Case Report

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Annals of Clinical and Laboratory Research
ISSN 2386-5180

2016
Vol.4 No.2:100

# Assessment of Suspected Cardiac Mass with Multi-Parametric Cardiac Magnetic Resonance: Do we Really Need Invasive Endomyocardial Biopsy in Everyone?

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**Received:** 07 June 2016; **Accepted:** 15 June 2016; **Published:** 18 June 2016

**Citation:** Amadu AM, Baritussio A, Dastidar AG, et al. Assessment of Suspected Cardiac Mass with Multi-Parametric Cardiac Magnetic Resonance: Do we Really Need Invasive Endomyocardial Biopsy in Everyone? Ann Clin Lab Res. 2016, 4: 2.

## Abstract

We present the case of a 44-year-old woman with a cardiac mass. This case highlights the role of cardiac magnetic resonance (CMR) in assessing non-invasively a myocardial mass and delineating its anatomy and tissue characterization, thus potentially avoiding endomyocardial biopsy (EMB).

**Keywords:** Cardiac fibroma, Cardiac magnetic resonance imaging, Incidental cardiac mass

## Introduction

Being extremely rare, cardiac masses are always a challenge. They can represent a tumor, which can either be primary or secondary and benign or malignant, or a pseudo-tumor (i.e. thrombus). Multi-parametric CMR may be a one-stop shop to accurately define a cardiac mass. We describe the role of CMR in diagnosing a case of a benign cardiac tumor, thereby avoiding invasive EMB.

## Case Presentation

An otherwise healthy 44-year-old woman presented with troponin negative sharp left-side chest pain associated with a dull ache throughout the entire chest. The electrocardiogram (ECG) showed T-wave inversion in leads V1-3. The initial diagnostic work-up showed good left ventricular (LV) systolic function, with mildly hypokinetic anterior wall and a small indentation in the apical septum on 2D transthoracic echocardiography, unobstructed coronaries on coronary angiogram and no evidence of pulmonary embolism on computed tomography pulmonary angiogram. She was then referred for cardiac magnetic resonance (CMR) for further assessment. The CMR protocol encompassed balanced steady-state free precession sequence (bSSFP) cines, full non-invasive tissue characterisation, including Turbo Spin-Echo (TSE)-T1 weighted sequences, TSE-T1 weighted with fat saturation, T2-weighted Short-Tau Inversion Recovery (STIR), dynamic rest perfusion imaging during contrast injection and late gadolinium enhancement. The images demonstrated a well-defined mass (32 × 15 × 4mm) on the right ventricular (RV) side of the apical septum **(Figure 1A** and **1B)** causing end-systolic RV apical obliteration **(Figure 1C)**. Comprehensive tissue characterisation showed no myocardial oedema on T2-STIR imaging, **(Figure 1D)** isointense-mildly hypointense signal on TSE-T1imaging, with islands of hyperintensity in the core **(Figure 1E)**, and no significant changes on TSE-T1 fat saturation imaging.

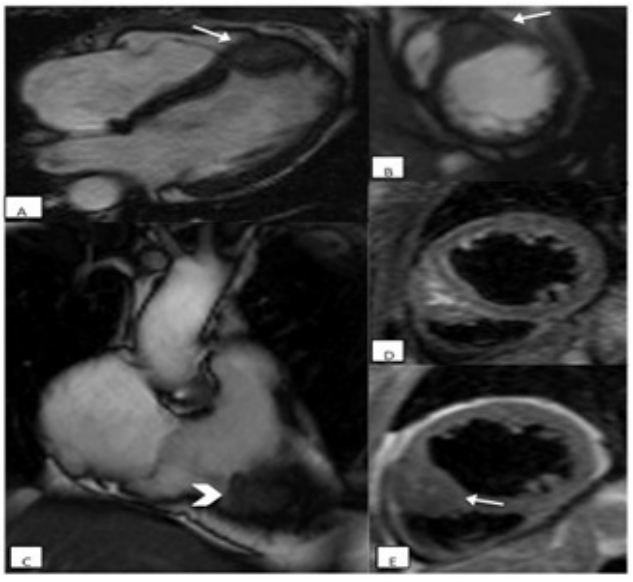

**Figure 1** (A,B) The mass is seen on the RV side of the apical septum (arrow) causing end-systolic RV apical obliteration (C) (arrow-head). No oedema is seen on T2-STIR imaging (D), isointense-mildly hypointense signal on TSE-T1 imaging with islands of hyperintensity in the core (E) (arrow).

On rest perfusion images there was a patchy perfusion defect within the mass **(Figure 2C** and **2D)** and following

gadolinium contrast administration, the mass showed patchy myocardial late enhancement **(Figure 2A** and **2B)**. Tissue characterization and avascularity were consistent with a benign nature and diagnosis of myocardial fibroma was made. The patient was managed conservatively with regular imaging follow-up. The 6-month follow-up scan was substantially unchanged.

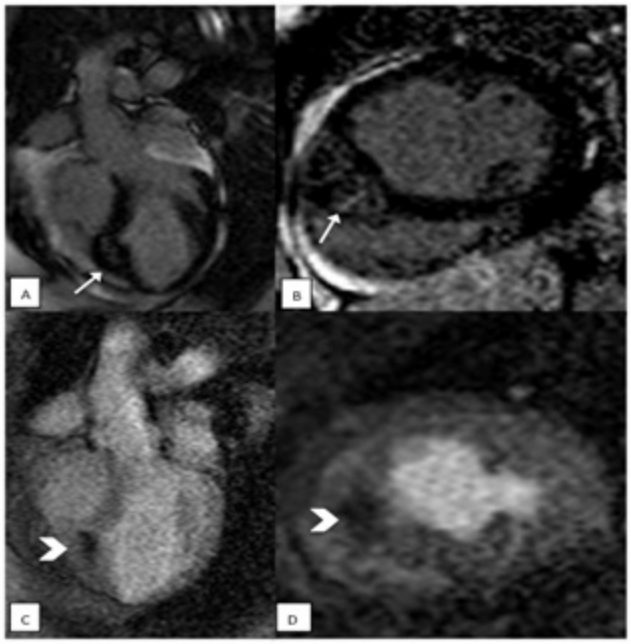


**Figure 2** (A) (B) Gadolinium contrast administration showed patchy myocardial late enhancement (arrow). Rest perfusion images showed a patchy perfusion defect within the mass (C) (D) (arrow-head).

## Discussion

Cardiac fibromas are benign tumours of the connective tissue deriving from fibroblasts. They are rare in adults and may be associated with arrhythmias and heart failure. Given their potential recurrence, once resected, they require surveillance imaging. The clinical manifestation depends on its size and location: patients can be asymptomatic, the mass being an incidental finding, or present with atypical chest pain, palpitations, hemodynamic compromise or arrhythmias [1]. Heart failure or sudden death may rarely represent the first clinical manifestation [1]. Cardiac fibroma is more frequently located in the ventricular septum or LV free wall, and less commonly in the right ventricle or in the atria [2]. Often fibromas are quite large (mean diameter, 5 cm) and can determine cavity obliteration. Sometimes fibroma can be associated with Polyposis syndromes (familial adenomatous polyposis) and Gorlin-Goltz syndrome [3-5]. CMR has a pivotal role in assessing the nature of cardiac masses, and particularly in excluding malignancies, by ruling out the presence of pleural and pericardial effusion and infiltration of surrounding structures [6]. Tissue characterisation defines the nature of cardiac masses: absence of myocardial oedema, isointense signal with islands of hypertensity in the core, avascularity and patchy myocardial late enhancement are features suggestive of a benign mass, as cardiac fibroma is. EMB is the gold standard for histological diagnosis; however, it is an invasive procedure with non-negligible complication rates (up to 2%) [7,8].

## Conclusion

Multiparametric CMR has a definitive diagnostic role in the assessment of cardiac masses, as shown in this case with its ability to determine diagnosis, guiding clinical management and assessing prognosis [3] and may also help in avoiding EMB in some suspected cases of cardiac mass.

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