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# Interest of Cardiac MRI in the Etiological Diagnosis of Dilated Cardiomyopathies: About 45 Cases

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## Abstract

Dilated cardiomyopathies (DCM) represent a heterogeneous group of disorders characterized by dilation and systolic impairment of the left or both ventricles. Identifying the underlying etiology is crucial for guiding management, assessing prognosis, and orienting therapeutic strategies. Cardiac magnetic resonance imaging (CMR) plays a central role thanks to its morphological, functional, and tissue characterization capabilities.

**Objective:** To evaluate the contribution of CMR in the etiological identification of dilated cardiomyopathies.

**Methods:** A retrospective study was conducted on 45 patients with echocardiographically documented DCM who underwent cardiac MRI.

**Results:** CMR provided accurate assessment of ventricular function and chamber dilation. Analysis of late gadolinium enhancement (LGE) and mapping sequences contributed to distinguishing ischemic causes (15 cases) from non-ischemic forms (30 cases: myocarditis, idiopathic/genetic DCM, infiltrative etiologies). MRI also provided prognostic insights by characterizing the extent and distribution of myocardial fibrosis.

**Conclusion:** Cardiac MRI is an essential tool in the etiological diagnosis of DCM, allowing better therapeutic orientation and risk stratification.

**Keywords:** Cardiac MRI; Dilated cardiomyopathie ; Etiology; Myocardial fibrosis; Tissue characterization

## 1. Introduction

DCM is a major cause of heart failure and cardiac transplantation. Its causes are multiple: genetic, myocarditis, toxic, autoimmune, ischemic, or infiltrative. While echocardiography is the first-line examination, its limitations in tissue characterization necessitate the use of cardiac MRI, which combines morphological, functional, and tissue analysis.

## 2. Patients and Methods

- **Study design:** Retrospective, observational, conducted from 2023 to 2025 at the Cardiology Center, Mohammed V Military Teaching Hospital, Rabat, Morocco.
- **Population:** 45 patients (mean age: 52 ± 18 years, 28 men, 17 women) followed for DCM.

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- **Inclusion criteria:** Left ventricular (LV) dilation with ejection fraction < 45% confirmed by echocardiography.
- **Examinations performed:** Cardiac MRI with cine sequences, T1/T2 mapping, and late gadolinium enhancement (LGE).
- **Analysis:** Morphological and functional study, tissue characterization, etiological orientation.

## 3. Results

### 3.1. Morphological and functional evaluation

- LV dilation in all patients, mean LVEF: 34%.
- Biventricular involvement in 18 cases.
- Moderate pericardial effusion in 4 cases.

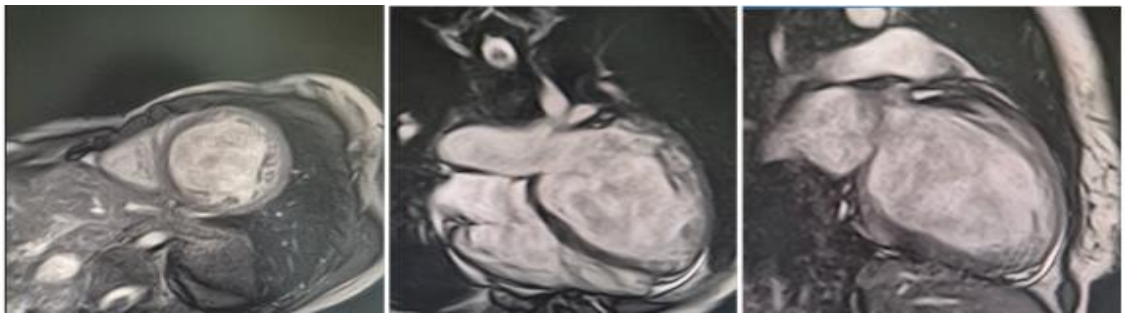

**Figure 1** Cine MRI sequences showing a dilated left ventricle with global hypokinesia

### 3.2. Etiological differentiation

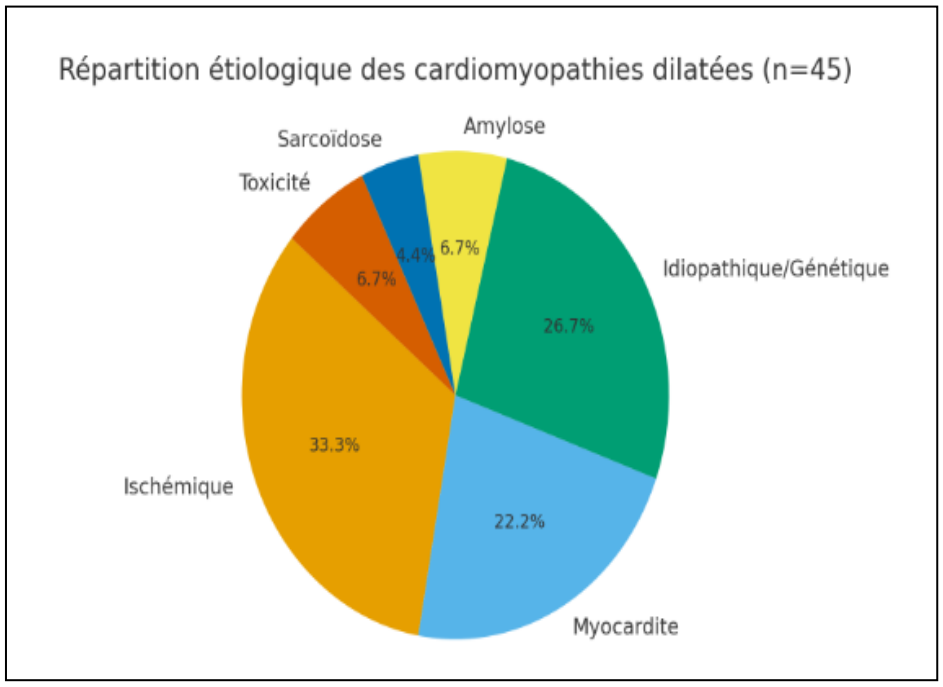


**Figure 2** Etiological distribution of dilated cardiomyopathies (n=45)

- **Ischemic origin (n = 15; 33%):** subendocardial or transmural LGE following a coronary territory.
- **Non-ischemic origin (n = 30; 67%):**
  - *Myocarditis (n = 10):* mid-wall or subepicardial LGE, T2 mapping abnormalities.
  - *Idiopathic/genetic DCM (n = 12):* diffuse interstitial fibrosis (mid-wall LGE).

- *Infiltrative diseases (n = 5):* 3 amyloidosis (diffuse subendocardial LGE, ↑ECV), 2 sarcoidosis (nodular, patchy lesions).
- *Toxicity (n = 3):* diffuse enhancement, reduced EF.

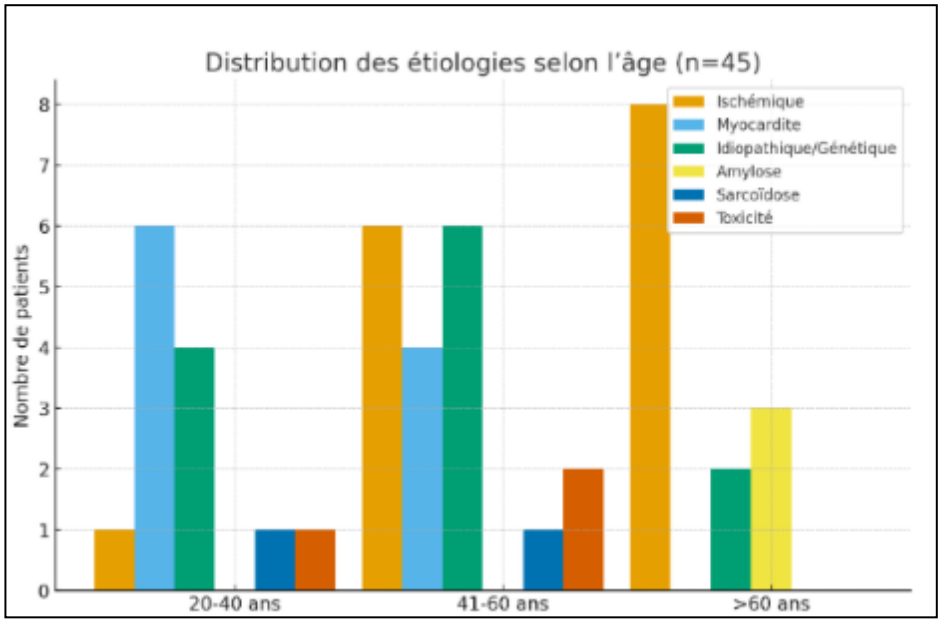


**Figure 3** Etiological distribution with age

### 3.3. Prognostic value

- Myocardial fibrosis detected in 32 patients (71%).
- Correlation between extent of LGE and severity of LV dysfunction.
- Identification of high arrhythmic risk patients, potential candidates for ICD implantation.

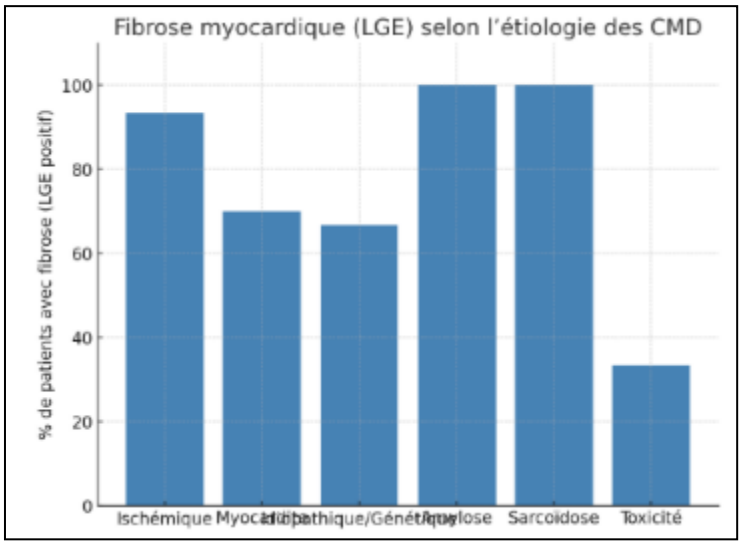


**Figure 4** Etiological Myocardiac fibrosis of cardiomyopathies

## 4. Discussion

Our series of 45 cases highlights the central role of cardiac MRI in the etiological diagnosis of dilated cardiomyopathies. As reported in the literature, CMR is currently the reference examination to distinguish ischemic from non-ischemic DCM through analysis of LGE and mapping sequences [1,2].

In our study, MRI identified an ischemic origin in one-third of cases, consistent with previous series [3]. Transmural or subendocardial LGE following a coronary distribution remains the most specific criterion of ischemic cardiomyopathy [4].

Among non-ischemic DCM, MRI revealed characteristic patterns:

- *Myocarditis:* mid-wall or subepicardial LGE associated with T2 hyperintensity is pathognomonic in the appropriate clinical setting [5].
- *Idiopathic/genetic DCM:* linear mid-wall fibrosis, frequently observed, consistent with findings from large multicenter cohorts [6].
- *Cardiac amyloidosis:* diffuse subendocardial enhancement and increased extracellular volume (ECV) are robust diagnostic and prognostic markers [7].
- *Cardiac sarcoidosis:* patchy or nodular myocardial lesions, in association with T2 mapping, are major diagnostic criteria [8].

Another essential contribution of MRI is its prognostic value. Several studies have shown that the presence and extent of myocardial fibrosis detected by LGE are associated with increased risk of ventricular arrhythmias and sudden cardiac death, independently of LVEF [9,10]. In our series, most patients with extensive fibrosis were identified as high arrhythmic risk, strengthening the role of MRI in selecting candidates for implantable cardioverter-defibrillator (ICD) therapy.

Finally, the contribution of mapping sequences (T1, T2, ECV) is increasingly recognized. They allow objective quantification of myocardial alterations, especially in infiltrative or diffuse diseases, where LGE alone may be limited [11].

Our findings confirm that cardiac MRI goes beyond morphological and functional assessment of DCM. It constitutes a true phenotyping tool, integrating differential diagnosis, etiological orientation, and prognostic stratification.

### *Limitations*

This study has some limitations: its single-center nature, the small sample size, and the absence of longitudinal follow-up do not allow definitive conclusions on prognostic value. Multicenter, prospective studies are needed to confirm these results.

## 5. Conclusion

Cardiac MRI is currently the reference imaging modality in the etiological diagnosis of dilated cardiomyopathies. Its contribution lies in its ability to combine morphological and functional evaluation with comprehensive tissue characterization. It thereby guides therapeutic management and prognostic follow-up of DCM patients.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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