

**The differential insertion of the atrioventricular valves: a plane-dependent echocardiographic feature for normal fetal hearts**

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**Introduction:**

The differential insertion of the atrioventricular valves (DIAVV) is an echocardiographic feature in a four-chamber view of structural normal fetal hearts. DIAVV is an ultrasound image of the more apical attachment of the tricuspid valve (TV) to the atrioventricular septum compared to the mitral valve (MV). A linear insertion of the atrioventricular valves (LIAVV) is suggested as a marker for atrioventricular septal defects (AVSDs). The aim of this study is to evaluate the anatomical substratum of DIAVV and LIAVV in normal hearts and AVSDs.

**Methods:**

Serial sections of 17 normal human hearts, ranging from 10 to 36 weeks gestation, were studied with various histological and immunohistochemical tissue markers with special attention to the extent and position of the fibrous skeleton and the attachment of the leaflets of the AV valves. For each trimester a 3D AMIRA reconstruction was made. Sectional planes equal to the echocardiographic four-chamber view were studied. In addition, this anatomical region was compared to a case with AVSD.

**Results:**

In normal fetal hearts the DIAVV is visible in the four-chamber plane just caudal to the aortic outflow tract. In this plane the offset of the TV is located more apical than the MV. In a more caudal four-chamber plane there is a lack of the DIAVV, resulting in a linear appearance of the offset of the AV valves. In a trisomy 21 fetus with an AVSD, a linear appearance (LIAVV) was observed in the four-chamber plane. However, more caudally to the aortic outflow tract a differential insertion (DIAVV) was found.

**Conclusions:**

In structural normal fetal hearts and in a heart with an AVSD both DIAVV and LIAVV can be found dependent on the plane where the four-chamber view is visualised. For demonstration of the DIAVV it is important to obtain the four-chamber view just caudal of the aortic outflow tract. The knowledge that such an accurate positioning of the four-chamber view is necessary, explains differences in reference values described in the literature. Therefore, the DIAVV is a useful echocardiographic tool, however, caution should be exercised when interpreting the DIAVV as characteristic for a normal heart.