

Anatomical Correlation Between Mitral and Tricuspid Valve Dimensions

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Objectives

This project has several objectives: (1) to learn about heart anatomy and function; (2) to find a potential correlation between the mitral valve and the tricuspid valve in sheep hearts; (3) to make a prediction model between those found correlations; (4) to then potentially prevent patient prosthesis mismatch and to economically benefit both patients and cardiovascular departments.

The four main components of the mitral valve (MV) and tricuspid valve (TV) - annulus, leaflets, chords, and papillary muscles (PMs) – work together to ensure proper heart pumping and to prevent blood back-flow into the left atrium (MV) and right atrium (TV). It was sought to determine anatomical correlation between the dimensions of these components. Twenty-five sheep hearts were dissected. Circumference of the annulus, length and breadth of the leaflets, and number of chords from the PM to the leaflets was measured. Using Excel and JMP software, all correlations were analyzed via a scatter plot with a regression line. If the correlation coefficient was high and the p-value was below .05, a residual plot was created to see if a linear model was appropriate. The results showed that annular lengths correlated ($r=.87$; $p= 0.007$) while other components did not. Medically, prediction of annular lengths will give doctors a better estimate to what the replacement ring size should be during surgery, helping prevent patient prosthesis mismatch. Potential future annular rupturing can be predicted if the other valve has unproportionate annular circumference. Economically, department costs will decrease as fewer rings will have to be opened and not used due to them not fitting.