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Full Length Research Paper

The value of 2D echocardiography in the diagnosis of Myxoma in Owerri, Nigeria

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Myxoma is the most common primary cardiac tumour found more commonly in female adults of 30-60 years of age. Certain pathologic lesions may mimic myxoma creating high rate of false positive and false negative impressions. Therefore, a more specialised ultrasound imaging technique unit with high diagnostic yield more than the conventional ultrasound unit may be required to make an accurate diagnosis. The purpose of the study is aimed at investigating the value of 2D echocardiography in the diagnosis of myxoma against the conventional ultrasound. Seventy eight patients with different cardiac disorders referred to the radiology department, Federal Medical Centre, Owerri for 2D echo/cardiac scans were studied retrospectively from June 2009 to May 2010. The two units were used on all the patients to determine the incidence of myxoma amongst other cardiac disorders, the diagnostic yield of 2D echo for myxoma general characteristics and associated findings and the results of both units were compared. Minimum age = 24, maximum age = 79, mean age = 52.40 ± 13.15 . Gender proportion- male = 40 (51.3%), female = 38 (48.7%). Myxoma incidence was 5.1% (4) with gender distribution, female 75% (3) and male 25% (1). Highest occurrence was seen in age group 41-50 years (14.4%). The general characteristics were demonstrated by both units up to 100%. For associated findings, conventional demonstrated 33.3% while 2D demonstrated 100%. The results of 2D echo compared to those of conventional ultrasound in the diagnosis of myxoma make 2D the gold standard ultrasound imaging technique.

Keywords: 2D echocardiography, Conventional ultrasound, Myxoma

INTRODUCTION

Myxoma is the most common primary cardiac tumour found more commonly in female adults of 30-60 years of age (American Society of Echocardiography (ASE), 2008). It is a soft and gelatinous mass which accounts for 30% of benign intra cardiac tumours (Bloor, 2003). Other cardiac tumours include papilloma, rhabdomyoma,

fibroma, hamartoma, lipoma, angioma and sarcoma. Over 90% of myxomas are found in the atria, more often in the left atrium. The size is variable, may be small or measure up to 8cm in length (American Society of Echocardiography (ASE), 2008). About 5% are multiple in nature. Mostly found attached to the intra atria septum in the area of the fossa ovalis and changes shape and position during systole and diastole (Bloor, 2003). Since the mass is solid, friable and moves with blood flow, it can partially obstruct flow across the mitral or tricuspid valve reducing the valve orifice. It can also embolize to

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the lungs or brain causing pulmonary infarction or stroke (Braunwald, 2001). Symptoms vary from fever, cachexis to dysrhythmia and death (Farah, 2005).

There are several reports of the familial occurrence of myxoma and the observation of myxoma in a mother and her three sons suggests that this condition may be transmitted as an autosomal dominance otherwise etiology is unknown (Heath, 1998). Myxomas are treated by surgical excision. About 5% of tumours will recur after surgery.

Certain pathologic lesions may mimic myxoma, since the commonest site is the left atrium, therefore, thrombus, atrial clot and large mitral valve vegetation may all resemble myxoma creating high rate of false positive and false negative impressions. This requires more than the conventional ultrasound imaging to make an accurate diagnosis.

American Society of Echocardiography (ASE) established guidelines for the diagnosis of myxoma with the following characteristics: absence/presence; size; location; attachment site; shape; texture and mobility. Associated finding must include systolic and diastolic phases; presentation; Ejection Fraction (EF) slope reduction; Mitral Valve (MV) orifice area stenosed; valvular regurgitation; atrial fibrillation if any and Left Atrial (LA) enlargement (Schweiger et al., 2000).

Two dimensional echocardiography is an ultrasound imaging technique which assesses the heart both anatomically and haemodynamically using 2-dimensional B-scan, M-mode, Doppler imaging and electrocardiography (ECG). In the past, sonographers rely on M-mode of conventional ultrasound only for making diagnosis without Doppler and ECG facilities which results to high false positive and high false negative values. M-mode on the other hand, is extremely useful in obtaining measurements and in the timing of events in certain cardiac pathologies. It records the cardiac motion at a thousand times per second. Subtle changes, for example in valvular motion can be better appreciated when used in conjunction with Doppler. Doppler used in 2D echocardiography are 3 namely: continuous wave Doppler (CWD), pulsed wave Doppler (PWD) with spectral display and color flow Doppler (CFD). Choice of a Doppler type at the appropriate time is essential since each type of Doppler provides some information not readily available using the other. Other diagnostic imaging modalities/techniques which can provide valuable information of myxoma include cardiac catheterization, chest x-ray, radionuclide imaging, CT, MRI and angiography.

This study however is aimed at investigating the value

of 2D echo a new entrant to diagnostic tools in the diagnosis of this cardiac condition against the conventional ultrasound.

MATERIAL AND METHODS

Seventy eight patients with different cardiac disorders who were referred to the radiology department, Federal Medical Centre, Owerri for 2D echo/cardiac scan were studied from June 2009 to May 2010. Selection criteria include age 21 to 79 years, both male and female patients within this age group. Study was performed using G50 sonoline 2D echocardiography unit with 3.5MHz sector probe and SI-400 ultrasound scanner with 3.5 MHz curvilinear probe. The consistency of the equipment was not in doubt as both were factory calibrated.

No patient preparation was required prior to the scan. 2D Echocardiographic scanning was performed in supine and anterior oblique (LAO) positions. Electrodes were applied to the chest wall of the patients in order to determine the heart rate, rhythm and polarization and depolarization electric activity processes of the heart during the scan. The heart was approached through the following echocardiographic windows: left parasternal; apical; subcostal and suprasternal windows, all in both long and short axis views.

The two ultrasound units were used on all the patients following the same procedure to determine the incidence of myxoma amongst other cardiac disorders, the diagnostic yield of 2D echo for myxoma general characteristics and associated findings and compared these with those obtained by the conventional ultrasound.

Data was analysed to obtain the Mean $\pm$ SD of age, gender proportion (male %, female %) and percentages of the cardiac disorders.

RESULT

Myxoma incidence

Myxoma incidence = 5.1% (4) with gender distribution, female 75% (3) and male 25% (1). Highest occurrence was seen in age group 41-50 years (14.4%) while the least was seen within the age group 51-60 years (4.2%). In other cardiac disorders, hypertension recorded the highest cardiac conditions observed in the patients examined (39.7%) while 35.9% of the patients showed normal findings.

Table 1. Age distribution of cardiac disorders

Age group (years)	Myxoma %	Valvular %	Hypertension %	Ischemic Heart DX %	Cardiomyopathy %	Normal %	Total %
21-30	-	2 (66.7)	-	1 (33.3)	-	-	3 (3.9)
31-40	1 (6.7)	4 (26.7)	1 (6.7)	-	1 (6.7)	8 (53.3)	15 (19.2)
41-50	2 (14.4)	-	5 (35.7)	1 (7.1)	1 (7.1)	5 (35.3)	4 (17.9)
51-60	1 (4.2)	1 (4.2)	10 (41.7)	2 (8.3)	-	10 (41.7)	24 (30.8)
61-70	-	1 (5.9)	12 (70.6)	-	-	4 (23.5)	17 (21.8)
71-80	-	-	3 (60.0)	1 (20.0)	-	1 (20.0)	5 (6.4)
TOTAL	4 (5.1)	8 (10.3)	31 (39.7)	5 (6.4)	2 (2.6)	28 (35.9)	78 (100)

Minimum age = 24, maximum age = 79, mean age = 52.40 ± 13.15.

Gender proportion- male = 40 (51.3%), female = 38 (48.7%).

Table 2. General characteristics of myxoma

	Absent	present	size	location	attachment site	shape	texture	mobility
Conventional Ultrasound (Real-time)	√	√	√	√	√	√	√	√
2D Echocard ultrasound	√	√	√	√	√	√	√	√

Table 3. Associated findings of myxoma

	Heart rate	Rhythm	LA enlargement	E-F slope	Systolic phase	Diastolic phase	MV orifice Area	Valvular Regurgitation	Atrial fibrillation
Conventional ultrasound	√	*	√	√	*	*	*	*	*
2D Echocard ultrasound	√	√	√	√	√	√	√	√	√

√ represents the ability of the unit to demonstrate the associated findings

* represents the inability of the unit to demonstrate the associated findings

DISCUSSION

Incidence of myxoma

In the study, incidence of myxoma is low compared to other cardiac disorders. Myxoma recorded 5.1% compared to the commonest which is hypertension which recorded 39.7%. This finding is in agreement with several literatures picking hypertension as the commonest heart diseases. Braunwald et al., (2001) stated that over 23 million people in the US have hypertension with prevalence more in the black population than the white. Myxoma in this study was found mostly between the age of 31 and 60 years and higher in age group 41- 50 years and also was found in 7.9% of the total female patients studied as against 2.5% seen in the male patients. This agrees with the reports of Tway et al., (2001) on age group and sex myxoma is commonly found.

Characteristics and associated findings of myxoma

Conventional real time ultrasound and other imaging modalities have been in use to demonstrate cardiac disorders/tumours but with less accuracy (American Society of Echocardiography (ASE), 2008). The general characteristics of myxoma such as presence/absence, size, location, shape, attachment site, texture and mobility can be demonstrated with near accuracy using the conventional ultrasound, but in determining the associated findings of myxoma which are pointers to the diagnosis, 2D echocardiography has a higher value because it uses combination of B-mode, M-mode, Doppler (PWD, CWD and CFD with spectral display) and ECG tracings. Some of the 2D echo findings include the appearance of the mass which is hypoechoic and contains some calcifications seen in the LA. It changes shape as it prolapse through the MV



Figure 1. Scanogram of 2D Parasternal long axis view showing myxoma projecting into the left ventricle through the MV in diastole



Figure 2. Scanogram of 2D Parasternal short axis view showing myxoma in the left ventricle in diastole

The 2D Doppler findings is similar to mitral stenosis and this achieved by placing the sample volume just below the MVL on the ventricular side of the valve and the features obtained include a decreased EF-slope as the tumour prolapses into the LV. There is small time lapse between MV opening and tumour prolapse in diastole.

On M- mode the myxoma is in the LA in systole when the MV is closed.

An increase in the amplitude of the 'A' wave is observed due to more forceful atrial contraction pushing the blood through a narrowed orifice. On M-mode, 'A' wave is seen reduced or absent. The mass causes partial obstruction to the MV and because of this spectral broadening is noted with high peak velocity exceeding 1.5m/s causing aliasing with the use of PWD. In this case CWD was mostly used to obtain peak flow velocities and the true flow pattern. Also the effective valve area is



Figure 3. Scanogram of 2D Parasternal long view showing myxoma within the left atrium in systole

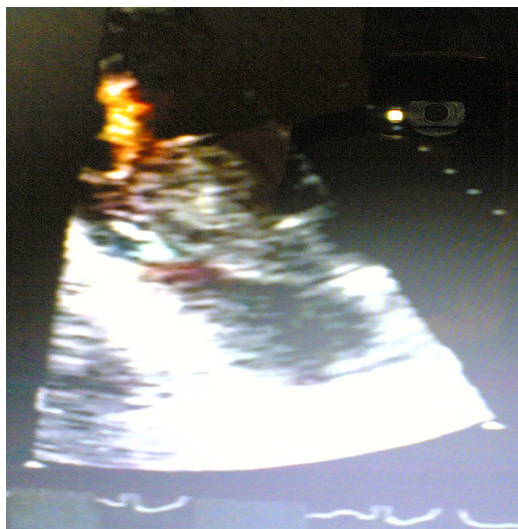


Figure 4. Scanogram of Color Doppler demonstrating some degree of regurgitant jet

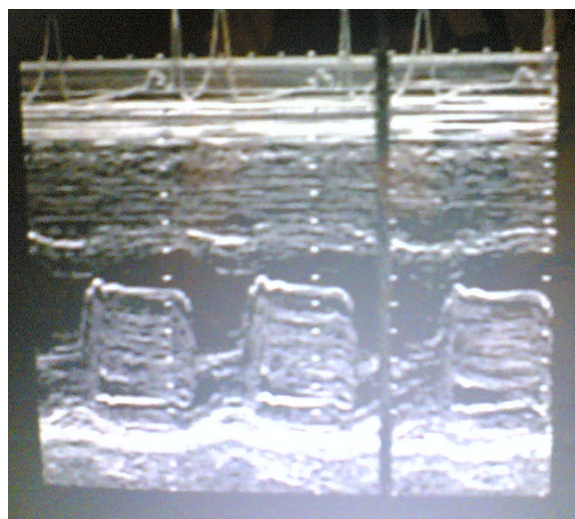


Figure 5. Scanogram of M-mode demonstrating myxoma projecting through the MV into the LV.

determined using the pressure half time formula, which is the time it takes the pressure across a valve to drop by half.

$$\text{MVA (cm}^2\text{)} = \frac{220}{\text{Pressure half time}}$$

This was achieved by the image from the apical four chamber view where the blood flow is almost parallel to the ultrasound beam.

Color flow Doppler (CFD) identified associated valvular regurgitation (see scan 4)

ECG tracing demonstrated atrial fibrillation in 50% of the patient studied and this resulted from disorganised impulses with abnormal atrial depolarization. No P-waves were evident on the tracings.

However, from the study the general characteristics of myxoma were demonstrated by both conventional ultrasound and 2D up to 100%. But the associated finding diagnostic yield of myxoma was not equal. Conventional demonstrated 33.3% while 2D demonstrated 100% of the findings.

CONCLUSION

The results of 2D echo compared to those of conventional ultrasound in the diagnosis of myxoma make 2D the gold standard ultrasound imaging technique.

Sonographers are advised to use specialised ultrasound units such as 2D echo when required especially for cardiac and vascular disorders and should not use the conventional ultrasound unit in place of it when detailed cardiac and vascular sonography are indicated.

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