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Role of Coronary Angiography in Myxoma Patients: A 14-Year Experience in One Medical Center

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Abstract
Cardiac myxoma is the most common form of primary heart tumor and often treated with surgical resection without a preoperative angiographic examination for fear of potential risk of sudden death. During the last 14 years, 24 of 38 patients with myxoma underwent coronary angiography. Coronary artery disease (CAD) and other abnormalities were found in 5. Our findings indicated that CAD is not uncommon among the myxoma patients, and coronary angiography should be performed preoperatively in all cases.

Cardiac myxoma is the most common primary cardiac tumor, accounting for about 50% of cardiac tumors [1]. However, it is still relatively uncommon, appearing in only 0.0017–0.33% of autopsy series [1]. Nowadays, myxoma can be easily diagnosed by echocardiography and almost cured by surgical resection. Therefore, some authors proposed to resect a myxoma as soon as it is detected, even without preoperative angiography [1–4], because of its potential risk of sudden cardiac death after mitral annular obstruction. In the past, there were very limited reports on the association of coronary artery disease (CAD) and myxoma. It is important to detect this counterpart association of CAD with cardiac tumor, because simultaneous coronary artery bypass surgery would be crucial to the patients with critical coronary lesions. The aims of this study were to investigate the coronary condition and to estimate the prevalence rate of coronary artery disease among patients with cardiac myxoma.

Patients and Methods

Between 1984 and 1998, a total of 38 patients (24 women and 14 men, aged 21–81 years) were diagnosed to have cardiac myxoma by echocardiography at the National Taiwan University Hospital. We excluded 3 patients, 2 died of other diseases and 1 with poor lung function. The remaining 35 patients received surgical resection with a definite pathological diagnosis of myxoma. Only 24 patients received preoperative coronary angiography. CAD was defined as >70% stenosis in the left anterior descending artery (LAD), left circumflex artery (LCx), and right coronary artery (RCA) and >50% stenosis in the left main coronary artery (LM).

We divided the myxoma patients into two groups (with/without CAD) and correlated the prevalence rate of CAD risk factors. The χ^2 test was used to test the correlation. The risk factors were defined according to guidelines of the National Cholesterol Education Program [5, 6].

Z-approximation was used to compare the CAD rate of our patients with that reported in a previous study of a Chinese population [7].

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Table 1. Characteristics of the myxoma patients undergoing coronary angiography (1984–1997) by timing sequence

	Sex	Age years	Symptom 1	Symptom 2	Symptom 3	Chest pain	CAD risk factors	CAD	Feeding artery
1	F	36	DOE	palpitation		–	1	–	RCA/LCx
2	F	61	orthopnea	palpitation	blindness	–	3	–	LCx
3	M	57	DOE			–	2	–	
4	F	42	DOE	syncope		–	0	–	
5	F	35	DOE			–	0	–	RCA
6	F	51	palpitation	dizziness		–	1	–	LCx
7	M	57	DOE	palpitation		–	4	–	
8	F	46	DOE	palpitation		–	0	1VD (LAD)	RCA
9	M	67	DOE	orthopnea	chest pain	+	3	–	LCx/RCA
10	F	48	DOE	palpitation		–	2	–	
11	M	50	DOE			–	3	–	RCA/LCx
12	F	41	palpitation			–	0	–	LCx
13	F	60	DOE			–	2	–	LCx
14	F	36	DOE	dizziness		–	0	–	RCA
15	F	44	DOE	PND	chest pain	+	0	LAD bridging	
16	F	59	DOE	chest pain		+	3	–	LCx
17	M	58	DOE			–	3	2VD (LAD, RCA)	
18	M	81	chest pain			+	4	2VD (LM, RCA)	
19	M	69				–	3	3VD	
20	F	21	palpitation	dizziness		–	0	–	
21	M	55	DOE	palpitation		–	4	–	
22	M	65	DOE	PND	syncope	–	3	–	
23	M	45	chest pain			+	2	3VD	
24	F	47	chest pain			+	1	–	

DOE = Dyspnea on exertion; PND = paroxysmal nocturnal dyspnea; 2VD = two-vessel disease; 3VD = triple-vessel disease.

Results

In our 38 patients, the myxoma was located in the right atrium in 4, in the left ventricle in 1 and in the left atrium in 33 patients. The major clinical manifestations of the 24 patients subjected to preoperative coronary study were listed in table 1 according to the timing sequence. The most common symptom was exertional dyspnea (16/24, 66.7%), followed by palpitation (9/24, 37.5%), chest pain (6/24, 25%), dizziness (3/24, 12.5%), and syncope (2/24, 8.3%). Among our patients, 5 had CAD, i.e. the prevalence rate was 20.8%, which is strikingly higher than the percentage in the general population studied previously ($p < 0.05$) [7]. Besides, another patient has myocardial bridging over LAD and atypical angina (table 2). One of the CAD patients had a discrete LAD stenosis, which was proved to result from a myxoma thrombus pathologically. The other 4 patients had multiple vessel diseases. None of the patients with CAD was disclosed to have left ventricular regional wall motion abnormality by echocardiography. In the 24 patients, 11 had angiographically defined tumor-feeding arteries, 3 from the RCA, 5 from the LCx, and 3 from both the RCA and LCx (table 1). All the CAD patients received coronary artery bypass grafting.

We compared the prevalence rate of CAD risk factors between the CAD and non-CAD groups, and no statistic discrepancy in age, hypertension, smoking habits, diabetes or hyperlipidemia was found between these two groups (table 3).

Discussion

Cardiac myxoma is rare and presents with a triad of obstructive, embolic, and constitutional symptoms [1, 9]. Some authors also reported malignant characteristics such as local invasion and metastasis [1, 10–12]. Myxoma may not only lead to distal embolization but also to mitral valve obstruction, which can occur at any time and precipitate sudden death [3]. Besides, it can be diagnosed eas-

Table 2. Clinical characteristics of the myxoma patients with coronary abnormalities

Age years	Sex	Symptom	Symptom	Chest pain	CAD risk score	Coronary condition	Operation
46	F	DOE	palpitation	–	0	LAD dicrete lesion resulting from thrombus	excision + LAD thrombectomy
44	F	DOE	chest pain	+	0	LAD middle bridging	excision
61	M	DOE		–	3	2VD: LAD + RCA	excision + CABG
81	M	angina		+	5	2VD: D1 + RCA	excision + CABG
69	M			–	3	3VD: LM + LCx + RCA	excision + CABG
45	M	angina		+	2	3VD: LAD + OM + RCA	excision + CABG

D1 = First diagonal branch of LAD; OM = obtuse marginal artery; DOE = dyspnea on exertion; LABG = coronary artery bypass graft.

Table 3. Prevalence of CAD risk factors in the myxoma patients

CAD risk factors	CAD patients (n = 5)		Non-CAD patients (n = 13)		χ^2 test
	%	n	%	n	
Age	60	3	63	12	$p > 0.05$
Gender	80	4	36	7	$p > 0.05$
Smoking	80	4	26	5	$p > 0.05$
Hypertension	20	1	5.2	1	$p > 0.05$
Hyperlipidemia	20	1	21	4	$p > 0.05$
Diabetes	0	0	5.2	1	$p > 0.05$

ily by echocardiography and cured by surgical intervention with low risk [2]. Therefore, some authors proposed that surgery should be performed as soon as echocardiographic examination has confirmed the diagnosis, and preoperative catheterization is not necessary [1–4]. In cases of syncope or embolic event, even emergency surgery may be considered [2]. However, such strategy prevents the detection of the coexisting CAD.

To the best of our knowledge, there are only five studies in the literature investigating the relationship between CAD and myxoma [8, 9, 13–15] (table 4). Most of those studies showed prevalence rates of CAD in myxoma patients of 0–11%, and only the study performed by Fueredi et al. [9] yielded a very high (6/9, 66.7%) rate. If the prevalence rate of CAD in the myxoma patients were as low as in these studies, it would be reasonable to skip the catheterization and go directly to surgery once myxoma is diagnosed by echocardiography. Actually, Cleemput et al. [8] proposed that coronary angiography was only indicated in patients with a previous myocardial infarction or with clear history of angina. Our study had a bigger sample size and revealed a much higher prevalence rate than those previously reported. We did not have much evidence in the literature to answer whether such a higher rate resulted from ethnical differences, i.e. if Chinese patients with myxoma had a higher CAD prevalence. However, compared with the previously reported CAD prevalence (9.41%, 673/7,159) in one autopsy study in a Chinese population [7], our myxoma patients still have a strikingly higher CAD rate ($p < 0.001$). Besides, from one of our unpublished epidemiological studies in Northern Taiwan which has enrolled 3,602 persons since 1991, the prevalence rate of CAD in Taiwan was only about 3%, which is still much lower than that of our myxoma patients.

What made the prevalence rate of CAD in our myxoma patients so high? Do they have more CAD risk factors? However, there is no significant difference in risk factor distribution in our study between the CAD and the non-CAD groups statistically, i.e. even though we considered the presence of CAD risk factors, it is still hard to know exactly before catheterization whether a myxoma patient would have CAD or not. Actually, even patients without any risk factor would have CAD (patient 8). Therefore, every patient with myxoma might need coronary angiography to rule out CAD before operation.

Why did so many myxoma patients have CAD? Just as 1 of our 5 patients, embolization of myxoma fragments could occur in the coronary system. In a study by Silverman et al. [16], 3 of the 35 myxoma patients with system embolization had the emboli in the coronary system. Balk et al. [17] reported chronic coronary embolization of myxoma led to vessel narrowing and aneurysm dilatation, which was similar to the findings of cerebral, renal, and

Table 4. Previous studies of myxoma and CAD

Authors	Year of publication	Patients	CAD		Feeding artery
			n	%	
Salcedo et al. [13]	1983	18	1	5.5	not defined
Fueredi et al. [9]	1989	9	6	67	3 from RCA, 1 from LCx, 1 from both
Chow et al. [14]	1991	9	0		2 from LCx, 1 from RCA and LCx
Shimono et al. [5]	1992	7	0		not defined
Cleemput et al. [8]	1993	19	2	10.5	4 from RCA, 3 from LCx

pulmonary vessels. Acute myocardial infarction might result from coronary embolization [15, 18–21]. Besides, Isobe et al. [22] reported that 3 myxoma patients had elevated levels of interleukin-6 and interleukin-8, which would induce a hypercoagulable state and induce coronary thromboembolism. Therefore, our myxoma patients might be under a higher risk of coronary embolism and cytokine-related thrombosis, which would lead to CAD afterwards.

Conclusion

CAD was more prevalent in the patients with myxoma than in the general population. This implies that coronary angiographic examination must be performed before surgical resection to detect coexistent CAD.

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