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ANATOMICAL STUDY OF ANNULAR CIRCUMFERENCE OF ATRIOVENTRICULAR VALVE WITH ITS CLINICAL CORRELATION

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Abstract

Introduction: -The human heart contains four chambers equipped with openings designed for the inflow and outflow of blood. Valves protect these openings for planned and controlled blood flow. The periphery to which the valves are attached is called the annulus. Atrioventricular valves are two in number: tricuspid and mitral (bicuspid), named according to number of cusps and located between the atria and ventricle on both sides. The other valves, the pulmonary valve, regulates blood flow in the pulmonary trunk, and the aortic valve regulates flow through the aorta.

Material and Method: - The present study was conducted in the anatomy department of medical college Baroda, Gujarat. One hundred formalin-fixed hearts specimens were taken for the study. The heart dissection was done and the interior of heart was seen for the tricuspid valve and bicuspid valve.

Results: - We observed that the annular circumference of the Tricuspid valve ranges from 47.01 to 132.23 mm, with a mean of 91.12 $\pm$ 18.65. While annular Circumference of the bicuspid valve ranges from 65-130 mm with a mean of 84.11 $\pm$14.25

Conclusion: - Detailed knowledge of the anatomical characteristics of the atrioventricular valve should improve the understanding of its anatomy and

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significantly contribute to better results in conservative procedures and thus promote a return to anatomical and functional normality.
Keywords: Bicuspid, Tricuspid, Mitral, Atrioventricular valve, Valve, Prostheses.

Introduction

The human heart contains four chambers equipped with openings, designed for the inflow and outflow of blood. Valves protect these openings for planned and controlled blood flow. The periphery to which the valves are attached is called the annulus. The valves that guard the exit from the ventricle are the pulmonary and aortic valves (semilunar valves), and those at the atrioventricular junction are tricuspid and mitral valves (Atrioventricular Valve). Atrioventricular valves are two in number: tricuspid and mitral (bicuspid), named according to number of cusps and located between the atria and ventricles on both sides. The other valves, the pulmonary valve, regulates blood flow in the pulmonary trunk, and the aortic valve regulates flow through the aorta. Valves generally act to close the chambers, thereby controlling the inflow and outflow mechanism. An increase in the incidence of a sedentary lifestyle leads to heart disease, which causes an increase in mortality and morbidity in humans. Moreover, heart valves are also affected by various diseases and disorders such as stenosis, regurgitation, valve prolapse, infectious endocarditis, rheumatic fever,fibrocalcific degeneration or dilatation of the valve annulus[1]. Knowledge of the normal anatomy of cardiac valves and the structural abnormalities caused by specific diseases is essential in the clinical detection of abnormalities of cardiac valves and in developing a particular therapeutic intervention that proves helpful in patient care. The cardiac valves are collagenous structures covered by the continuous endothelial layer that line the cardiovascular system. The cardiac disease may also involve more than one Valve. Severe damage to the heart valves can be corrected with prosthetic valves[2].

The present study was undertaken to construct a normal range for the annular circumference of the tricuspid and bicuspid valve orifice, which may be helpful for cardiac surgeons and invasive cardiologists, who use direct measurements of this region.

Material

The present study was conducted in the anatomy department of medical college Baroda, Gujarat. One hundred formalin-fixed hearts specimens were taken for the study.

Inclusion criteria

1. Hearts in good condition after removing from cadavers.
2. Hearts specimens retain their morphological features.

Exclusion criteria

1. Hearts in lousy condition after removing from cadavers.

2. Hearts specimens with damaged atrioventricular valve.

Method

Present study was conducted after taking permission from Institutional Ethics Committee.The heart dissection was done according to standard method and interior of heart was seen for the tricuspid valve and bicuspid valve. Morphological parameters of the structure mentioned above were measured as follows:

Tricuspid valve

- Annular Circumference: With the help of cotton thread length of the attached margin of tricuspid valve was measured and it was considered an annular circumference.

Bicuspid Valve

- Annular Circumference: With the help of cotton thread length of the attached margin of the bicuspid valve was measured, and it was considered an annular circumference.

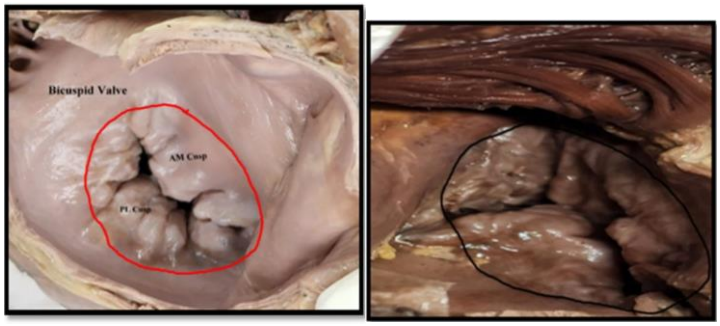


Figure 1 Shows method to measure annular circumference

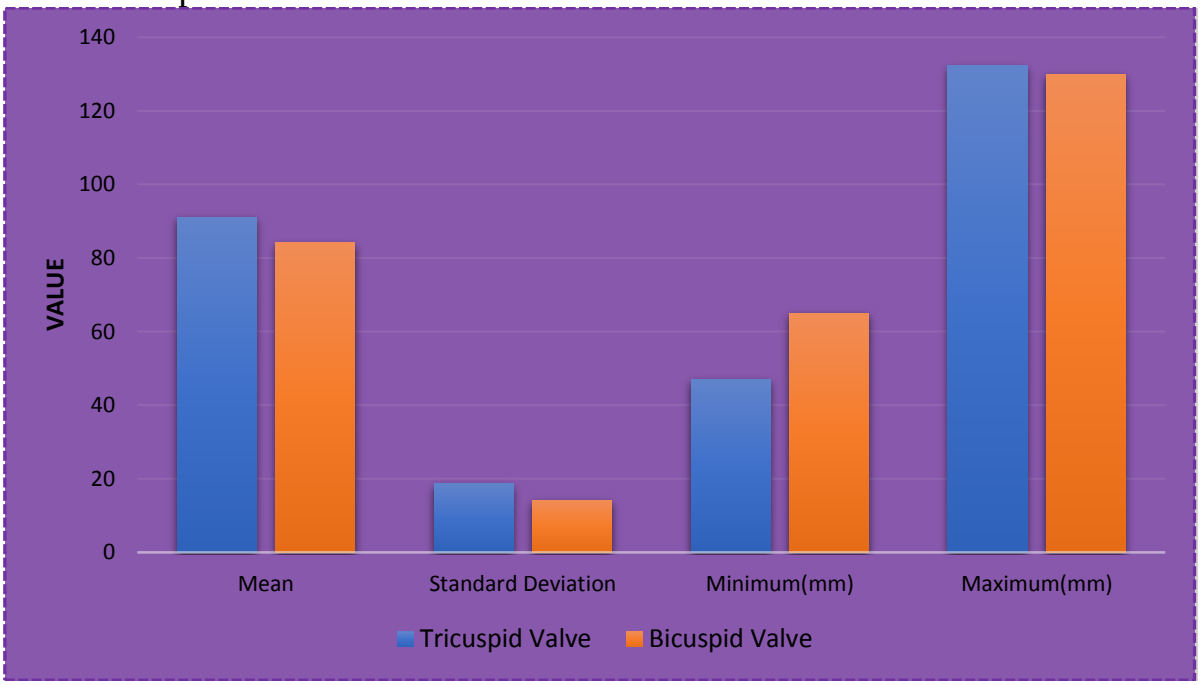
Result

In our current study, we observed that the annular circumference of the tricuspid valve ranges from 47.01 to 132.23 mm with a mean of 91.12 $\pm$ 18.65. While annular circumference of the bicuspid valve ranges from 65-130 mm with a mean of 84.11 $\pm$14.25,as shown in table-1.

Table No. 1: Annular Circumference of Atrioventricular Valve

Annular Circumference	**Mean (mm)**	**Standard Deviation**	**Minimum (mm)**	**Maximum (mm)**
Tricuspid Valve	91.12	18.65	47.01	132.23
Bicuspid Valve	84.11	14.25	65	130

Graph No. 1: Annular Circumference Of Atrioventricular Valve

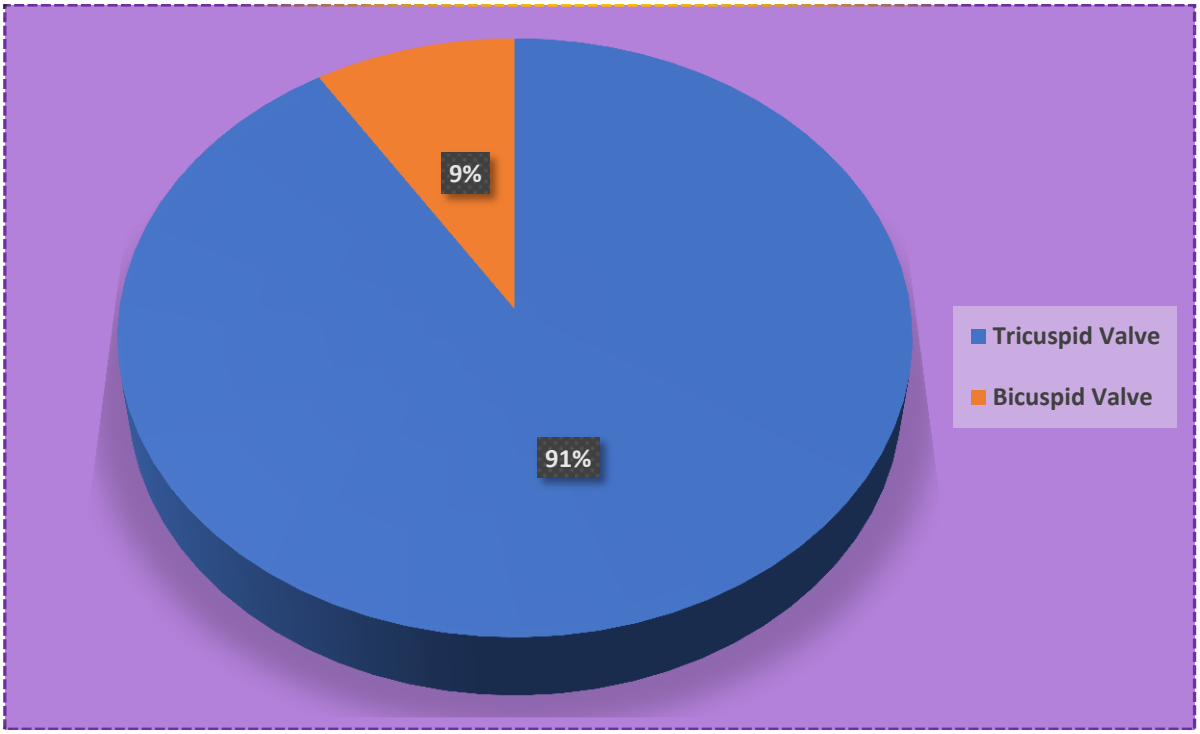


In present study, only 9% cases were having annular circumference of bicuspid valve higher than the tricuspid valve.
However in majority of specimen, annular circumference as well as mean value was found higher in tricuspid valve.

Table No. 2: Comparison Of Higher Value Of Annular Circumference Of A-V Valve

Annular Circumference	**No Of Specimen (N=100)**
Tricuspid Valve	91
Bicuspid Valve	9

Graph No. 2: Comparison Of Higher Value of Annular Circumference of A-V Valve



Discussion

In our study, we observed that the annular circumference of the tricuspid valve has a mean of 91.12 ± 18.65 mm. While annular circumference of the bicuspid valve with a mean of 84.11 ±14.25 mm. In the work of S. Ilankathir et al[3,] the mean valve of annular circumference of the tricuspid valve was 103.7 mm and mean value of the bicuspid valve was 82.8 mm, which is similar to our study. Another study by Kouji Chida et al.[4], annular circumference of the tricuspid valve has a mean of 99 ± 10 mm, while mean value of annular circumference of the bicuspid valve was 83 ± 10 mm. In study of Geethanjali. B.S et al. [5], the circumference of bicuspid valve was 81.9 ±10.1mm in males, 77.6±9.9 mm in females. Brock RC et al. [6] studied on 50 hearts and observed circumference of bicuspid valve was 99 mm. Nagarathnamma B et al. [7] observed that the circumference of tricuspid valve was 95.25±11.48 mm and Skwarek, et al.[8] observed circumference tricuspid valve was 105.67±16.76mm.

Conclusion

Disorders affecting the heart valves impair the pumping efficiency of the heart. They cause either stenosis or regurgitation. Detailed knowledge of the anatomical characteristics of the atrioventricular valve should improve the understanding of its anatomy and significantly contribute for better results in conservative procedures and thus promote a return to anatomical and functional normality. This precise knowledge also defines some of the details of the atrioventricular valve architecture that are necessary for the development and

manufacture of the prosthesis. This will be useful for anatomists and cardiac surgeons in surgical procedures valvuloplasty, differential diagnosis of damaged atrioventricular valve etc.

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