Whereas the former should be ascribed to congenital malformations of the mitral valve, the latter may represent anatomic variants of otherwise normal mitral leaflets or, more rarely, adaptive mechanisms of the mitral valve configuration, as observed in some disease conditions.⁴ In our case, real-time 3-dimensional echocardiography was highly predictive of detailed surgical anatomy and thus promises to be an invaluable tool in distinguishing between rare mitral valve malformations and variants of normal anatomy.

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EDITORIAL COMMENTARY

How many leaflets in the mitral valve?

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In their brief report published in this issue of *The Journal*, Benfari and colleagues¹ demonstrate the presence of clefts within both the aortic and mural leaflets of the mitral valve, producing the arrangement they describe as being “quadricuspid.” In making this designation, Benfari and

The solitary zone of apposition of the mitral valve, with slits in the mural leaflet.

Central Message

For the best description of the leaflets of the normal mitral valve and their component parts, we should take note of their pattern of closure.

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FIGURE 1. The solitary zone of apposition of the mitral valve, with slits in the mural leaflet.

colleagues¹ have shown their preference to retain the concept of the normal mitral valve possessing but 2 leaflets. Citing historical preference and mindful of their Italian heritage, they are happy to describe the 2 leaflets, as did Andreas Vesalius when working in Padova many centuries ago, as being aortic and mural. The obliquity of the left atrioventricular junction means that these designations are more accurate than the alternative and popular titles of anterior and posterior leaflets. Any anatomic structure with 2 moving components, of course, must then close along a solitary zone of apposition, as with the lips or the eyelids. Anatomists call this zone of apposition the “commissure.”

It has become customary, however, to describe the ends of the solitary zone of apposition in the mitral valve as paired commissures. It is recognition of the pattern of closure, nonetheless, that now serves to distinguish the normal mitral valve (Figure 1) from the trifoliate arrangement observed in the setting of atrioventricular septal defect with common atrioventricular junction.²

The zone of apposition between the 2 leaflets does not extend to the level of the atrioventricular junction. To permit snug closure of the valve during ventricular systole, furthermore, there are usually several slits along the mural leaflet (Figure 1), producing the “scallops” within the mural leaflet. Some would elevate the scallops to the level of leaflets,³ while others also recognize additional “commissural” leaflets.⁴ The presence of the single obvious major zone of apposition (Figure 1) is sufficient to justify retention of the conventional designation of the valve as being “bicuspid.” But is “cusp” the best word with which to describe the moving components of either the atrioventricular or arterial valves? When defined literally, a “cusp” is a point or elevation, or the crossing of 2 curves. One can only imagine that it was used to describe the cardiac valves by old anatomists in view of their

similarity to the surfaces of the molar or premolar teeth (Figure 1). “Leaflet” is surely the better descriptor, and it can be used to account for the moving components of either the arterial or atrioventricular valves. To justify the description of the quadrifoliate valve, these Italian authors emphasize that the described clefts extend to the atrioventricular junction, distinguishing them from the normal slits. The definition also shows that the so-called “cleft,” as seen in ostium primum defects, is itself a zone of apposition between the left ventricular components of the bridging leaflets of the common atrioventricular valve because it extends to the scooped-out ventricular septum rather than the atrioventricular junction.²

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