Editorial

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Cardiac MRI in Argentina: strengths, weaknesses, and the road ahead.

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ABSTRACT

The IMAGGEN AR-CMR Registry provides a comprehensive and representative overview of cardiac magnetic resonance (CMR) utilization in Argentina. With more than 1,000 studies performed between 2018 and 2022 across 15 centers in 9 provinces, it reflects both strengths and weaknesses of national practice. Non-ischemic cardiomyopathy was the leading indication (55.7%), consistent with international registries. However, stress CMR, a Class IB recommendation in clinical practice guidelines for ischemia assessment, was performed in only 0.6% of cases, compared with 16–30% reported in international registries. Similarly, limited use (~6%) of tissue characterization techniques (T1/T2 mapping) was observed. Beyond these differences, the registry confirms the high diagnostic quality, excellent safety profile, and increasing adoption of macrocyclic gadolinium agents. These findings validate the capacity of our centers while underscoring the need to expand the use of stress CMR and advanced sequences such as T1 and T2 mapping to achieve international standards.

In the last decade, cardiac magnetic resonance imaging (MRI) has consolidated as the model technique in multiple clinical scenarios.[1] Its capacity to assess ventricular function, perfusion, tissue and anatomy in a single test yields advantages in comparison with traditional methods like echocardiography or nuclear medicine. However, in Argentina, little is known about the degree of protocol standardization and the level of integration of this tool in clinical practice.

In this scenario, the publication of the IMAGGEN AR-RMC Registry offers a comprehensive view on the use of cardiac MRI in the country. This is the second multicenter registry of this magnitude after the RENAREC, and the first to report on the use of sequences such as T1/T2 mapping and the type of gadolinium used.[2] Although both registries included a considerable number of provinces, it is important to highlight that distribution was not homogeneous: in the IMAGGEN AR-RMC, 70% of studies were made in the province of Santa Fe; while in the RENAREC, 70% of centers were in the province of Buenos Aires, introducing a bias in representation.

Among the most relevant findings, the main indication of cardiac MRI stands out: nonischemic heart disease, in agreement with international registries, although with differences deserving attention: cardiac MRI of stress, widely recommended for the evaluation of ischemia, is still markedly underused in Argentina.[3,4,5,6,7,8,9]

The extent of this gap is reflected when comparing international registries. The EuroCMR included more than 27,000 patients in 15 European countries, in which 34% of indications corresponded to risk stratification for CAD, with 30% of stress cardiac MRI.[10] Likewise, in the Global CMR Registry (GCMR), with more than 11,000 patients from 6 continents, stress cardiac MRI represented 16% of indications and showed a significant prognostic impact.[11] The SCMR Registry, with more than 150,000 studies, confirmed this tendency (30% of stress cardiac MRI).[12] In contrast, in Argentina, the use of stress cardiac MRI was just 0.6%, reflecting a markedly different reality.

The causes for such discrepancies are probably multifactorial. On the other hand, availability and experience in stress protocols are still limited in comparison with Europe and North America. On the other hand, clinical practice in the country still prioritizes traditional methods such as stress echocardiography or nuclear medicine, partly due to costs, even though stress cardiac MRI has the same level of recommendation (IB) and comparative studies have shown its diagnostic superiority versus SPECT in detecting CAD.[3,13]

Although in Europe and North America, cardiac MRI has consolidated as a first line tool for the evaluation of ischemia and feasibility, in Argentina there is still uncertainly on its capacity for replacing traditional methods.[9] Beyond cardiac MRI offering a higher diagnostic accuracy, its implementation should be evaluated according to availability and cost effectiveness, and more evidence is required, showing a real benefit in clinical results for patients.

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Another relevant finding of the registry is the pattern of use of sequences. In agreement with international registries and the SCMR recommendations, a wide use of cine (91.7%) and late enhancement (85.6%) sequences was observed.[14] Nonetheless, in spite of noninschemic cardiomyopathy being the most frequent indication (55.7%), the use of tissue characterization sequences, such as T1 and T2 mapping, was surprisingly low (5.8% and 5.6%, respectively). This information is in contrast with what was reported in the GCMR Registry, where nonischemic cardiomyopathy represented 21% of indications and the use of T1 mapping reached 26%, in agreement with the current recommendations.[8,14]

Beyond these differences, the IMAGGEN AR-RMC Registry confirms the high diagnostic quality, the excellent safety profile and the tendency to using macrocyclic gadolinium agents, in line with international recommendations.[14] These results validate the technical capacity of the participating centers and locate Argentinian cardiac MRI in a converging trajectory with global standards, although with quite a way to go yet. Overcoming structural obstacles will be essential for cardiac MRI to hold the place that has already reached in other international scenarios, encouraging a greater use of stress cardiac MRI and advanced sequences, such as T1 and T2 mapping.

Just as Everett Rogers described in "Diffusion of innovations", adopting a new technology follows a predictable course, that goes from innovators and early adopters, to an early majority, late majority, and finally, laggards.[15] While in Europe and North America, cardiac MRI seems to have reached the "early majority", consolidating as part of routine clinical practice, Argentina is still in an intermediate stage, with the potential to advance to a wider use if access obstacles are overcame, hindrances that limit its full integration in clinical practice.

BIBLIOGRAFIA

1. Doherty JU, Kort S, Mehran R, et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. J Am Coll Cardiol **2019**; 73: 488 –516.
2. Del Castillo SL, Jaimovich G, Destefano L, et al. Registro Nacional Argentino de Resonancia Cardíaca (RENAREC). Rev Argent Cardiol **2022**; 90: 250 – 256.
3. Greenwood JP, Maredia N, Younger JF, et al. Cardiovascular magnetic resonance and single-photon emission computed tomography for diagnosis of coronary heart disease (CE-MARC): a prospective trial. Lancet **2012**; 379: 453 – 460.
4. Takx RAP, Blomberg BA, El Aidi H, et al. Diagnostic accuracy of stress myocardial perfusion imaging compared to invasive coronary angiography with fractional flow reserve meta-analysis. Circ Cardiovasc Imaging **2015**; 8: e002666.
5. Ihekwaba U, Johnson N, Choi JS, et al. Long-term prognostic value of contemporary stress echocardiography in patients with suspected or known coronary artery disease: systematic review and meta-analysis. Heart **2024**; 110: 1349 – 1356.
6. Ricci F, Khanji MY, Bisaccia G, et al. Diagnostic and Prognostic Value of Stress Cardiovascular Magnetic Resonance Imaging in Patients With Known or Suspected Coronary Artery Disease: A Systematic Review and Meta-analysis. JAMA Cardiol **2023**; 8: 662 – 673.
7. Lipinski MJ, McVey CM, Berger JS, et al. Prognostic value of stress cardiac magnetic resonance imaging in patients with known or suspected coronary artery disease: a systematic review and meta-analysis. J Am Coll Cardiol **2013**; 62: 826 – 838.
8. Kwong RY, Ge Y, Steel K, et al. Cardiac Magnetic Resonance Stress Perfusion Imaging for Evaluation of Patients with Chest Pain. J Am Coll Cardiol **2019**; 74: 1741 – 1755.
9. Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation **2021**; 144: e368 – e454.
10. Bruder O, Wagner A, Lombardi M, et al. European Cardiovascular Magnetic Resonance (EuroCMR) registry--multinational results from 57 centers in 15 countries. J Cardiovasc Magn Reson **2013**; 15: 9.
11. Global Cardiovascular Magnetic Resonance Registry (GCMR) Investigators, Kwong RY, Petersen SE, Schulz-Menger J, et al. The global cardiovascular magnetic resonance registry (GCMR) of the society for cardiovascular magnetic resonance (SCMR): its goals, rationale, data infrastructure, and current developments. J Cardiovasc Magn Reson **2017**; 19: 23.
12. Tong MS, Slivnick JA, Sharif B, et al. The Society for Cardiovascular Magnetic Resonance Registry at 150,000. J Cardiovasc Magn Reson **2024**; 26: 101055.
13. Schwitter J, Wacker CM, Wilke N, et al. MR-IMPACT II: Magnetic Resonance Imaging for Myocardial Perfusion Assessment in Coronary artery disease Trial: perfusion-cardiac magnetic resonance vs. single-photon emission computed tomography for the detection of coronary artery disease: a comparative multicentre, multivendor trial. Eur Heart J **2013**; 34: 775 – 781.
14. Kramer CM, Barkhausen J, Bucciarelli-Ducci C, et al. Standardized cardiovascular magnetic resonance imaging (CMR) protocols: 2020 update. J Cardiovasc Magn Reson **2020**; 22: 17.
15. Rogers EM. Diffusion of Innovations, 5th Edition. Simon and Schuster; **2003**. 577 p.