



EDITORIAL COMMENT

Intracardiac echocardiography in structural heart disease: Current prospects[☆]

Ecocardiografia intracardíaca em cardiopatia estrutural: perspectivas actuais

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Advances in percutaneous treatment of structural heart disease and arrhythmias have led to the development of new imaging methods, noninvasive and invasive, to meet the needs of diagnosis and planning and monitoring of procedures.^{1,2} There are now various methods available for different types of disease and intervention, from transthoracic, transesophageal and intracardiac echocardiography to CT angiography and magnetic resonance imaging.

Fluoroscopic monitoring has various shortcomings and drawbacks, including lack of resolution in assessing soft tissues, high radiation doses and the need for contrast agents. However, any additional imaging method in a percutaneous intervention will incur further costs.

Ideally, imaging techniques used in a catheterization or electrophysiology laboratory should meet the following criteria: ease of use, image acquisition in real time and in three or four dimensions, close visualization of cardiac structures and the material being used without interfering with the procedure, minimal invasiveness, low cost, and no need for sedation or anesthesia; in the ideal system, the ability to visualize and treat should be integrated in the same device, with no need for additional equipment or operators.¹

One area in which imaging is crucial at all stages of diagnosis and treatment is percutaneous closure of defects of

the atrial septum. This technique, first described by King et al. in 1976,³ has been shown to be effective and safe in the treatment of ostium secundum atrial septal defect (ASD) and patent foramen ovale (PFO) following paradoxical embolism.^{4,5} The results are at least as good as surgical treatment in patients with favorable anatomy.⁶

In the article by Seca et al.⁷ in this issue of the *Journal*, the authors report their experience of intracardiac echocardiography using the AcuNav[®] catheter (manufactured by Siemens Medical Solutions and distributed by Biosense Webster) to guide closure of defects of the atrial septum in 127 patients, with a high success rate and a low percentage of complications, and conclude that its use eliminates the need for additional imaging techniques.

Echocardiographic monitoring may not be required in percutaneous PFO closure, depending on the characteristics of the defect and the type of closure device used.⁸ However, it is essential at all stages of ASD closure, the technique selected depending among other factors on the facilities of each center, particularly the availability of an anesthetist and echocardiographer. Intracardiac echocardiography is an attractive alternative, since it means that the interventional cardiologist can perform the entire procedure, which is much simpler in logistical terms.

Various studies have demonstrated the efficacy and safety of intracardiac echocardiography with the AcuNav[®] catheter in ASD closure,^{9,10} additional advantages being high image definition, acquisition of multiple planes and color Doppler study. The drawback is the high cost of the catheter, which according to the manufacturer can only be used once. The authors stress that a cost-effectiveness analysis was outside the scope of their study but that others have suggested

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that the technique has economic benefits, but this has yet to be proven.¹¹

There is currently a debate, especially in Europe, on the reuse of medical devices such as the AcuNav[®] catheter, for which image quality and patient safety do not appear to be jeopardized by reprocessing.¹² Defining a medical device as single-use is the responsibility of the manufacturer and not of regulatory bodies such as the Food and Drug Administration (FDA) or the European regulatory authority. In the US, the FDA requirements for the reuse of a medical device stipulate that it should be as safe and effective as a new device. For the AcuNav[®] catheter, reuse up to four times has been authorized,¹³ significantly reducing the cost of using it in procedures. The question remains unresolved in Europe, practices varying between countries and even between centers, and regulation is still awaited. The report of the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) of the European Union concluded in 2010 that "not all single use medical devices are suited for reprocessing in view of the characteristics (e.g. material used, geometry), [and] their complexity ... In order to identify and reduce potential hazards associated with reprocessing of a specific single use device, the whole reprocessing cycle starting with the collection of these single use medical devices after (first) use until the final sterilization and delivery step, including its functional performance, needs to be evaluated and validated."¹⁴

The role of various echocardiographic modalities in planning and guiding percutaneous interventions in congenital and valvular heart disease is growing rapidly, from intracardiac to three-dimensional transesophageal echocardiography.^{15,16} Recently developed transesophageal echocardiographic microprobes that can be introduced through the nose, with no need for deep sedation or anesthesia, may become an alternative to intracardiac echocardiography, particularly if technical developments allow for remote catheter manipulation, the entire procedure thus being controlled by one operator.¹⁷ As more and more imaging techniques become available, their appropriate use also becomes more challenging, from selection of technique and integration of data to questions of cost, safety and efficacy.

Conflicts of interest

The author has no conflicts of interest to declare.

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