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Variations in structure of the outflow tract of the human embryonic heart: A new hypothesis for generating bicuspid aortic semilunar valves.

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ABSTRACT

Outflow tract development of the heart is complex. The presence, differential growth and interactions of the various tissues through space and time contribute to the final development of the tract. This paper presents a novel interpretation of observations of outflow tract development, in particular of the aortic and pulmonary semilunar valves in embryos from the Shaner Collection at the University of Alberta. Three-dimensional reconstructions assist in the visualization of the spatial relationships of the developing valve tissues. In some embryos the aortic intercalated valve swelling is displaced proximally, giving rise to a bicuspid aortic semilunar valve more distally. In addition, the developing valve tissue first appears external to the myocardial cuff. The pulmonary semilunar valve regions appear to be more normal. This paper thus proposes a novel mechanism for generating a bicuspid aortic valve and also supports the idea that there is some independence of the aortic and pulmonary regions from each other during development.

KEY WORDS: Semilunar valve swellings, bicuspid aortic valve

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