

# Atrial Myxoma : A Review of Clinical Experience at Srinagarind Hospital

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## Abstract

Thirty-two intracardiac myxoma patients who underwent tumor excision in Srinagarind Hospital between January 1, 1983 and January 30, 1997 were retrospectively reviewed. Clinical presentations, diagnostic method, operative findings, and postoperative course were also analysed. There were 20 female and 12 male patients, age range 10 to 60 years (mean 37.9). Clinical presentations included congestive heart failure (56.2%), atypical chest pain (25.0%), syncope (18.9%), and constitutional symptoms (9.3%). In six patients, there was clinical evidence of systemic embolism. One patient was essentially asymptomatic and incidentally detected during clinical check-up. Diagnosis was all made by two dimensional (2-D) echocardiographic study. There were 29 left atrial, 2 right atrial and 1 combined right atrial and right ventricular myxomas. There were 3 postoperative deaths, two due to septicemia and the other due to cerebral embolism. One patient developed postoperative severe mitral regurgitation and complete heart block needed mitral valve replacement and permanent pacemaker insertion. One patient developed localized seizure 6 years after resection and was suspected of brain metastasis. The other was found to have two high echogenic liver masses, 2 years after resection, suggestive of hepatic metastasis. Unfortunately, we could not obtain the histologic confirmation from any of those suspected lesions.

Because of the non-specific and various manifestations of atrial myxoma, a high index of suspicion is needed. The diagnostic method of choice is 2D-echocardiography. Clinical follow-up for at least 10 years may be needed to rule out recurrence or metastasis.

**Key word :** Atrial Myxoma, Clinical Experience, Srinagarind Hospital

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Atrial myxoma is believed to be the most common "primary cardiac tumor", comprising 40 per cent of the benign and 24 per cent of all tumors of the heart and pericardium<sup>(1-7)</sup>. This lesion is, furthermore, clinically the most significant primary tumor of the heart, for its discovery and proper treatment can be lifesaving and offer an excellent prognosis. Early diagnosis is essential to reduce catastrophic complications such as sudden death, embolism, or cardiac failure. However, there are currently no definitive signs or symptoms that expose the presence of a myxoma. In this study we reviewed the incidence of an intracardiac myxoma in Srinagarind Hospital with emphasis on the clinical manifestations, diagnosis, treatment of the disease and its prognosis.

## MATERIAL AND METHOD

Thirty-two intracardiac myxoma patients who underwent tumor excision in Srinagarind Hospital between January 1, 1983 and January 30, 1997 were retrospectively studied. The patients' medical records were reviewed regarding various clinical presentations, diagnostic methods, operative findings, postoperative course, as were all available roentgenograms, electrocardiograms, echocardiograms, and other laboratory tests.

For laboratory test, anemia was defined as a hemoglobin concentration of less than 14 g/dl in males and less than 12 g/dl in females. Elevation of erythrocyte sedimentation rate (ESR) was defined as a level of more than 20 mm in 1 hour in males and more than 40 mm in females by the Westergren method.

## RESULTS

### Patient population

The study group consisted of 20 female (62.5%) and 12 male (37.5%) patients ranging in age from 10 to 60 years (mean 37.9 years). There was only one child younger than 15 years of age. Twenty-nine (90.7%) of tumors were located in the left atrium, 2 (6.2%) in the right atrium, and only 1 (3.1%) combined in both right atrium and right ventricle. The majority of these tumors originated from the atrial septum or in the region of the foramen ovale. (Table 1)

### Clinical presentations

#### Symptoms

The major presenting symptoms were those secondary to congestive heart failure (New York Heart Association Class III or IV) in 18 patients (56.2%), all of whom had dyspnea on exertion or paroxysmal nocturnal dyspnea. Other cardiac manifestations included atypical chest pain in 8 (25%), and palpitations in 5 patients (15.9%). Syncopal episodes were reported in 6 (19.3%), usually in relation to postural changes. Atrioventricular valve obstruction by the tumor could have been implicated in these patients. Peripheral arterial embolization occurred in 6 patients (18.9%). One of them had two episodes of acute arterial ischemia due to embolization to the mesenteric artery, presenting with acute abdominal pain and hematochezia, ten hours later she developed acute gangrene of the left leg. The other five presented with cerebral embolism, of these, 1 had a history of several episodes of transient ischemic attack (TIA) and eventually presented with gangrene of right upper extremity on the day of admission.

Three patients presented with a myriad of constitutional symptoms such as fever, loss of weight, fatigue, skin rashes, arthralgia, and myalgia. One interesting case presented as bacterial endocarditis with fever, chills, petechiae, subconjunctival hemorrhages, a heart murmur, microhematuria, and hemocultures positive for  $\alpha$ -Hemolytic Streptococcal Group-B. This patient was later discovered to have a left atrial myxoma floridly infected with gram - positive cocci. Another patient had a history of right shoulder leiomyosarcoma, which was successfully resected 4 years ago, she then developed clinically overt hyperthyroid with progressive jaundice and the combined right atrial and right ventricular myxomas were discovered incidentally during

**Table 1. Cardiac myxoma implantation sites.**

Location	Implantation site		No.
	General	Specific	
Left atrium (90.7%)	Septal	Fossa ovalis	24
	Extraseptal	Interatrial wall	2
		Mitral annulus	2
Right atrium (6.2%)	Septal	Atrial free wall	1
		Fossa ovalis	2
Right ventricle (3.1%)	Tricuspid valve		1

abdominal ultrasonographic study. The distribution of these clinical presentations is shown in Table 2. The time interval between the onset of symptoms and operation varied from 2 days to 6 years, and the mean interval was 13.4 months.

**Table 2. Atrial myxoma : presenting symptoms in 32 patients.**

	Total (N=32)	
	No. patients	%
Congestive heart failure	18	56.2
Atypical chest pain	8	25.0
Syncope	6	18.9
Embolism	6	18.9
Constitutional symptoms	3	9.3
Pericarditic chest pain	6.2	2
Acute abdominal pain	1	3.1
Asymptomatic	1	3.1

### Physical examination

Twenty-nine patients had abnormal findings at their cardiac examination. Auscultatory findings varied greatly. The first heart sound and the pulmonary component of the second heart sound were both accentuated in 15 patients. In six patients, an early diastolic sound was reported and was interpreted as an opening snap but in reality was probably a "tumor plop"<sup>(8)</sup>. Apical systolic murmurs were audible in 16 patients and apical late diastolic murmurs in 11. In addition, six patients had pansystolic murmurs at the left lower sternal edge which varied markedly with respiration and were, therefore, regarded as tricuspid in origin.

Four patients had cerebral embolic stroke with resulting permanent neurological deficit and two had peripheral arterial embolism requiring embolectomy. In one of the latter, signs of acute peritonitis were also documented as the initial presenting problem.

### Chest roentgenogram and electrocardiogram

The chest roentgenogram revealed left atrial enlargement in 14 patients, redistribution of pulmonary vasculature in 9 patients. No abnormal intracardiac calcification was found. Electrocardiograms showed that five patients had atrial fibrillation. Left atrial enlargement was present in nine

patients and nonspecific T-wave and ST segment abnormalities in 23 patients. Three patients had right ventricular hypertrophy.

### Laboratory studies

Anemia was observed in 13 patients and was the most common laboratory finding. Leukocytosis (white blood cell counts  $> 10,000 / \text{mm}^3$ ) was noted in 11 patients, but only 1 of them had a documented infection. An erythrocyte sedimentation rate was not routinely done, but when done, was found to be elevated in half of those tested (2 of 4 patients). Other rare findings included polycythemia in 2 patients with right atrial myxoma and thrombocytopenia (platelet count of  $33,000 / \text{mm}^3$ ) in the patient with blood cultures positive for  $\alpha$  - Hemolytic Streptococcal Group B.

### Diagnostic method

In all 32 cases of our study, preoperative diagnosis was obtained either by M-mode or two-dimensional (2D-) echocardiographic study. The presence of a cardiac tumor was diagnosed when an abnormal echogenic mass moving through the atrioventricular valve during the cardiac cycle was detected. Neither cardiac catheterization nor angiography was performed preoperatively in our study. In all of the intracardiac tumors the definite diagnosis of myxoma was confirmed by histologic examination.

### Clinical diagnosis

In 21 patients (65.9%), the clinical diagnosis was mitral valvular heart disease. Other clinical diagnosis included acute rheumatic carditis, bacterial endocarditis, cardiomyopathy, thyrotoxicosis, and constrictive pericarditis (Table 3). Further evaluation by echocardiographic study led to the correct diagnosis of myxoma in 29 patients. In the remaining three patients, cardiac myxomas were unsuspected and were found incidentally during ultrasonographic study of the upper - abdominal region. None of our patients was correctly diagnosed solely on the basis of clinical examination, chest roentgenogram, or electrocardiogram.

### Postoperative course

There were three operative deaths (9.3%) among the 32 patients who underwent surgical excision of cardiac myxoma, two due to early postoperative septicemia. Another patient died of com-

**Table 3. Atrial myxoma : clinical diagnosis \* in 32 patients.**

	Total (N=32)	
	No. patients	%
Mitral valve disease	21	65.9
Acute rheumatic carditis	2	6.2
Cardiomyopathy	2	6.2
Infective endocarditis	2	6.2
Thyrotoxicosis	1	3.1
Constrictive pericarditis	1	3.1
Vasculitis	1	3.1
Polymyalgia rheumatica	1	3.1
Asymptomatic	1	3.1
Atrial myxoma	0	0

(\* Diagnosis made before echocardiographic study or surgery)

plications from a cerebral emboli the day after the removal of a left - sided atrial myxoma. Early morbidity included reversible acute renal failure in 2 patients (6.2%) and arrhythmic complications in 5 patients (15.5%), 4 with atrial fibrillation and 1 with atrioventricular block. Other complications were pleural effusion requiring drainage in 2 patients (6.2%), significant bleeding requiring reexploration in 1 (3.1%).

Additional procedures were needed in three patients, who developed severe mitral regurgitation and underwent mitral valve replacement. One of these also needed permanent pacemaker insertion due to permanent postoperative complete atrioventricular block.

### Anatomical findings

The atrial myxomas in our study ranged in size from 2.5 to 10 cm in maximum diameter and from 28 to 295 g in weight. The macroscopic aspect of the tumors was also variable : 26 were pedunculated and 6 were sessile ; with a varied consistency : friable, gelatinous, smooth or fibrous.

### Follow-up

Follow-up of the 29 survivors varied from 2 months to 12 years ( mean 4.9 years). There were two late (suspected of) tumor recurrences. One developed localized seizure six years after surgery with the computed tomography (CT) scan demonstrating a left parietal high density mass suggestive of brain metastasis. This patient's seizure has been

well controlled by oral anticonvulsant. He has been currently free of any cardiac problems, and refused brain surgery. The other developed symptoms of right upper quadrant discomfort, jaundice, weight loss and low grade fever, 2 years after surgery, with the abdominal ultrasonographic examination discovering two high echogenic liver masses suggestive of hepatic metastasis. However, she was lost to follow-up after that.

Of the remaining, 1 required a permanent pacemaker insertion for persistent complete atrioventricular block and 1 developed right-sided heart failure due to severe tricuspid regurgitation and needed tricuspid valve annuloplasty 3 years after tumor resection. Other patients available for follow-up are in New York Heart Association functional Class 1 or 2.

The 5 patients who presented with arterial embolization recovered completely in 3, whereas, the other two, with the cerebral embolus still have hemiparesis.

### DISCUSSION

Myxoma of the heart can now be successfully treated but the success is obviously dependent upon the correct diagnosis and treatment prior to the development of catastrophic complications. Unfortunately, there are no definitive signs or symptoms that expose the presence of an intracardiac myxoma. Thus, it still represents an interesting diagnostic and therapeutic challenge.

Atrial myxoma is the commonest primary cardiac tumor, most frequently occurring in the left atrium and mostly arises from the region of the limbus of the fossa ovalis at the interatrial septum. In our case series, the ratio of female : male was 1.7 : 1, compared with previous studies varying from 2:1 to 5.6:1(9,10). The average patient age in these studies was in the late forties, 70 per cent of our patients fell in the 30 to 60 year-old range.

The presenting clinical picture of the cardiac myxoma varies, depends upon the chamber in which it is located. As a rule, myxomas become symptomatic when they obstruct the atrioventricular valves, embolize peripherally, or cause systemic effects. Left atrial myxomas, therefore, have a different set of symptoms from right-sided myxomas. In our study, 90.7 per cent of the myxomas originated in the left atrium, similar to previous studies(6,10).

All patients but one were symptomatic. The most frequent clinical cardiac problem was related to atrioventricular valve dysfunction manifested as congestive heart failure. In our study, 18 patients (56.2%) presented with either dyspnea on exertion, orthopnea, or paroxysmal nocturnal dyspnea. Some studies have a lower frequency of this symptom as 43 per cent<sup>(6)</sup>, whereas, others have a greater frequency of pulmonary edema reaching as high as 70 per cent<sup>(10)</sup>. The pathophysiology suggests that the myxoma causes obstruction of the mitral valve, resulting in high left atrial pressure and pulmonary edema.

In six patients, there was clinical evidence of systemic embolization. Since myxomas are globular, gelatinous, and friable, they are certainly prone to embolization. In other series, the rate of embolization has been reported to be as high as 30 per cent<sup>(9,11-15)</sup>. It is of interest also to note that 50 per cent of the myxoma patients with embolism, in this study, were less than 40 years old and none was in atrial fibrillation, a finding quite similar to that previously reported<sup>(9)</sup>. There was no clinical evidence of pulmonary embolism from right-sided myxoma patients in our study.

Constitutional symptoms and modifications in laboratory values found in patients with cardiac myxoma include fever, weight loss, myalgia, arthralgia, clubbing of fingers, anemia, thrombocytopenia, elevated levels of globulin and C-reactive protein, and increased erythrocyte sedimentation rate<sup>(16)</sup>. The reported incidence of these symptoms has widely varied from 25-35 per cent up to 90 per cent<sup>(17)</sup>, whereas, only 9.3 per cent of the patients in this study had such symptoms. Some have theorized that there is an autoimmune reaction to the tumor itself or to tumor fragments, leading to these immune-mediated symptoms<sup>(6)</sup>. Rarely, this tumor may get infected and lead to septic syndrome<sup>(6)</sup>, as was demonstrated in one of our patients who presented with infective endocarditis secondary to an infected atrial myxoma.

Other symptoms were atypical chest pain (25.0%), palpitation (15.9%). Finally, intracardiac myxoma can even be discovered in essentially asymptomatic patients, as was found in only 1 of our patients, compatible with the finding of previous investigators<sup>(6,9)</sup>.

Auscultatory findings in cardiac myxoma vary greatly and have been discussed in detail elsewhere<sup>(13,17-20)</sup>. Additionally, in about 20 per

cent of our patients, an early diastolic sound was heard which was interpreted as an opening snap but more likely represented a "tumor plop". The third heart sound was an important auscultatory finding highly against the diagnosis of severe mitral stenosis. Apical systolic and diastolic murmurs were detected in one half and one third of our patients, respectively. Although left atrial myxomas have been regarded as classic simulators of mitral stenosis, the combination of a loud first heart sound, an apical early diastolic sound (tumor plop), and a late diastolic murmur were present in only 30 per cent of our patients.

Chest roentgenograms were not helpful in establishing the definite diagnosis. Biochemical and hematologic tests were disappointing; they were abnormal in less than 20 per cent of the patients and usually in those presenting with severe constitutional disturbances. An unusual but previously documented finding<sup>(9,21)</sup> in two patients with right atrial myxoma was polycythemia, probably due to inter-atrial right-to-left shunting.

The diagnosis, therefore, of atrial myxoma should be suspected in a patient who has various features of classic triad of atrioventricular valvular obstructive disease, of embolism, and of constitutional manifestations. The definitive diagnosis, however, can only be established with echocardiography. Our experience in this study was that two-dimensional (2-D) echocardiography is a specific and sensitive test for the diagnosis of an atrial myxoma. Whereas, either angiography or echocardiography can be used to confirm the diagnosis, the latter method has become the primary diagnostic technique because of its high degree of accuracy and lack of invasiveness<sup>(6,22,23)</sup>. We therefore advocate 2-D echocardiography as the screening and diagnostic method of choice to demonstrate synchronous tumors, size of tumor, point of attachment, mobility, and the extent of tumor obstruction. Transesophageal echocardiography has also been reported for its useful information due to better resolution of the posterior cardiac structures<sup>(24)</sup>.

The role of angiography seems to be reserved, therefore, for cases in which echocardiography is nondiagnostic or patients in whom the coronary vessels need to be evaluated for arteriosclerotic lesions<sup>(25,26)</sup>. Other potential methods of diagnosis include the gated blood pool technique of radionuclide cardiac scanning. Its role may be as

an adjunct to echocardiography<sup>(6)</sup>. Another new approach to the diagnosis of these tumors, the magnetic resonance imaging, has also been reported about its excellent detail and resolution of intracardiac myxomas<sup>(27)</sup>. None of our patients, however, underwent these diagnostic methods.

Once the diagnosis of intracardiac myxomas has been made, the patient should be operated upon as soon as possible to avoid any catastrophic complications. An 8 per cent mortality has been reported in patients awaiting operation following definitive diagnosis<sup>(28)</sup>. With current operative techniques, the operation is generally a safe procedure. In this current study, there were 3 operative deaths (9.3%). Minor complications were present in about one third of our patients. The most common complication was arrhythmia (5 patients ;

15.5%), nearly the same frequency of those reported by Panchaipetch *et al*<sup>(29)</sup>.

The reported recurrent rate of the tumor ranges from 5-14 per cent<sup>(7,12,15,30)</sup>. The cause of recurrence is not clear but probable factors have been attributed to tumor implantation at the time of surgical removal, incomplete resection, multicentricity of the tumor, or malignant degeneration<sup>(4, 7,30-32)</sup>. In our study, two patients were suspected of tumor recurrences after intracardiac myxoma excision. Unfortunately, we could not obtain the histologic confirmation from any of those suspected lesions. We, nevertheless, agree with previous authors<sup>(30-37)</sup> that long-term follow up of the myxoma patients, for at least 10 years, may be needed to exclude any local recurrence or distant metastasis of the intracardiac myxoma.

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## ประสบการณ์ทางคลินิกในการรักษาผู้ป่วยเนื้องอกหัวใจชนิดมิกโซมา ในโรงพยาบาลศรีนครินทร์

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ระหว่างเดือนมกราคม ปี พ.ศ. 2526 ถึงเดือนมกราคม ปี พ.ศ. 2540 มีผู้ป่วยเนื้องอกมิกโซมาของหัวใจ ได้รับการผ่าตัดที่ รพ.ศรีนครินทร์ 32 ราย เป็นเพศหญิง 20 ราย ชาย 12 ราย อายุระหว่าง 10 ถึง 60 ปี (เฉลี่ย 37.9 ปี) อาการสำคัญคือ เหนื่อยหอบจากภาวะหัวใจวาย (56.2%) เจ็บหน้าอกชนิดไม่จำเพาะ (25.0%) หน้ามืดหมดสติ (18.9%) และอาการไข้ ปวดเมื่อยตามตัว (9.3%) อาการอุดตันหลอดเลือดแดงจากการหลุดกระจายของเนื้องอกพบในผู้ป่วย 6 ราย ไม่มีอาการใดๆ 1 ราย ผู้ป่วยทุกรายได้รับการวินิจฉัยโดยการตรวจคลื่นสะท้อนเสียงของหัวใจชนิด 2 มิติ พบมิกโซมาเอเดรียมซ้าย 29 ราย เอเดรียมขวา 2 ราย ทั้งเอเดรียมขวาและเวนทรีเคิลขวาาร่วมกัน 1 ราย ผู้ป่วย 3 ราย เสียชีวิตหลังผ่าตัดสาเหตุจากติดเชื้อในกระแสเลือด 2 ราย และจากเนื้องอกหลุดกระจายไปที่สมอง 1 ราย หลังผ่าตัด 3 ราย เกิดภาวะล้นหัวใจไมตรัลรั่วรุนแรง ต้องผ่าตัดเปลี่ยนลิ้นหัวใจไมตรัล ในจำนวนนี้ 1 ราย เกิดภาวะกระแสไฟฟ้าในหัวใจถูกปิดกั้น และต้องใส่เครื่องช่วยกระตุ้นหัวใจถาวรร่วมด้วย ผู้ป่วย 29 ราย ได้รับการติดตามผลการรักษาหลังผ่าตัดเป็นเวลา 2 เดือน ถึง 12 ปี (เฉลี่ย 4.9 ปี) มีผู้ป่วย 2 ราย สงสัยว่าจะมีการเกิดซ้ำของเนื้องอก โดย 1 ราย เกิดอาการชักหลังผ่าตัด 6 ปี อีก 1 ราย พบก้อนในตับหลังผ่าตัด 2 ปี (แต่จากการศึกษานี้ไม่สามารถตรวจพิสูจน์ชิ้นเนื้อทางพยาธิวิทยาได้ เนื่องจากผู้ป่วยปฏิเสธผ่าตัดซ้ำ)

เนื่องจากอาการทางคลินิกของเนื้องอกหัวใจมิกโซมา แตกต่างหลายแบบและไม่จำเพาะ จึงจำเป็นต้องนำมาพิจารณาวินิจฉัยแยกโรคเสมอ วิธีการวินิจฉัยที่ให้ความแม่นยำสูง และควรเลือกใช้เป็นวิธีแรก คือ การตรวจคลื่นสะท้อนเสียงหัวใจ 2 มิติ การติดตามอาการทางคลินิกอย่างน้อย 10 ปี อาจจำเป็นเพื่อติดตามการเกิดซ้ำหรือการกระจายของเนื้องอก

**คำสำคัญ :** เนื้องอกมิกโซมาหัวใจ, ประสบการณ์ทางคลินิก, โรงพยาบาลศรีนครินทร์

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