCs, 1AVB, VPCs
4	M	78	NC death	4	(+)	(+)	SSS, Adv. AVB
5	M	45	Dropout	(−)	(+)	(+)	Adv. AVB
6	M	65	Alive	8	(+)	(+)	Af, CAVB

M=male; NC death=noncardiac death; Adv. AVB=advanced atrioventricular block; CRBBB=complete right bundle branch block; LAH=left anterior hemiblock; Brady=bradycardia; Af=atrial fibrillation; SSS=sick sinus syndrome; 1AVB=first degree atrioventricular block; VPCs=ventricular premature contractions; CAVB=complete atrioventricular block.

Table 4. Comparisons of patients with and without bradyarrhythmias

Items	Bradyarrhythmia (+)	Bradyarrhythmia (−)
Number of patients	6	33
Cardiothoracic ratio	62.2±7.3%	57.7±7.5%*
LV ejection fraction	30.8±10.1%	34.5±14.1%*
LV diastolic dimension	62.0±3.5 mm	60.7±8.7 mm*
Number of follow up patients	5	31
Cardiac death	3 (60.0%)	8 (28.5%)
Noncardiac death	1 (20.0%)	1 (3.6%)
Alive	1 (20.0%)	19 (67.9%)

LV=left ventricular.
* No significant difference between those with bradyarrhythmia (+) and (−).

patients without bradyarrhythmias (40.0±17.6 years of age, 8~73). The rate of cardiac death was higher in the patients with bradyarrhythmias (60%) than in those without them (25.8%), though this difference was not statistically significant because the patients with bradyarrhythmias were older and their numbers were relatively few.

3. Comparisons of patients with and without conduction disturbances

Table 5 shows the age at onset in these 2 groups. There was a significant difference ($p<0.02$) between them; 50.4±16.5 years of age in 25 patients with conduction disturbances and 37.7±19.3 years in 23 patients without. Cardiac death occurred in 5 of the 18 patients with conduction disturbances and in 7 of the 18 patients without such disturbances. There was no significant difference between them.

Discussion

Though the incidence of bradyarrhythmias in DCM patients has not yet been reported, previous studies reported the incidence of advanced or complete AV block from 0 to 10%[1,4,5,14~17], and sinus bradycardias as 2%.[1,17] In the present study, the incidence of bradyarrhythmias was 12%; SSS 4%, sinus bradycardias 2%, and advanced or complete AV block 8%. These results indicate that bradyarrhythmias are not rare complications in patients with DCM. They occur at a rate of about 10%

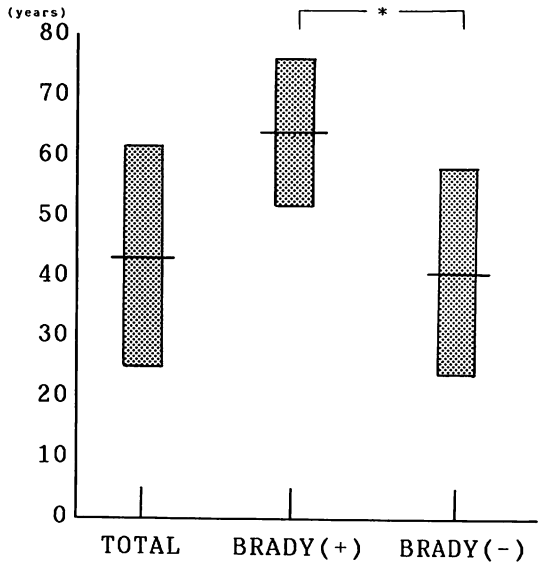

Fig. 1. Comparison of ages at onset of symptoms.

With bradyarrhythmias (BRADY (+): 60.3±12.1 years old), without bradyarrhythmias (BRADY (−): 40.0±17.6 years old). The age at onset of all patients was 42.4±12.6 years old.

*: $p<0.01$.

in DCM patients.

Tachyarrhythmia is a well-known risk factor of mortality in DCM.[7~9,18] However, bradyarrhythmia has not been regarded a risk factor in analysis of prognostic factors.[2,18] In the present study, however, 3 of 5 (60%) patients with bradyarrhythmias died during the follow-up period, and 2 patients who declined to have a pacemaker implantations were included in these deceased patients. Murao[9] reported that the 5-year survival rate of DCM patients with bradyarrhythmias was 56%. In patients with complete AV block, the 5-year survival rate of those without pacemakers was 33%, versus 70% of those with pacemakers.[9] In the present study and in Murao's, the prognosis of patients with bradyarrhythmias without pacemakers was relatively poor, compared with the general mortality of patients with DCM, which is reportedly 29~50%.[1~3,18] We therefore, regard bradyarrhythmias to be an important risk factor in DCM patients.

In the present study, the mean age at onset of symptoms in patients with bradyarrhythmias was higher (60.3 years of age) than that of patients without bradyarrhythmias (40.0 years of age). Murao reported the same tendancy, though his comparisons were of patients with bradyarrhythmias versus those with tachyarrhythmias.[9] He reported that in DCM patients with bradyarrhythmias, the mean onset age was 40.1 for cardiac symptoms and 47.8 for congestive heart failure; whereas, in those with tachyarrhythmias, the figures were 37.5 and 41.8, respectively, suggesting that the development of bradyarrhythmias be more frequent in older patients with DCM. Many pathological

Table 5. Comparisons of patients with and without conduction disturbances

	Conduction disturbances (+)	Conduction disturbances (−)
Number of patients	25	23
Age at onset (years)	50.4±16.1	37.7±19.3*
(Excluding bradyarrhythmia patients)	47.4±16.0	
Number of follow-up	18	18
Follow-up period (years)	11.9±11.1	9.4±6.9
Cardiac death	5	7
Age at onset (years)	51.4±17.7	31.1±17.5*

* $p<0.02$.

Conduction disturbances include any degree of AV block, left bundle branch block, right bundle branch block, and intraventricular conduction defect.

studies have reported the affected conduction system in DCM patients.[11,12,19,20] Particularly in elderly patients with DCM, the conduction system is supposed to be more subject to the involvement because the incidence of conduction disturbances itself is reportedly higher in this age group.[21] Alcohol may be another factor. The incidence of conduction disturbances was reported high among DCM patients with a drinking habit.[2,10] Supposedly, the conduction system may be more strongly affected in elderly DCM patients with a history of mild but consistent drinking habit.

The cardiac function is similar between patients with and without bradyarrhythmias.

We concluded that attention must be devoted to the detection of bradyarrhythmias in elderly DCM patients. The early implantation of pacemakers should improve their prognoses.

Conclusion

1. Bradyarrhythmia is not a rare complication of DCM; its incidence is about 10%.
2. Though the cardiac function of patients with bradyarrhythmias does not differ from that of patients without bradyarrhythmias, the prognosis tended to be poorer in patients with bradyarrhythmias, especially in those without pacemakers.
3. Bradyarrhythmia and other conduction disorders are significantly more frequent among elderly DCM patients.
4. The early detection of conduction disturbances is important in the treatment of elderly DCM patients.

要　　約

徐脈性不整脈を伴う拡張型心筋症患者の臨床的特徴

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徐脈性不整脈を伴う拡張型心筋症の臨床的特徴を50例の入院患者で調べた．このうち6例で徐脈性不整脈が見られ，その内訳は心拍数が毎分50以下の洞徐脈1例，心房細動1例，高度房室ブロックを伴う洞不全症候群1例，高度房室ブロックが3例であった．心症状の発現年齢は徐脈性不整脈群では60.3±12.1歳で，徐脈を伴わない群(40.0±17.6歳)に比べ有意に高かった($p<0.01$)．左室拡張終期径と左室駆出率は両群間に有意差はなかった．50例中36例が追跡可能であったが，このうち31例の徐脈性不整脈を伴わない患者では8例(25.8%)が心臓死したが，徐脈性不整脈患者では5例中3例(60.0%)が死亡し，この3例のうち2例にはペースメーカーは装着されていなかった．

何らかの伝導障害を伴う患者の発症年齢は50.4±16.5歳で，これは伝導障害を認めない群(37.7±19.3歳)に比べ有意に高かった($p<0.02$)．

以上の結果から，徐脈性不整脈は拡張型心筋症においては希な状態ではなく(6/50例)，その予後は悪い傾向にあり，更に徐脈性不整脈および何らかの伝導障害を伴う患者では，発症年齢が高いことが示された．

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