Anatomy of a Criss-Cross Heart

To the Editor:

We read with interest the article by Araoz et al and its description and beautiful three-dimensional (3D) images of a rare criss-cross heart. The 3D gadolinium-enhanced magnetic resonance angiography (MRA) images clearly demonstrate the complex anatomy, in particular the relationship between the crossed atrioventricular pathways. Based on the images presented, however, the assignment of the ventricular loop as an L-loop appears incorrect. The concept that the ventricles have handedness (chirality), introduced by Van Praagh et al, was conceived as a solution to the dilemma presented by superoinferior ventricles and how looping is ascertained in these complex hearts. The internal spatial organization of the ventricles (handedness) is independent of their location in space. In this case, the leftward and superior location of the morphological right ventricle does not make it an L-looped right ventricle. As described by Van Praagh, one’s hand can be used to determine the handedness of a ventricle in space. A D-looped right ventricle is present when the palm of the right hand can be placed on the septum, the thumb placed through the inflow, and the fingers placed through the outflow. This case has solitus atria, D-looped ventricles, and L-transposition of the great arteries, ie, segmental set notation \{S, D, L\} of Van Praagh.

In an echocardiographic analysis of 14 cases of criss-cross hearts, Marino et al reported that the most common segmental set was \{S, D, L\}, as was the case here. If the great arteries with L-looped ventricles \{S, L, L\} were indeed present, then this anatomy would have been an example of the extremely rare occurrence of disharmony between the atrioventricular alignments (connections) and atrioventricular situs. An echocardiographic description of the latter rare anomalies, as well as a discussion of the segmental approach, can be found in a report by Geva et al.

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