Buenos Aires, Argentina. These include technical issues such as catheter design and level of operator experience, trial conduct, Hawthorne effect, placebo effect, patient demographics, and medication changes or adherence.

In regard to catheter design, with the monopolar single-point catheter, there is energy loss into tissue and blood and nonhomogeneous injury distribution. Animal data have shown that the number of ablations is correlated with the concentration of norepinephrine and that approximately 6 to 10 ablations are required to achieve sufficient RDN [Mazor M. *J Am Coll Cardiol.* 2012]. Subanalyses of the Symplicity HTN-3 data revealed a significant reduction in SBP at 6 months in nonblack patients, which raises the question of whether this is because of racial differences or adherence to medication, said Prof Mendiz. RDN was also effective in patients taking an aldosterone antagonist at study entry.

Whether adequate maximal sympathetic blockade was achieved before RDN in Symplicity HTN-3 is questioned, because approximately 40% of the patients in the RDN and sham groups had changes in their medication between baseline and 6 months. Patients were taking about 5 drugs each, >50% had ≥1 drug change, 69% of all medication changes were "escape" changes, and about 50% were taking central-acting sympatholytics.

A subanalysis of Symplicity HTN-3 showed that the use of aldosterone antagonists at baseline, the total number of ablation attempts, and baseline office SBP ≥180 mm Hg were predictors of a change in SBP at 6 months in the RDN group [Kandzari D et al. EuroPCR. 2014]. A matched cohort analysis by these authors also showed an association between the number of ablations and change in office and ambulatory SBP, with ≥10 ablations associated with a significant reduction.

The ALSTER BP real-world registry of the Symplicity RDN system showed that there are 3 types of responders: early, late, and non [Kaiser L et al. *EuroIntervention.* 2014]. In 5 of 8 nonresponders who had a second RDN procedure, SBP was reduced at 6 months. The company-sponsored Global SYMPLICITY Registry [NCT01534299] showed that there were reductions in the mean 24-hour ambulatory SBP and in office SBP (by 11.9 to 20.2 mm Hg) in its first 1581 patients.

Prof Mendiz stated that patients with true treatment-resistant hypertension would be considered candidates for RDN after careful patient selection using a team approach with well-defined criteria in a well-trained catheterization laboratory, which should perform ≥14 ablations per patient. New RDN devices are showing promising preliminary outcomes, and new applications for different clinical settings (eg, for kidney failure, heart failure, obesity, diabetes, and sleep apnea) are being investigated.

Update on Mitral Valvotomy

Written by Mary Mosley

Mitral valvotomy is primarily used in the developing world because of the constraints in those countries, stated F. E. Smit, MD, University of the Free State, Bloemfontein, South Africa. Survival is increased, with an excellent or normal lifestyle, without the need for reintervention. A number of factors must be considered to select the type of valvotomy, including patient factors (eg, where the patient lives and the stage of the disease) as well as facility and operator factors (eg, level of training and available resources).

Several scoring systems have been developed to help optimize patient selection. The Wilkins score evaluates the extent of valvular disease and identifies patients who may be eligible for balloon valvotomy. Additional scores help predict long-term outcomes in patients with severe mitral stenosis, and a recent scoring system based on 20-year follow-up to obtain ideal results is guided by scoring systems such as the Wilkins score. Prognostic scoring systems for outcomes after balloon mitral valvotomy (BMV) include the transesophageal echocardiography (ECHO) assessment of commissure morphology [Sutaria N et al. *Heart.* 2006] and the scoring system by Zhang and colleagues that predicts late outcomes in patients with severe mitral stenosis [Zhang HP et al. *Am Heart J.* 1997]. A recent scoring system is based on the factors that predict late function as identified from the 20-year follow-up of patients who underwent percutaneous mitral commissurotomy (Table 1) [Bouleti C et al. *Circulation.* 2012].

Closed mitral commissurotomy (CMC) and open mitral commissurotomy (OMC) provided similar survival at 30 years (49.1% vs 45.9%; P=NS), but the need for another procedure was lower with OMC (5 patients vs 44 with CMC; $P<.05$), as shown by Detter and colleagues [Detter C et al. *Ann Thorac Surg.* 1999]. A series by Chen and colleagues substantiated the hemodynamic improvements achieved with valvotomy [Chen CR, Cheng TO. *Am Heart J.* 1995].

Percutaneous mitral valvotomy using the double balloon technique provided similar results as CMC and the improvement in mitral valve area (MVA) was durable at the 15-year follow-up (mean follow-up 99 months) [Rifaie O et al. *J Cardiol.* 2009]. Mitral restenosis occurred in 5 patients in each group. The durable results with BMV were also shown by Farhat and colleagues in their 7-year follow-up [Farhat MB et al. *Circulation.* 1998].

OMC provided a durable improvement in MVA in a series of 100 patients with mitral stenosis [Antunes MJ et al. *J Heart Valve Dis.* 2000]. The mean MVA was 0.99 cm^2 before surgery, increased to 2.89 cm^2 after

Table 1. Factors That Predict Late Outcomes After Percutaneous Mitral Commissurotomy

Factor	Adjusted HR (95% CI)	*P* Value	Points for Score (of 13 Total Points)
Age, y, and final MVA, cm^2			
< 50 and MVA ≥ 2.00	1		0
< 50 and MVA 1.50–2.00, or 50–70 and MVA > 1.75	2.1 (1.6 to 2.9)	< .0001	2
50–70 and MVA 1.50–1.75, or ≥ 70 and MVA ≥ 1.50	5.1 (3.5 to 7.5)	< .0001	5
Valve anatomy and sex			
No valve calcification	1		0
Valve calcifi cation			
Female	1.2 (0.9 to 1.6)	.18	0
Male	2.3 (1.6 to 3.2)	< .0001	3
Rhythm and NYHA class			
Sinus rhythm or atrial fibrillation and NYHA class I to II	1		0
Atrial fibrillation and NYHA class III to IV	1.8 (1.4 to 2.3)	< .0001	2
Final mean mitral gradient, mm Hg			
≤3	1		0
3–6	1.1 (1.0 to 1.8)	.05	1
≥6	2.5 (1.8 to 3.5)	< .0001	3

MVA, mitral valve area.

Adapted from Bouleti C et al. Late results of percutaneous mitral commissurotomy up to 20 years: development and validation of a risk score predicting late functional results from a series of 912 patients. *Circulation* 2012;125:2119–2127. With permission from American Heart Association, Inc.

surgery, and was 2.37 cm^2 on Doppler ECHO at the mean 8.5-year follow-up. An MVA > 2.0 cm^2 was found in 81% of patients at follow-up. Importantly, this study showed that a postintervention MVA between 1.3 and 1.5 cm^2 should not be considered a success, stated Prof Smit.

Valvuloplasty is ideal for complex disease, which includes all valves with pathology extending beyond the leaflet and valvular structural disease, as defined by the scoring systems. Such valves likely require either valvuloplasty or valve repair for the first attempt at valve salvage, stated Prof Smit.

The selection of a percutaneous or surgical procedure is determined by the available expertise, infrastructure, and cost. If both options are available, Prof Smit recommends BMV as the first choice, or CMC, if the patient is an ideal candidate according to the scoring systems. OMC should be performed for all other patients. An irreparable valve should be replaced because the possibility of another surgery may not be available in developing countries. A diagnostic program for early detection should be established.

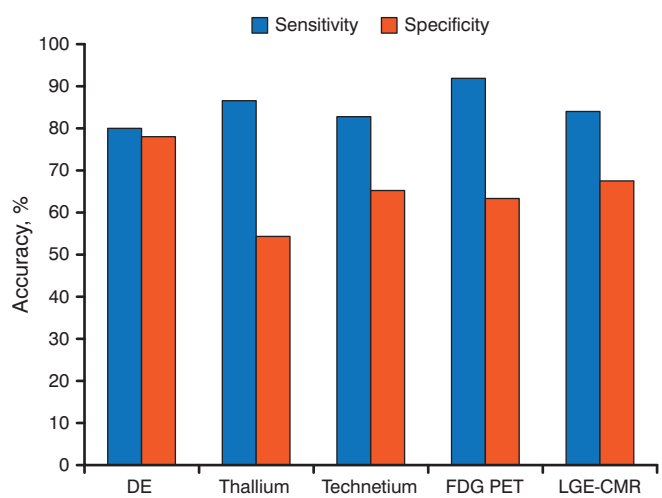
Imaging Solutions to Determining Myocardial Viability Before Revascularization

Written by Maria Vinall

Up to 61% of patients with left ventricular (LV) dysfunction still have some viable myocardium. Ahmad Fathala, MD, King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia, believes that revascularization should continue even in the face of jeopardized—but still viable—myocardium.

Surgical revascularization may improve heart failure (HF) symptoms, LV ejection fraction (EF), and long-term prognosis in patients with coronary artery disease (CAD) who have a substantial amount of viable myocardium. A variety of methods can be used to identify patients with viable myocardium and to predict patient outcomes, but the sensitivity and specificity vary among the techniques (Figure 1) [Schinkel AF et al. *Curr Probl Cardiol.* 2007].

Figure 1. Sensitivity and Specificity of Various Imaging Methods for Identifying Myocardial Viability



DE, dobutamine echocardiography; FDG PET, F-18 fluorodeoxyglucose positron-emission tomography; LGE-CMR, late gadolinium enhancement cardiovascular magnetic resonance.

Source: Schinkel AF et al. *Curr Probl Cardiol.* 2007. Reproduced with permission from A Fathala, MD.