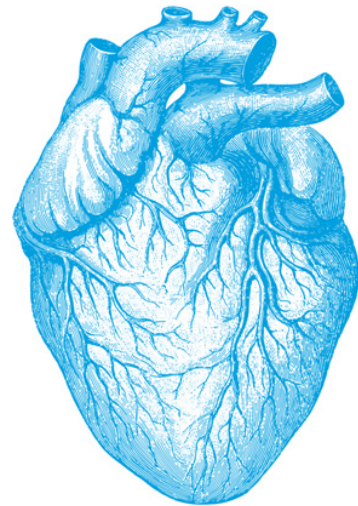


International Day of Radiology

CARDIAC IMAGING



November 8th 2018

Interview on Cardiac Imaging Malta / Dr. Luise Reichmuth

Regular multidisciplinary team meetings attended by the cardiac imaging team, cardiologists and cardiac surgeons make for excellent cooperation between all involved specialties, says Dr. Luise Reichmuth from Msida, Malta

European Society of Radiology: *Could you please give a detailed overview of when and for which diseases you use cardiac imaging? Which modalities are usually used for what?*

Luise Reichmuth: There are many indications for cardiac imaging with CT and MRI in our radiology department. A very common indication for cardiac CT is an assessment for the presence and severity of coronary artery disease in patients with stable chest pain. Other indications for cardiac CT include:

- Calcium scoring for risk assessment in asymptomatic patients with intermediate risk scores to determine the need for prescription as well as a dose of statins
- Assessment of coronary bypass grafts
- Anatomical assessment of pulmonary venous and left atrial appendage (LAA) anatomy prior to pulmonary vein isolation and LAA closure procedures
- Assessment of severity of aortic valve stenosis with calcium scoring and at times planimetry of the aortic valve opening area in mid systole
- Valve sizing and peripheral access assessment prior to TAVI procedures
- Anatomical assessment of congenital heart disease e.g. ASD, anomalous

pulmonary venous drainage, aortic coarctation, shunt thrombosis

- Assessment of aortic calibre in aortic aneurysms and aortic root dilatation
- Pre- and post-operative assessment for aortic and valve surgery
- Rarely functional cardiac assessment if MRI is contra-indicated

Indications for cardiac MRI in our department are varied but more common indications include:

- Assessment for presence of myocarditis, myocardial infarction or other aetiology in patients with chest pain, troponin rise and non-obstructed coronary arteries on an angiogram
- Assessment for the cause of heart failure
- Cardiomyopathy assessment (DCM, HCM, ARVC, restrictive cardiomyopathy)
- Assessment of patients with operated congenital heart disease, mainly tetralogy of Fallot, transposition of the great arteries, aortic coarctation and Fontan circulations
- Myocardial iron quantification for the large thalassaemia population in Malta

- Assessment for the presence of infiltrative disorders (amyloidosis, sarcoidosis)
- Pericardial disease (constrictive pericarditis, complex effusions)
- Ischaemia assessment with perfusion or dobutamine stress CMR
- Cardiac tumour characterisation (less common)

ESR: *What is the role of the radiologist within the 'heart team'? How would you describe the cooperation between radiologists, cardiologists, and other physicians?*

LR: Cardiac imaging with CT and MRI is carried out in the medical imaging (radiology) department by radiographers trained in the respective modalities. The imaging service is a joint service between the radiology and cardiology departments. There are two lead physicians, a cardiologist and a radiologist with a special interest in cardiac imaging with CT and MRI. Trainees from both specialties regularly attend the scanning and reporting sessions and all trainees from both specialties are required to gain some experience in both cardiac CT and MRI in order to complete their specialty training. Once a week there is a multidisciplinary team meeting attended by the cardiac imaging team, cardiologists and cardiac surgeons during which difficult or interesting cases are presented and discussed with occasional short lectures on cardiac imaging topics. Cooperation between all involved specialties is very good.

ESR: *Radiographers/radiological technologists are also part of the team. When and how do you interact with them?*

LR: Radiographers are in charge of the image acquisition in cardiac CT and MRI. Cardiac patients are usually grouped together once or twice a week so that a number of cardiac trained radiographers, as well as a physician for protocolling and scan supervision, will be available during this dedicated time slot. In the case of cardiac CT, the radiographers assess the patient's heart rate, blood pressure and take a short history to exclude contraindications to contrast medium, beta-blockers or GTN. Following this the supervising physician is contacted to prescribe any premedication

for heart rate control should this be required and any queries regarding the scanning protocol are also addressed. I then join the radiographers at intervals to prescribe all medications and to administer IV drugs. During some scans, I am personally present in the scanner room to set up the scanning protocol together with the radiographers.

During cardiac MRI lists, I am usually in the room with the radiographers to advise on sequence planning and addition or removal of sequences, according to the imaging findings during the scan.

ESR: *Please describe your regular working environment (hospital, private practice). Does cardiac imaging take up all, most, or only part of your regular work schedule? How many radiologists are dedicated to cardiac imaging in your team?*

LR: I work in the public acute general and teaching hospital of the Maltese health service. Cardiac imaging takes up 60% of my regular work schedule at this time, the remainder being dedicated to other areas of radiology. I am currently the only dedicated cardiac radiologist in our team, however, there are trainees who are preparing to join the team in the future. This situation is similar on the cardiology side of the team, with one dedicated cardiac imaging cardiologist involved in cardiac CT and MRI and several trainees who are still specialising and will join the team in the future.

ESR: *Do you have direct contact with patients and if yes, what is the nature of that contact?*

LR: Most patient contact occurs during administration of IV premedication and to explain the imaging procedure or results. Rarely, in the case of any adverse events, I will examine the patient and explain further management to them and any attending family members.

ESR: *If you had the means: what would you change in education, training and daily practice in cardiac imaging?*

LR: With regards to training in cardiac CT and MRI, a lot of this is based on logbooks which require reporting of a large number of cases with certain pathologies. At our hospital, we have a relatively good case mix

and sufficient numbers, since due to Malta's small size it is the only referral centre in the country. However, it can be difficult for trainees to complete their logbooks for certain types of cases. I believe that special courses based on reporting from large case libraries could solve this issue, especially if only a small proportion of cases is not covered in the trainee's respective centre.

ESR: *What are the most recent advances in cardiac imaging and what significance do they have for improving healthcare?*

LR: In cardiac CT, I believe one of the biggest advances is that most modern CT scanners are now capable of performing cardiac CTs, thus putting many centres in a position to perform these scans even if this was not previously possible and not a part of their portfolio. This makes cardiac CT available to a larger population in less specialised centres.

Cardiac MRI applications for tissue characterisation and anatomical assessment are constantly being refined and improve the evaluation of the numerous cardiac pathologies mentioned previously.

The amount of cardiac CT and MRI scans being performed is on the rise, which seems to indicate that the results are of help to the referring physicians in making management decisions for their patients.

ESR: *In what ways has the specialty changed since you started? And where do you see the most important developments in the next ten years?*

LR: Locally, the two biggest changes that have occurred since I started are the much-improved imaging equipment and the increased awareness of the benefits of cardiac cross-sectional imaging amongst

referrers. Up until a few years ago, only a handful of patients (mostly congenital heart disease patients being followed up after operation) used to be sent to centres abroad to have their cardiac MRI done. In the past year, our team has scanned 250 cardiac MRIs and there has been a rapidly growing demand from the side of the referrers which at times we are struggling to meet. This is of course driven by the fact that cardiac CT and MRI are being incorporated into more and more clinical practice guidelines, but also due to referrers having personally experienced how helpful cardiac imaging findings can be in deciding on their patient's best management.

In order to meet these demands, I hope that in the next decade cardiac MRI will become faster with further advances in scanner technology so that more patients can be scanned in a shorter time frame. Further radiation dose reduction in cardiac CT may make this modality even more accessible for certain indications, such as functional and perfusion scans, for which it is currently only used in exceptional circumstances.

ESR: *Is artificial intelligence already having an impact on cardiac imaging and how do you see that developing in the future?*

LR: At this point, artificial intelligence is not having an impact on cardiac imaging in clinical practice, however, I am sure it will become a helpful tool in the future. Improved vessel analysis software may be able to shorten reporting time for CT coronary angiograms and give precise measurements of plaque burden and characteristics. The abundant data that can be acquired with cardiac MRI will become more useful clinically once more automated image analysis tools are available.

Dr. Luise Reichmuth is a general and cardiac radiologist with a special interest in cardiac CT and MRI and works at the radiology department at Mater Dei Hospital in Msida, Malta. She is the radiology lead of the cardiac imaging team and together with a colleague from cardiology has introduced these modalities to Malta's health service. She is involved in the post-graduate training programmes of radiology and cardiology and has given numerous lectures at national conferences.

