

The Edler Lecture: When a Picture Is Worth 1000 Words

Written by Jill Shuman

The Edler lecture is presented annually at the EuroEcho-Imaging meeting in honor of Inge Edler, MD, an internationally renowned pioneer in using ultrasound for the medical diagnosis of heart abnormalities. This year's Edler lecture was presented by Gerald Maurer, MD, Medical University of Vienna, Vienna, Austria. Prof Maurer spoke about the evolution of cardiac imaging techniques over the past 40 years and the impact of these techniques on both patients with heart abnormalities and healthy populations.

Before the advent of echocardiography, images of the heart were vague and indistinct. In the 1980s, innovations in cardiac imaging allowed clinicians to see all 4 chambers of the heart, measure ventricular contractions, and see structures even more granularly, such as infections of the mitral valve. Prof Maurer highlighted the impact of newer imaging techniques on a variety of conditions and assessments, including valvular heart disease, left and right ventricular function, myocardial perfusion, myocardial metabolism, and interventional imaging. According to Prof Maurer, intra- and perioperative echocardiograms have revolutionized mitral valve surgery, eventually allowing surgeons to perform many more mitral valve repairs and replacements; as the technology became more sophisticated in the early 1990s, replacement of the mitral valve began to eclipse mitral valve repair.

Prof Maurer emphasized that imaging has a direct impact on patient care as well as on healthy populations. Imaging can provide detailed morphologic, functional, hemodynamic, and molecular data, which can certainly inform patient outcomes. Such data can improve our understanding of cardiac disease processes and risk stratification, allowing researchers to develop new treatment algorithms designed to improve outcomes. In addition, data generated from the technology can also be used to develop screening programs for healthy populations, such as young athletes.

Like many new technologies, however, there are concerns about overuse and misinterpretation of the data generated from the technology. According to Prof Maurer, sensitive technologies can detect subclinical disease that should be left alone. There is a danger of overinterpretation and of detecting nontarget findings that have no clinical relevance but require additional testing. For example, a computed tomography scan of the abdominal aorta might reveal an adenoma in the adrenal gland or cysts in the kidney. This creates a great deal of anxiety for the patient and additional testing for abnormalities that are not likely to influence long-term outcomes. Advanced cardiac imaging techniques also expose patients to contrast agents or a risk of radiation exposure, and increase the overall cost of healthcare.

Prof Maurer cited an example of an unintended harm to patients related to the overzealous interpretation of echocardiographic testing for mitral valve prolapse (MVP). He estimates that in 1982, the prevalence of MVP in the United States was 14.2%, compared with 2.4% in 2014. This 7-fold decrease is probably not the result of any interventional therapy to eliminate MVP between 1982 and 2014 but more the result of an increasing use of noninvasive, 2D echocardiography in the early 1980s. Clinicians were excited to have this new tool but were likely overzealous in analyzing the imaging results, interpreting even a minimal dip of the mitral leaflet past the mitral annulus as MVP. Many of these early patients had subsequent difficulty purchasing health insurance or were unable to attain employment because they were considered "high risk."

Imaging plays an important role in providing prognostic information. Information from the Val-Heft trial showed that measurements of the left ventricular (LV) internal diameter and ejection fraction obtained via echocardiography could predict mortality among patients with heart failure [Wong M et al. *J Am Coll Cardiol.* 2004]. Similar data were obtained regarding the relationship of LV and left atrial dimensions, ejection fraction, and LV mass to subsequent clinical outcome of patients with heart failure enrolled in the SOLVD Registry and trials [Quinones M et al. *J Am Coll*

Official Peer-Reviewed
Highlights From



Cardiol. 2000]. According to Prof Maurer, echocardiography has become the tool of choice for patients with valvular heart disease, harking back to early trials suggesting that in adults with asymptomatic aortic stenosis, the rate of hemodynamic progression and clinical outcome were predicted by measurements of velocity across the aortic valve and the rate of velocity change. In a US retrospective cohort study, echocardiography successfully enhanced the predictability of a first cardiovascular event among elderly men and women [Tsang TS et al. *J Am Coll Cardiol.* 2004].

Prof Maurer then went on to discuss the role of imaging in defining the risk of ischemic events. While there is a compelling need for clinicians to identify patients who are at very high risk of developing acute coronary events, there is little evidence as to which imaging techniques might best accomplish that goal. To provide that evidence, some have called for the design of randomized clinical trials that use clinical events as the primary outcome. Ideally, these trials would also test a strategy of imaging compared with no imaging, compare distinct imaging modalities, and focus on hard cardiac end points such as cardiac death or

myocardial infarction. However, such trials are difficult to manage, expensive, and often inconclusive. While there are data available from some clinical trials that have investigated imaging as a predictor of ischemic heart disease, it has been difficult to determine whether patients undergoing imaging receive much clinical benefit compared with medical therapy [Boden WE et al. *N Engl J Med.* 2007; Hochman JS et al. *N Engl J Med.* 2006; Mahmarian JJ et al. *J Am Coll Cardiol.* 2006].

To provide clinicians with guidance regarding the use of cardiac imaging in clinical practice, the European Society of Cardiology/European Association of Cardiovascular Imaging has commissioned a committee to develop a position paper regarding the appropriate criteria for imaging use in clinical practice; the committee has already published a paper describing the process that it is using to develop the criteria [Garbi M et al. *Eur Heart J Cardiovasc Imaging.* 2014]. The appropriateness criteria will be patient centered and encourage clinicians to balance a patient's need for imaging alongside the need to preserve resources and develop standardized processes care across Europe.



The editors would like to thank the many members of the EuroEcho-Imaging 2014 presenting faculty who generously gave their time to ensure the accuracy and quality of the articles in this publication.

