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20 YEARS

Congress-News

Friday 9 December

Highlights from the recent and upcoming EACVI recommendation papers

by Prof. T. Edvardsen, Scientific Documents Committee Chair at the European Association of Cardiovascular Imaging and Department Of Cardiology, Rikshospitalet, Oslo University Hospital, Norway

During the past few years, the scientific documents committee of the European Association of Cardiovascular Imaging (EACVI) has been very active. We have initiated lots of recommendation and expert consensus papers and, in the last year, one of the most important publications was the update to the recommendations for the evaluation of left ventricular diastolic function by echocardiography.[1] It was a joint paper between the EACVI and the American Society of Echocardiography, and Sherif Nagueh, Houston, Texas, USA, and Otto Smiseth, Oslo, Norway, were the co-chairs. One of the most important contributions to the updated recommendations was the development of a new algorithm for the diagnosis of left ventricular diastolic dysfunction in patients with normal left ventricular ejection fraction. It has cleared up some misunderstandings from earlier papers, and it was well-received by our members.

Another very important paper that was published in 2016 was on the imaging assessment of prosthetic heart valves, and how to follow these valves after implantation using all imaging modalities.[2] It was endorsed by the Chinese Society of Echocardiography, the Inter-American Society of Echocardiography and the Brazilian Department of Cardiovascular Imaging, and the lead author was EACVI Past-President Patrizio Lancellotti, Liège, Belgium.

T. Edvardsen, Oslo, NO

Prosthetic heart valve dysfunction is a rare condition but can be life-threatening. It is therefore essential that the exact cause of prosthetic heart valve dysfunction is determined, together with the appropriate treatment strategy, and these topics are emphasised in this paper.

For 2017, there are two very important papers in the pipeline. One focuses on multimodality imaging in restrictive cardiomyopathies, and has EACVI President Gilbert Habib, Marseille, France, as the first author. This expert consensus document will offer specific and detailed information on the correct use of all non-invasive imaging techniques for the diagnosis, prognostic evaluation and management of patients with restrictive cardiomyopathies. This will be particularly relevant as it is a rare disease that is caused by a diverse group of myocardial diseases with a wide range of aetiologies, and this paper will help to differentiate between those diseases and make it easier for members to diagnose and evaluate such patients.

Another paper that will be published in 2017 is a consensus document on the comprehensive multi-modality imaging approach in arrhythmogenic cardiomyopathy, chaired by Kristina Haugaa, Oslo, Norway. The condition was previously known as arrhythmogenic right ventricular cardiomyopathy. However, that name was misleading as the disease is characterised by an acquired and progressive replacement of the ventricular myocardium by fibrous and fatty tissue that starts from the epicardium or mid-myocardium and then extends to become transmural in the right ventricle, leading to wall-thinning and aneurysms. There is, however, very convincing evidence that the condition also affects the left ventricle, and that is why we have changed the name to arrhythmogenic cardiomyopathy. The consensus document will make it clear how to follow these patients, how often they should be followed and what we should look for in the different imaging modalities and risk markers found in the different imaging techniques.

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2. Lancellotti P, Pibarot P, Chambers J et al. Recommendations for the imaging assessment of prosthetic heart valves: a report from the European Association of Cardiovascular Imaging endorsed by the Chinese Society of Echocardiography, the Inter-American Society of Echocardiography, and the Brazilian Department of Cardiovascular Imaging. Eur Heart J Cardiovasc Imaging 2016; 17: 589–590.

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The growing use of cardiac magnetic resonance in ischaemic heart disease by Prof. Bucciarelli-Ducci

Cardiac magnetic resonance imaging (CMR) is a non-invasive and radiation-free technique that is increasingly used in patients with chest pain, as it offers the ability to assess the causes of the symptom. This article discusses CMR and its and its increasing use in clinical practice.

Don't miss
Friday 9 December

- 08.30–10.00
The Best of Heart Imagers of Tomorrow (HIT),
Room Wagner
- 11.00–12.30
Live session from the Heart Center Leipzig,
Room Mahler
- 14.00–15.30
The research in imaging in the world- The EuroEcho-Imaging Lecture,
Room Wagner
- 18.00–19.00
Echo@Jeopardy,
Room Beethoven

Today in this issue

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The growing use of cardiac magnetic resonance in ischaemic heart disease

Prof. C. Bucciarelli-Ducci, Chair of the CMR Section at the EACVI and co-director of the Clinical Research and Imaging Centre at Bristol Heart Institute, Bristol, UK.

Cardiac magnetic resonance imaging (CMR) is a non-invasive and radiation-free technique that is increasingly used in patients with chest pain, as it offers the ability to assess the causes of the symptom. Primarily, this means assessing the presence and extent of myocardial ischaemia, but the technique can also be used to rule out other causes of chest pain, such as myocarditis or pericarditis, among others.[1]

Increased clinical use of CMR in cardiology

The CMR service in Bristol, a city with 500,000 inhabitants, has grown to be one of the largest in the UK, performing ~3,000 scans a year in one dedicated scanner at the Bristol Heart Institute, of which 1,200 are stress CMR tests. Over the last 4 years, referrals for stress CMR have grown by 480%, reflecting the confidence that referring cardiologists have in the test, as well as patient preference for a test of ~1 hour versus a few hours spent in a nuclear medicine department for single-photon emission computed tomography (SPECT).

CMR to detect myocardial viability

CMR was initially validated against histology for detecting the presence and extent of infarct size, and the latest gadolinium enhancement (LGE) technique very accurately reflects myocardial scarring. Gadolinium-chelate contrast agents are extracellular molecules that accumulate in increased extracellular space. In myocardial infarction, they accumulate inside infarcted myocytes due to membrane rupture, which increases the extracellular space.

Wagner et al. demonstrated that both CMR and SPECT could similarly detect transmural infarcts but that

Prof. C. Bucciarelli-Ducci, Bristol, UK

CMR could consistently detect subendocardial (partial thickness) infarctions missed on SPECT.[2] Moon et al. also validated the use of CMR, showing that Q waves on ECG do not equate to transmural infarction, and are determined by total infarct size rather than transmural extent (i.e., a large subendocardial infarction could also lead to a Q wave).[3]

Imaging the presence and extent of myocardial infarction is important in relation to regional wall motion abnormality and the prediction of regional functional recovery. Indeed, myocardial segments that are very dysfunctional (akinesia or severe hypokinesia) but only minimally infarcted suggest myocardial hibernation and can show a degree of functional recovery following successful revascularization.[4] CMR can therefore be a valuable myocardial vitality test in ischemic heart disease patients who are candidates for revascularization.

CMR to detect myocardial ischemia

The stressors used in CMR are the same as those used in stress echo and SPECT, and the protocols are similar. The most commonly used agent is adenosine, given its very short half-life (<10 seconds) and ease of use in a patient being stressed in the scanner without the physician at their side. After 4–5 minutes of adenosine infusion, stress first-pass perfusion images are acquired dynamically. Myocardial segments with reduced perfusion identify a coronary artery territory with significant coronary artery disease (CAD).

Given the high spatial resolution of CMR (~2mm), the presence and extent of hypoperfused myocardium can be easily identified and related to a territory. Moreover, three-vessel myocardial ischemia is easily identified and the issue of 'balanced-ischemia' is not experienced.

Over the last 20 years, CMR has gone from being an experimental research tool to a robust clinical application (Figure 1). This began with the development of non-diagnostic images in 1990, the progressive accumulation of clinical evidence from single and then multicentre studies, and finally studies comparing stress CMR against invasive and non-invasive imaging techniques, such as positron emission tomography and coronary angiography.[5] Lockie et al. validated stress CMR against fractional flow reserve, with a good sensitivity and specificity.[6] A number of studies have also highlighted the high negative predictive value of CMR stress and very low event rates in patients with a normal stress CMR test.

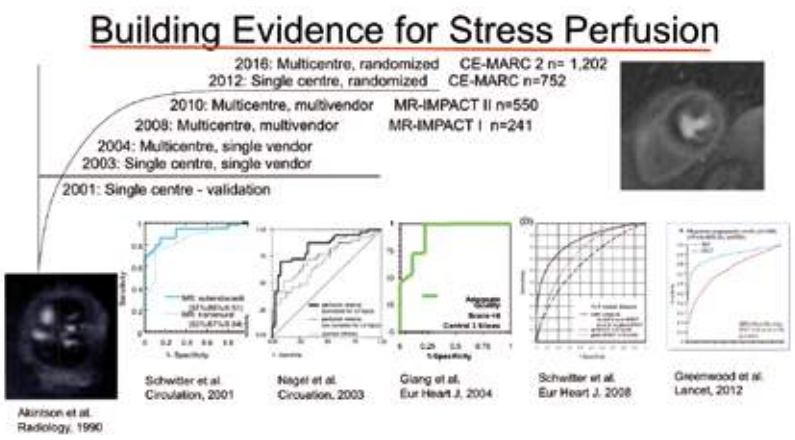
In recent years, two randomized studies finally established stress CMR as a routine test in assessing patients with stable angina. In 2012, the CE-MARC single centre study established the higher diagnostic accuracy of stress CMR versus SPECT in 752 patients with stable angina undergoing both tests in addition to invasive angiography.[7] Subset analysis confirmed these findings in patients with single, dual and triple vessel coronary artery disease and in women and men. At 5-year follow-up, CMR was a stronger predictor of risk for major adverse cardiac events, independent of cardiovascular risk factors, angiography results and initial patient treatment.[8]

Consequently, stress CMR was, for the first time, introduced to the 2014 ESC Guidelines on myocardial revascularization as a class IA recommendation in patients with intermediate CAD risk.

The multi-centre CE-MARC 2 was presented at the ESC Congress in 2016.[9] It was a pragmatic comparative effectiveness study to determine whether care guided by CMR, National Institute for Health and Care Excellence (NICE) guidelines or myocardial perfusion scintigraphy (MPS) is superior in reducing unnecessary angiography in 1,202 patients with suspected CAD. There was a significant reduction in the proportion of patients undergoing unnecessary angiography with CMR-guided versus NICE guideline-guided care, suggesting that imaging can act as a 'gatekeeper' to angiography. From the patient perspective, this means avoiding an invasive test that is not without risk. While there was no significant difference in the rate of unnecessary angiography between CMR- and MPS-guided care, the prognostic impact of CMR was higher.

CMR has been well validated, and its use in clinical practice in patients with known or suspected ischemic heart disease is increasing. While its use may be limited by the availability of the equipment and expertise and costs, the literature suggests it is increasingly being used in cardiology over other imaging modalities.

To learn more about CMR, how it can be used in clinical practice and what it can offer to your patients, join us at EuroCMR 2017 (25–27 May; Prague, Czech Republic). This year, a CMR level 1 course has been designed for CMR novice colleagues as a special track to follow through the meeting, at no extra cost. For more information, visit: http://www.escardio.org/Congresses-&-Events/EuroCMR



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Leipzig, Germany
December 7-10, 2016

EuroEcho Imaging2016
Leipzig - Germany
7-10 December 2016

TODAY

Room Wagner
12.45-13.45

Scientific programme

Improvement of cardiac efficiency with ivabradine based on imaging modalities

Chairpersons:
Michael Böhm (Germany)
Patrizio Lancellotti (Belgium)

Introduction
Michael Böhm (Germany)

How to integrate imaging modalities in clinical practice
Oliver Gämperli (Switzerland)

Left ventricular remodeling with ivabradine: data from the SHIFT study
Michael Böhm (Germany)

How imaging can help to manage the ischemic heart disease patient
Olímpio R. França Neto (Brazil)

Conclusion
Patrizio Lancellotti (Belgium)

Satellite Symposium organized by SERVIER

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Prof. P. Sengupta: Bringing together humanitarianism and innovation

Prof. P. Sengupta is Director of Interventional Echocardiography and Cardiac Ultrasound Research and Core Lab and a Prof. of Medicine in Cardiology at Mount Sinai Medical Center, New York, NY, USA. He will give the EuroEcho-Imaging Lecture: "Cardiac imaging in the era of precision medicine", during The research in imaging in the world – EuroEcho-Imaging Lecture session on Friday 14:00–15:30, Room Wagner.

Prof. Sengupta was born in Nagpur, India. His father was a physician, and his mother is an obstetrician and gynaecologist. They ran a small health clinic and his first inspiration in cardiology came from his father, who made him listen to heart sounds as a boy and would explain interesting cases. Motivated by his father, Prof. Sengupta gave a science talk in his school on the workings of the heart.

At medical school, he won a record number of prizes and gold medals. He then completed his residency in Nagpur and his first thesis, in 1994, was on dobutamine stress echocardiography, which led him to win the national young investigator award. This, in turn, attracted JC Mohan, an echocardiographer in New Delhi, who would become an influential mentor. Prof. Sengupta subsequently completed three years of cardiology training at the All India Institute of Medical Sciences in New Delhi.

Prof. Bijoy Khandheria invited Prof. Sengupta to join the Mayo Clinic in 2003. His seminal work in myocardial architecture and myocardial mechanics won him the American Society of Echocardiography (ASE)'s young investigator award in 2004. From there, beside his proliferating

Prof. P. Sengupta, New York (NY), US

research, he completed his internal medicine residency and clinical cardiology fellowship. In 2010, Prof. Jagat Narula at the University of California, Irvine recruited him as Director of Non-Invasive Cardiology. Prof. Sengupta then moved to New York to direct the cardiac ultrasound research laboratory at Mount Sinai Medical Center, as well as the interventional echocardiography programs.

Taking to the clouds

A few years ago, Prof. Sengupta joined the ASE's international committee. One of his first projects was to go to India and combine innovation, humanitarianism, industry support, membership engagement, education and research simultaneously over 2 days. The project aimed to test the feasibility of performing focused echocardiographic studies with Web-based assessments. The Remote Echocardiography with Web-Based Assessments for Referrals at a Distance (ASE-REWARD) Study involved over 1000 examinations across India over two days, which were uploaded into the cloud and read by over 75 institutions worldwide.1

From this, Prof. Sengupta created new types of datasets and showed how echocardiography could be done in novel ways. Three more large-scale studies have since been completed, and the ASE and several European and South American societies have adopted this model of humanitarian collaboration.

Harnessing the power of teams

Prof. Sengupta was nominated to give the ASE's 14th Feigenbaum Lecturership. Taking inspiration from Hollywood, music and the stage, he wanted to adapt holographic shows for his lecture, but found that they were far too expensive. He instead crowdsourced the lecture, bringing together a dozen engineers from India, Europe, Canada and the USA to create the first holographic talk. This was given at the ASE in 2013, and can be found on YouTube (https://youtu.be/l5oFUDlA50E).

Just before EuroEcho-Imaging, Prof. Sengupta delivered a TEDMED talk in Palm Springs to demonstrate innovation in cardiac ultrasound technologies. He is the chair of the ASE innovation award task force and his mission this year is to focus on technologies that speed up diagnosis and allow better decision making with more time available for taking care of patients. This includes automation, robotics, and new designs that accelerate discovery of disease, allowing more time modelling individual patient therapies.

Value is more than material wealth

Dr. Sengupta is passionate about training new leaders in the field. He has mentored over 30 research fellows and trainees over the last 10 years, of whom seven have been ASE young investigator finalists.

Prof. Sengupta's advice to younger cardiologists is to focus on research activities that look at value in terms of not just material prospects but their impact on lives and making a meaningful difference.

Although he never started with a million dollar grant, Prof. Sengupta's work has had a huge impact. His humanitarian projects, which have affected thousands of people, were built on crowdsourced ideas and small donations. He says that a lot of people think research requires capital investment. However, researchers can be extremely creative with big ideas that have an impact on people's lives.

For Prof. Sengupta, there is a difference between viewing research as a capital pursuit versus something that is more fulfilling and the pursuit for knowledge and creativity, by itself, will generate capital.

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Using imaging techniques to predict arrhythmia

Dr. K. Hermann Haugaa, Department Of Cardiology, Rikshospitalet, Oslo University Hospital, Norway

Dr. K. Hermann Haugaa, Oslo, NO

"My focus here is on the prediction of arrhythmias using imaging in a disease called arrhythmogenic right ventricular cardiomyopathy (ARVC). It is a genetic disease that may or may not be apparent to patients, as some of them go through life without anything happening, while others die suddenly.

It is the most common cause of sudden death in athletes in Europe, typically footballers. So when you see on television that a footballer has died suddenly, or that they have a cardiac arrest, it's often this disease. All our efforts are therefore geared towards preventing these collapses and sudden cardiac events,.

What we know is that the amount of sport and exercise you have done during your lifetime plays a role. If you have done more exercise, you are more prone to sudden death, which is the opposite of what you would think. Normally, more exercise is considered good for your heart and your life expectancy, but in this case it's the other way around. So those patients who exercise the most have the highest risk of dying suddenly, which is why it has a higher frequency among sportspeople and top athletes.

So what can we do with imaging techniques? Thanks to genetic testing, we now know which family members of cases who have the genetic mutation and are at higher risk, and they can now be followed clinically. Because we now know about them, we have the responsibility to prevent sudden death, of course. Therefore we use imaging among other diagnostic criteria, with echocardiography and cardiovascular magnetic resonance imaging, to make the diagnosis and follow them up.

The latest development with echocardiography is that we can use it to look for early signs, and we have some candidate parameters that we think may be good early indicators of the risk of sudden death."

How is EuroEcho-Imaging important to you and for the science?

Dr. A. DeMaria, San Diego, USA. Honorary Lecture nominee, EuroEcho 1999 – Vienna

Dr. A. DeMaria, San Diego (CA), US

EuroEcho-Imaging is important from a scientific perspective in that it provides the most up-to-date information about the clinical application of echocardiography. Of perhaps even more importance, EuroEcho-Imaging presents the most promising leading edge research and highlights those innovations that will be incorporated into cardiac ultrasound in the future. EuroEcho-Imaging is a major source for feedback on my own research and for ideas on new investigative directions to pursue.

Because I became involved with echocardiography at its beginning, I have been blessed with the opportunity to make a number of observations for the first time. The research I performed that is likely the highlight of my years was the initial demonstration of the ability to image myocardial perfusion with contrast echocardiography. During preclinical experiments with contrast we injected CO_2 into the coronary artery of dogs and visualized intense myocardial opacification. Subsequently we had the opportunity to advance the field by achieving myocardial opacification by intravenous injection of contrast agents. These findings opened up the field of the potential to assess myocardial perfusion and coronary artery disease by myocardial contrast echocardiography

EuroEcho-Imaging will continue to be one of the most important venues for research and education in echocardiography for the foreseeable future. Medical meetings provide the opportunity for direct interaction, for question and answer, for debate, and for informal discussions that the medical literature cannot provide. In addition, there is the opportunity for social interactions and camaraderie […].It will be a beacon into the future of cardiac ultrasound, and will thereby provide a pathway to the future for those working in the field.

Learn more about the EuroEcho-Imaging history makers. Visit the web page dedicated to the cardiovascular imaging experts who are the pillars of this successful history: www.escardio.org/euroecho-imaging/20years

The research in imaging in the world – The EuroEcho-Imaging Lecture, Room Wagner (14.00-15.30)