Commentary: What makes the morphologically left ventricle double chambered?

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An example of double-chambered left ventricle.

Central Message

Congenital division of the left ventricle is being described with increasing frequency. The lesion likely reflects abnormal coalescence of the trabecular component of the developing walls.

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As is indicated by Park and colleagues¹ in their discussion in this issue of the *Journal* of the potential for congenital division of the morphologically left ventricle, this entity is appreciably rarer than comparable congenital division of the morphologically right ventricle. The use of search engines such as Google, nonetheless, now shows that the lesion is being encountered and described with increasing frequency, albeit usually as individual case reports. The largest series of lesions has been described subsequent to examination of an archive of autopsied hearts, including division of both the right and left ventricles.² As Park and colleagues¹ emphasize, the congenitally divided right ventricle can itself appear in several guises. Many consider the entity to be produced by a prominent anomalous trabeculation spanning the ventricular cavity. Such an anomalous trabeculation, however, does not obviously divide the ventricle into 2 components. A double-chambered arrangement is much more readily recognized when a prominent myocardial shelf, itself formed by condensed trabeculations, divides the apical component into obvious inlet and outlet parts.³ It is much harder to provide an explanation for the congenital malformations that might produce a comparable 2-chambered arrangement within the morphologically left ventricle. This is in part because the apical trabeculations of the morphologically left ventricle are fine and crisscross, in contrast to the coarse trabeculations found at the apex of the right ventricle. And septoparietal trabeculations, spanning from the septal to the parietal walls, are found only within the morphologically right ventricle. As already indicated, nonetheless, reports are beginning to appear with increasing frequency of division of the left ventricle, perhaps because of the increasing use of 3-dimensional techniques during cardiac diagnosis.⁴⁻⁶

The current case showing congenital division of the morphologically left ventricle is further complicated, because Park and colleagues¹ suggest that their patient also had an ischemic aneurysm develop, thus potentially producing the arrangement in which the left ventricle

possessed 3, rather than 2, components. They suggest that the aneurysm itself ballooned from both of the divided components. We confess that we find it exceedingly difficult to correlate the images obtained in the operating room with those produced by their 3-dimensional reconstruction. To our eyes, the alleged dividing shelf could just as easily be interpreted as representing the parietal wall of the left ventricle, with the purported second ventricular component itself being the aneurysm, because it seems that only the chamber labelled as “LV2” possesses apical trabeculations. This could be significant, because in one of the earliest accounts of a series of patients with congenital division of the left ventricle, Gerlis and associates⁷ suggested that a similar arrangement was indeed due to division of the parietal ventricular wall. In the series reported by Gerlis and associates,⁷ the other 2 cases showed evidence of sequestration of the entirety of the apical component of the left ventricle from its inlet and outlet components. In collaboration with Anton Becker, in our textbook *Cardiac Pathology*, one of us (R.H.A.) published a case with sequestration of the apical component of the right ventricle.⁸ In retrospect, it is clear that the heart in question came from a patient with excessive apical trabeculations, the arrangement frequently described as *noncompaction*, and that the apical part of the left ventricle is similarly sequestered. We recently encountered another case in which the dividing shelf in the left ventricle was likely the consequence of abnormal coalescence of the trabecular component of the developing ventricular wall

FIGURE 1. An example of double-chambered left ventricle.

(Figure 1).⁶ Although there is no evidence to show that such initial trabeculations during development form the normal compact component of the wall, they almost certainly do

coalesce to produce the papillary muscles in both ventricles. In this regard, in the majority of the cases described thus far, the dividing myocardial shelf within the left ventricle has been closely related with the papillary muscles of the mitral valve (Figure 1). It seems likely, therefore, that in both variants of double-chambered ventricles, it is the manner of coalescence of the trabecular component of the developing ventricular walls that underscores the morphogenesis. The good news is that, irrespective of the interpretation of the findings, the surgical outcome in the case reported by Park and colleagues¹ was excellent.

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