Editorial Comment

Percutaneous Mitral Balloon Valvulotomy or Balloon Valvuloplasty?
It’s Not Just Semantics Anymore

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In this issue of Circulation, Abascal and coworkers present another in a series of articles in which they conclude that echocardiographic evidence of thickening, immobility, subvalvular fusion, and calcification of the stenotic mitral valve predicts a low immediate success rate of mitral balloon dilation.1-5 These findings are particularly valuable to those who treat mitral stenosis in the cardiac catheterization laboratory. In roles reversed from those of years past, interventional cardiologists now depend on noninvasive diagnostic findings to guide invasive therapy. Though these findings may seem predictable, the situation was not as clear just a few years ago.

A brief history of balloon dilation in the treatment of mitral stenosis may aid in appreciating the importance of these findings. Early in the development of percutaneous mitral and aortic balloon dilation, the technique was considered to be experimental, unproven, and even dangerous. However, many invasive cardiologists had only a few years earlier been skeptical when they heard of the Swiss physician Greuntzig’s proposal of balloon dilation of coronary arteries. The surprising success of balloon angioplasty made cardiologists receptive to the possibility that balloons could effectively treat valvular stenosis. Because it was experimental, patients who were poor candidates for surgical valve replacement were those initially chosen for mitral balloon dilation. These patients were usually elderly and had severe valvular deformity and heavy valvular calcification. Even so, balloon dilation was at times surprisingly successful.6,7 To some cardiologists it seemed that no matter how diseased the mitral valve, balloon dilation was at least worthy of a trial. It was not uncommon to hear proponents of mitral balloon dilation encourage those attending national meetings to attempt balloon dilation in any patient suffering from severe mitral stenosis. In contrast, surgeons seemed, at least privately, dismayed by the success of mitral balloon dilation. Their long experience in viewing and replacing such valves suggested that not all stenotic valves could be repaired by any means, let alone by percutaneous dilation.8,9 The impressive results of surgical commissurotomy relied in part on surgeons’ “almost mystical ability to select (surgical) candidates.”10 Initially, there was a tendency for the cardiologist, although a novice in valvular interventional therapy, to belittle such opinions. The literature surgeons cited seemed antiquated, and broad experience in treating mitral stenosis by commissurotomy antedated the professional careers of most invasive cardiologists. Which valves might respond to balloon dilation seemed to cardiologists an unanswered question.

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Perhaps prompted by their own or by others’ adverse experiences with balloon dilation of severely deformed mitral valves, several authors instituted ongoing studies to assess the relation of echocardiographic valvular morphology to outcome.1-5,11-13 In large measure, they found that the surgeons were right all along. Not all percutaneous valve dilation procedures are successful. Although there are patients whose valves can be successfully treated with balloon dilation, there are others who are probably better off with surgery. Finally, the predictable relation of valve morphology to successful mitral balloon dilation provokes comment about the mechanism of successful mitral balloon dilation and suggests appropriate naming for the balloon dilation procedure.

Not all percutaneous valve dilation procedures are successful. An important contribution of Abascal et al11 and of Palacios et al12 is their clear assessment of the probability of the success of a mitral balloon dilation. Using their hemodynamic definition of immediate success and New York Heart Association class I or II functional status on follow-up as the definition of long-term success, their initial success rates were 65–69%,1,5 and their 13-month success rate was 78%.5 Their success rates appear lower than similarly defined immediate success rates of 85–87% and 3–9 month success rates of 91–93% reported by others for mitral balloon dilation.11,12 Their success rates also seem lower than the 1 and 4 year success rates of 73–84% and 90%, respectively, reported for

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surgical commissurotomy. However, in studies by Abascal et al and Palacios et al, overall success rates were calculated by including data from all 130 or 100 patients, respectively, in their series, including patients who died as well as those whose balloon dilation procedures were clearly suboptimal. In previous studies of percutaneous dilation, cardiologists excluded 13–18% of patients from the calculation of immediate and long-term success rates. They excluded patients who died during the procedure, patients who required valve replacement soon after the procedure, patients whose procedures were deemed technically inadequate, and patients whose hemodynamic data were incomplete. The inclusion of these patients in their calculations would have lowered reported success rates to values similar to those reported by Abascal et al. Similarly, authors of surgical studies excluded the 9–16% of patients who suffered immediate or late deaths from calculations of long-term success rates of surgical commissurotomy. The denominator in surgical series is reduced further because valve replacement is performed in place of commissurotomy when commissurotomy proves suboptimal during the operation, but such patients are not followed up as examples of failed surgical commissurotomy. I believe that the data presented by Abascal et al accurately represent what physicians might appropriately expect to achieve with percutaneous balloon dilation in a given patient with mitral stenosis. It is clear that neither percutaneous mitral balloon dilation nor surgical commissurotomy is always successful.

Although there are patients whose valves can be successfully treated with balloon dilation, there are others who are probably better off with surgery. Which patients are poor candidates for mitral balloon dilation? In their 130 patients, Abascal et al found that valves that are severely deformed or calcified can be successfully dilated (as defined by immediate hemodynamic criteria) in only 42% of patients, whereas valves whose stenosis is primarily caused by commissural fusion may be successfully dilated in 84% of patients. These researchers have previously shown that echocardiographic evidence of valvular deformity or calcification also predicts poor long-term results, with restenosis occurring in 70% of such patients 13 months after the procedure. Most such studies have led to similar conclusions. Valahian et al (with 200 patients) and Reid et al (with 33 patients) agree that immediate results are better in patients with less valvular thickening, calcification, and subvalvular fusion, although Reid et al did not find valvular morphology predictive of long-term functional improvement. Disagreeing with these conclusions, Come et al (with 37 patients) found similar immediate increases in mitral valve area irrespective of predilation valvular or subvalvular morphology or calcification. Nonetheless, the majority opinion is that flexible valves affected primarily by commissural leaflet fusion respond well to balloon dilation, but thickened and calcified valves with extensive chordal fusion are often not optimally improved by the procedure. Given this relation between the severity of valvular deformity and the success rate of mitral balloon dilation, cardiologists have again proven what surgeons knew years ago. Thickened, heavily calcified valves with extensive subvalvular fusion can not be reliably repaired, whether by percutaneous balloon dilation or during surgery. In many cases, these patients should probably be referred directly for valve replacement.

Finally, the predictable relation of valve morphology to successful mitral balloon dilation invites comment about the mechanism of mitral balloon dilation and suggests appropriate naming for the balloon dilation procedure. In vitro, autopsy, and echocardiographic studies suggest two possible effects of balloon dilation in mitral stenosis. Balloon dilation separates fused commissures and increases the flexibility of stenotic valves by cracking calcific deposits within the valve leaflets. The echocardiographic and clinical data in the balloon dilation studies cited above suggest that of these two effects, the opening of commissures in a flexible valve (tomy, derived from the Greek -tomes, in turn derived from tennein, to cut) provides a high chance of effectively relieving mitral stenosis. In contrast, simply deforming an inflexible or calcified mitral valve in hopes of increasing its flexibility (plasty, derived from the Greek -plasia, in turn derived from plassein, to mold or form) does not usually relieve mitral stenosis in a lasting way. Thus, recent publications labeling mitral valve balloon procedures “valvulotomy” or “commisurotomy” rather than “valvuloplasty” probably correctly identify the preferred therapeutic process.

Percutaneous mitral balloon valvuloplasty or valvuloplasty? The difference is more than semantic; it is probably the difference between success and failure.

References
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