

Intra-cardiac masses in adults: A review of echocardiogram records at two echocardiographic laboratories in Enugu, South-East Nigeria

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Abstract

Background: Transthoracic echocardiography (TTE) is an excellent initial diagnostic technique used to evaluate and diagnose cardiac masses, even though transoesophageal echocardiography (TEE) provides superior image resolution and better visualization of cardiac masses, especially in patients with suboptimal transthoracic echocardiographic studies. TTE is the clinical procedure of choice for identification of left ventricular thrombi. TTE has greater than 90% sensitivity and greater than 85% specificity for detection of left ventricular thrombi and is probably superior to the sensitivity and specificity of TEE, especially for apical thrombi.

Aims: The study aimed to identify the common types of cardiac masses and their commonest locations in the heart.

Materials and Methods: We did a retrospective review of our echocardiogram reports from May 2003 to July 2012 to identify the frequency of intra-cardiac masses in adults, as well as the gender distribution and commonest location of these masses.

Results: There were 2,814 echo examinations in adults over this period, comprising 1,661 males (59.1%) and 1,153 females (40.9%). Intra-cardiac masses were found in 20 of these patients representing 0.7% of the study population. Thrombi were the commonest masses noted in our study, and there were more masses in the atria than in the ventricles. The left heart chambers also had more masses than the right heart chambers. There was no sex difference in the frequency of cardiac masses.

Conclusion: Intra-cardiac masses are rare, and transthoracic echocardiography is still valuable in the diagnosis and initial characterization of cardiac masses.

Key words: Adults, echocardiography, intra-cardiac masses, Nigeria

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Introduction

The first effort to use pulse-reflected ultrasound to examine the heart was initiated by Dr. Helmut Hertz of Sweden in collaboration with Dr. Inge Edler.^[1]

In the 1950s, Dr. Effert and his colleagues in Germany began to duplicate Edler's work describing mitral stenosis. During their work, Effert and his group detected left atrial masses. Since the initial ultrasonographic demonstration of

an atrial myxoma by Effert and Domanig in 1959, the value of echocardiography for diagnosing cardiac mass lesions has become well established.^[2]

Transthoracic echocardiography (TTE) is an excellent initial diagnostic technique to evaluate and diagnose cardiac masses, even though transoesophageal (TEE) echocardiography

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provides superior image resolution and better visualization of cardiac masses, especially in patients with suboptimal transthoracic echocardiographic studies.^[3] TTE is the clinical procedure of choice for identification of left ventricular thrombi.^[4] TTE has greater than 90% sensitivity and greater than 85% specificity for detection of left ventricular thrombi and is probably superior to the sensitivity and specificity of TEE, especially for apical thrombi.^[5]

There are several normal structures and variants that may mimic a cardiac mass. The Eustachian valve, Chiari network, crista terminalis, pectinate muscles, moderator band, trabeculations, and lipomatous hypertrophy of the interatrial septum are some examples of normal structures that are frequently mistaken for pathologic entities.^[6,7]

Abnormal masses (tumors, thrombi, vegetations, cysts) must be distinguished from normal cardiac structures that may mimic a mass. The echocardiographic evaluation of intra-cardiac masses is dependent on the ability to distinguish normal from abnormal findings.^[1]

About 75% of cardiac masses are benign. Cardiac myxoma is the most frequent cardiac tumor found in adults.^[1] Myxoma typically affects patients 30-60 years old, with a higher prevalence in women.^[2]

Thrombi occur in areas of blood stasis. Left ventricular thrombi occur commonly at the apex and are predominant in patients with ventricular aneurysms or patients within the first week of an ST segment elevation myocardial infarction. Left atrial thrombi are usually found in the appendage and associated with atrial fibrillation, atrial flutter, mitral stenosis or prosthetic mitral valve.

There is a dearth of data on the types and locations of intra-cardiac masses detected by echocardiography in this environment, and this created the need for this study.

Materials and Methods

The University of Nigeria Teaching Hospital (UNTH) Enugu, Enugu State is a 500-bed tertiary hospital in South-East Nigeria. Within the period under review, it provided echocardiographic services for about 20 million Nigerians in the South East region. Although many new centers currently offer echocardiographic services, the UNTH remains a referral center for other tertiary institutions in South-East Nigeria. The hospital is designated the cardiothoracic center of excellence in Nigeria and was the only center in Nigeria providing cardiac surgeries routinely up till the year 2005.

Conquest Medical Imaging Limited is a private medical diagnostic center in Enugu which offers diagnostic radiologic and ultrasonographic services.

The consecutive echocardiogram reports of 1,890 adults done over a period of 8 years at the UNTH (May 2003-Jan 2012), and 924 adults done over a period of 3 years at Conquest Medical Imaging (July 2009-July 2012) were retrospectively reviewed.

All adults (aged 18 years and above) who had an intra-cardiac mass on transthoracic echocardiography were included in the study.

Echocardiography was done with either a Hewlett Packard SONOS 2000 echocardiographic machine equipped with a 3.7 MHz transducer for adults, a video recorder and printout processor, a Sonoscape SSI 5000 echocardiographic machine or a Logic 500MD echocardiographic machine. The machines have capabilities to perform M-mode, Two Dimensional (2-D) and Doppler examinations. The echocardiographic examinations were performed and interpreted by three cardiologists.

All measurements were taken from standard echocardiographic views according to the recommendation of the American Society of Echocardiography.^[8]

Data obtained from the echo register included age, gender, clinical diagnosis and location of mass in the heart. Data obtained were analyzed with a computer using SPSS version 15 software. Student *t*-test was used for comparison of continuous variables, and results presented as mean \pm standard deviation.

Results

There were 2,814 echo examinations in adults over this period, comprising 1,661 males (59.1%) and 1,153 females (40.9%). Intra-cardiac masses were found 20 patients representing 0.7% of the study population [Table 1].

The age range of adults with intra-cardiac masses was from 21 years to 76 years with a mean of 44.5 ± 13.1 years [Table 2]. The mean age of the males was 43.1 ± 11.2 years, while the mean age of the females was 45.9 ± 13.4 years. There was no statistically significant difference between the ages of the males and females ($P = 0.6$) [Table 2].

Ten females and 10 males had intra-cardiac masses. The chamber involvements were as follows – left atrium (7), right atrium (6), left ventricle (5), right ventricle (2). The intra-cardiac masses were thrombi (10), myxomas (3), and fibrous tissues (2), vegetation (2), ‘mass’ (3).

Left atrial masses

The seven masses in the left atrium consisted of 2 vegetations, 2 thrombi and 3 myxomas. The vegetations were attached to the anterior mitral valve leaflet, while the myxomas were attached to the mid-portion of the inter-atrial

septum. One thrombus was floating and exhibiting a ball-valve phenomenon [Figures 1-3].

Left ventricular masses

There were 5 masses in the left ventricle, and all of them were thrombi. Four of the thrombi were in males, while only one was in a female [Figure 4].

Right atrial masses

There were 3 thrombi in the right atrium and 3 other masses which were most likely neoplastic in nature. One of these latter masses was in a patient with lymphoma [Figures 5 and 6].

Table 1: Demographic characteristics of the patients and location of masses

Case number	Age (years)	Sex	Location of mass	Diagnosis
01	21	M	RV	Fibrous tissue
02	23	F	LA (MVL)	Vegetation
03	25	M	LV	Thrombus
04	29	M	LV	Thrombus
05	30	F	LA	Thrombus
06	33	M	RA	Thrombus
07	34	M	LV	Thrombus
08	34	F	RV	Fibrous tissue
09	35	M	LA	Thrombus
10	35	F	RA	Thrombus
11	45	M	LA	Myxoma
12	49	F	RA	Mass
13	50	F	LV	Thrombus
14	52	F	RA	Thrombus
15	54	F	LA	Myxoma
16	61	M	LV	Thrombus
17	65	F	LA (MVL)	Vegetation
18	67	F	LA	Myxoma
19	72	M	RA	Mass
20	76	M	RA	Mass

RV=Right ventricle; LV=Left ventricle; LA=Left atrium; RA=Right atrium; MVL=Mitral valve leaflet



Figure 1: Left atrial mass

Right ventricular masses

Two patients with right ventricular endomyocardial fibrosis had fibrous tissues in the right ventricular apex.

Discussion

The frequency of cardiac masses in our study was 0.7%. The fact that these data were collected from tertiary referral centers may account for this high figure. Similar studies in the past had recorded frequencies ranging from 0.001-0.71% at autopsies.^[9-11] Most of these studies were however on cardiac tumors, and not necessarily cardiac masses. Brian Deville *et al.*, had also studied cardiac masses

Table 2: Comparison of age and gender differences in patients with intracardiac masses

Case number	Age (years)		t-test	P-value
	Male	Female		
01	21			
02		23		
03	25			
04	29			
05		30		
06	33			
07	34			
08		34		
09	35			
10		35		
11	45			
12		49		
13		50		
14		52		
15		54		
16	61			
17		65		
18		67		
19	72			
20	76			
Mean age (SD)	43.1 (11.2)	45.9 (13.4)	0.507	0.6183



Figure 2: Left atrial myxoma in classical location

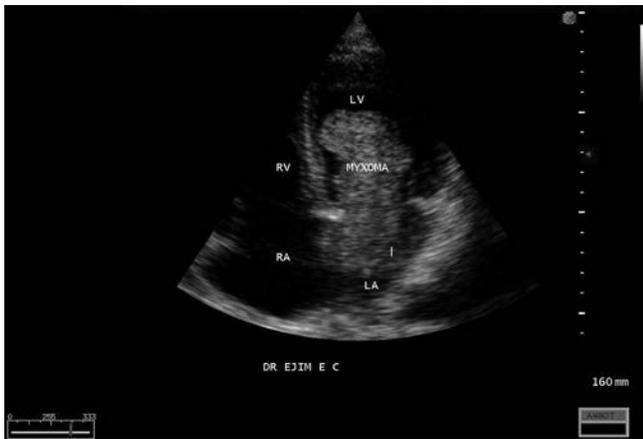


Figure 3: Left atrial myxoma prolapsing through the mitral valve

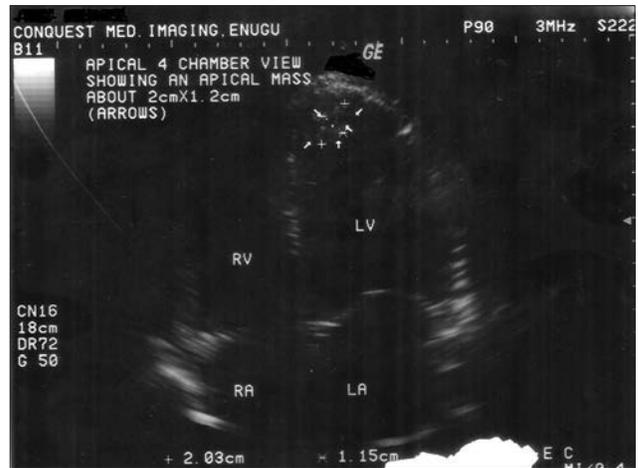


Figure 4: Apical mass

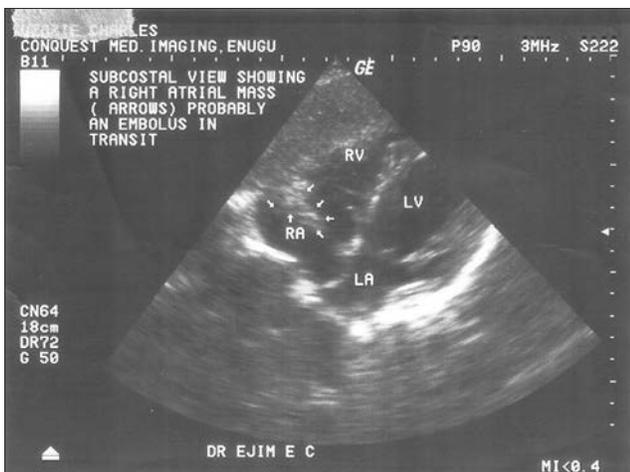


Figure 5: Right atrial mass

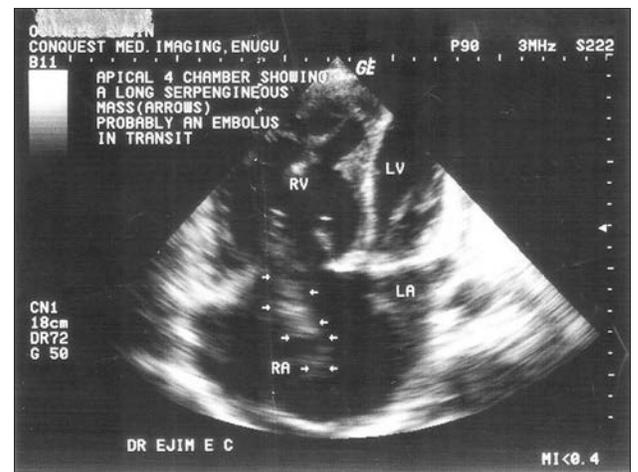


Figure 6: Embolus in transit

by transoesophageal echocardiography at the Texas Heart Institute, and documented similar results.^[12] Tasdemir *et al.*, also studied cardiac masses in Kayseri, Turkey and had similar findings.^[13]

Fifty percent of the cardiac masses were thrombi, and half of these were in the left ventricle. Of the five thrombi in the left ventricle, four were in males while one was in a female. The commonest risk factors for left ventricular thrombus formation in this environment (dilated cardiomyopathy, heart failure, myocardial infarction) are commoner in males,^[14] and this may be the reason for the higher frequency of left ventricular thrombi in males.

One of the right atrial thrombi was most likely an embolus in transit because of its shape and its location.

All the myxomas and vegetations were noted in the left atrium. This is similar to the findings of Kun *et al.*^[9] All the 3 myxomas were attached to the inter-atrial septum, in the region of the fossa ovalis, which is the most common site

of attachment of atrial myxomas,^[15,16] and is one criterion for the diagnosis of myxoma. Two of these were in females, while one was in a male. One of the cases of myxoma was confirmed by histology after surgical excision.

The 3 masses in the right atrium which were not characterized were most likely secondary malignant neoplastic deposits.

Conclusion

Intra-cardiac masses are rare in this environment, and transthoracic echocardiography is valuable in the diagnosis and initial characterization of these masses, despite its limitations.

Limitations of the study

The absence of routine cardiac surgical services in our center for over six years made it difficult to get a histologic diagnosis of most of these masses.

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