Percutaneous Valve Intervention
A Surgeon’s Perspective
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Two articles1,2 in this issue of Circulation present small series of patients who had either a percutaneous mitral annuloplasty performed via the coronary sinus or a percutaneous aortic valve replacement via a retrograde femoral artery approach. The main thrust of each article was to demonstrate the technical approach, complications, and short-term results of these techniques. It is clear that this technology is in its infancy. The technical challenges, reliability, and ability to achieve consistent results (not to mention appropriate patient selection) will be an area of active research and development over the foreseeable future.

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The magnitude of investment by major medical device companies and startup companies and the degree of venture capital investment will clearly drive this technology forward rapidly. Nevertheless, our role as cardiologists and cardiac surgeons is to provide guidance, perform the trials honestly with minimal bias, and work collaboratively as providers of cardiovascular care to perfect the techniques to reliably and appropriately treat the specific valve lesion.3 We must perform the science rigorously to ensure patient safety and learn how to advise patients about the variety of options that will ultimately be available. The model of “bail-out” cardiac surgery after failed percutaneous coronary intervention for coronary artery disease will not be easily transferred to percutaneous approaches to a variety of valve lesions.4–6

The specific approaches to mitral valve pathology are either focused on the leaflet with the use of edge-to-edge fixation or the dilated annulus often present in ischemic and functional mitral regurgitation. More complex pathology may require a combination of techniques and devices. The surgical community has in general been cautious and disappointed with long-term results of edge-to-edge techniques (Alfieri), especially when performed without an annuloplasty.7,8 Therefore, if the technology and techniques are eventually developed to reliably and safely deploy such devices percutaneously, the late results must be comparable and effectively compete with reliable open surgical procedures. Costs and patient preferences must always be considered, but recommending the appropriate procedure will require randomized trials to provide the medical evidence to guide clinical advice and decisions.2,9

The coronary sinus technique and devices to treat annular dilation will need similar study. The long-term issues of extensive hardware left in the coronary sinus and how this may affect later placement of left ventricular leads for cardiac resynchronization therapy, electrophysiology studies, or administration of retrograde coronary sinus cardioplegia with cardiac surgery must be considered. Additionally, the coronary sinus does not exactly follow the posterior mitral valve annulus. The risk to the circumflex coronary artery must be evaluated rigorously in the short and long term. Additionally, short-term results may not predict late results when further remodeling of the mitral valve, left ventricle, and left atrium continues over time, affecting the degree of mitral regurgitation. Finally, we are very aware of the adverse impact of mitral regurgitation on late survival and symptoms in patients after myocardial infarction or left ventricle dysfunction. However, we are not as knowledgeable about the appropriate subgroups of patients in whom even successful treatment of the mitral regurgitation will actually lead to improved survival.

The replacement of the aortic valve for aortic stenosis with an equine tissue valve via a percutaneous approach will need to undergo the same rigorous randomized investigations. Current feasibility trials are enrolling patients not considered good surgical candidates. The term “high-risk” surgical patient is very broad. Experienced cardiac surgeons performing valve surgery routinely report excellent results even in elderly high-risk populations. Issues of peripheral vascular access in patients with diseased or small femoral or iliac vessels will be an issue in many of these elderly patients when the retrograde approach is considered. Direct access and deployment through the left ventricular apex will have advantages and present technical challenges. Durability of the tissue valve within a metal stent is another unknown. Perivalvar leaks may be more of an issue because of hemolysis than the hemodynamic burden of the regurgitation. Therefore, the surgeon and cardiologist must work collaboratively in the development and eventual use of these devices. Together we can develop the procedural techniques to ensure appropriate patient selection, provide informed consent, and ensure patient safety.2,5,9

If the polarization that has taken place during the decades of percutaneous coronary intervention development and practice for coronary disease can be reversed in the Dawning era of percutaneous valve interventions, all stakeholders (surgeons, cardiologists, and patients) will be the ultimate winners. Percutaneous valve intervention is exciting, generates

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media hype, and holds great promise. Collaboration between the surgeon and cardiologist functioning as a team will be the most successful paradigm for the development and eventual practice of percutaneous valve intervention. First we must perform the science.

**Disclosures**

Dr Shemin has served on the science advisory board for 3F Therapeutics and as a consultant to Edwards LifeSciences and St Jude Medical.

**References**


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