

## Morphology of Right Atrioventricular Valve -A Postmortem Study

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### Abstract

**Introduction:** Heart valves serve the important function of preventing backflow, or regurgitation, in the healthy heart. It is well known that cardiac valves can suffer from congenital and acquired disease. Most frequent acquired valvular abnormalities are stenoses of the aortic and mitral valves, which account for approximately 2/3rd of all valve disease. For the management of valvular disease morphology of right atrioventricular valve is essential. **Materials and Methods:** Study design was descriptive type of study. Place and period of study was Department of Anatomy, Sylhet MAG Osmani Medical College, Sylhet from July 2015 to June 2016. **Results:** Present study was performed on 70 post mortem human hearts of age ranging from 9 to 70 years. Human heart was collected from the unclaimed dead bodies autopsied in the department of Forensic medicine in Sylhet MAG Osmani Medical College during the study period fulfilling the inclusion criteria. **Conclusion:** The collected samples were divided into 3 groups depending on age. Group - A: (9 - 21 Years), Group - B: (22 - 41 Years), Group - C: (42 -70) Years. Each group was subdivided into two groups depending on their sex.

**Key words:** Atrioventricular valve, Heart.

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### Introduction:

The right atrioventricular or tricuspid valve guards the right AV orifice <sup>1</sup>. Through the right atrioventricular (tricuspid) orifice, the inflow part of the right ventricle receives blood from the right atrium, located posterior to the body of the sternum at the level of the 4th and 5th intercostal space <sup>2</sup>. The right atrioventricular orifice is somewhat oval or circular in outlet and is oriented almost vertically. It measures on average 11.4 cm in circumference in males and 10.8 cm in females <sup>1,3</sup>. The A-V valves (the tricuspid and mitral valves) prevent backflow of blood from the ventricles to the atria during systole. These valves close and open passively. That is, they close when a forward pressure gradient forces blood in the forward direction. For anatomical reasons,

the thin, filmy A-V valves require almost no backflow to cause closure <sup>4</sup>. The atrioventricular valve is developed by local proliferations of mesenchymal tissue after the fusion of atrioventricular endocardial cushions <sup>5,6</sup>. Replacement of damaged cardiac valves with prostheses has now become a common and often life-saving mode of therapy. This advancement has undoubtedly called for an improved anatomical knowledge on the part of the surgeon. Besides for correction of cardiac abnormalities modern cardiac surgery demands precise methods of investigation to provide accurate anatomical details. It is only when such information is available that a precise diagnosis can be planned <sup>7</sup>. This sort of information is undoubtedly best gathered through experience in the living subject, secondly to that approach and clearly prerequisite to the study of representative specimen such as anatomical study through autopsy.

### Materials and Methods:

This descriptive study was conducted in the Department of Anatomy, in collaboration with the Department of Forensic Medicine, Sylhet MAG Osmani Medical College, Sylhet during the period from July 2015 to June 2016. Seventy human postmortem hearts were collected from the dead bodies autopsied within 36 hours of death. Considerable signs of decomposition or decomposed dead body, any gross heart disease were excluded. The obtained Hearts were classified according to the age and sex. Particulars of dead body was collected from police inquest report and chalan. Heart was collected after standard procedure of autopsy. Unwanted tissues were cleared and heart was washed thoroughly with normal saline and was gently squeezed to remove the clotted blood from the cavity of the heart. Congenital anomalies of heart was excluded after dissection. Each specimen was duly tagged by a piece of waxed cloth bearing an identifying number which was considered as serial number. Then the specimen was fixed and preserved in 10% formalin.

### Grouping and distribution of cases

The collected samples were divided into 3 groups depending on age.

Group - A: 9 - 21 Years.

Group - B: 22 - 41 Years.

Group - C: 42 -70 Years.

Each group was subdivided into two groups depending on their sex. Parameter: Circumference of the right atrioventricular orifice.

#### Measurement of Parameter of the Right Atrioventricular Valve:

**Measurement of right atrioventricular orifices:** For the measurement of the circumference of the right atrioventricular orifices the annulus of each orifice was cut open and stretched flat. A metric scale and non-stretchable nylon thread was used for this purpose. The latter used on base (annulus) of the cusps and subsequently stretched and compared with the metric scale. The values was expressed in centimeter.

#### Results:

##### Distribution of circumference of right atrio-ventricular orifice among different age group.

The circumference of right atrio-ventricular orifice was  $6.62 \pm 1.80$  cm in the age group-A (9-21 years),  $9.02 \pm 1.27$  cm in the age group-B (22-41 years) and  $8.73 \pm 1.33$  cm in the age group-C (42-70 years). There was significant difference of circumference of right atrio-ventricular orifice between age group-A and age group-B ( $p < 0.001$ ); and age group-A and age group-C ( $p < 0.001$ ); but no significant difference between age group-B and age group-C ( $p = 0.504$ ). Distribution of circumference of right atrio-ventricular orifice among different age group was shown in table I.

**Table-I: Distribution of circumference of the Right atrio-ventricular orifice among different age group (n=70).**

Group	n=70	Minimum cm	Maximum cm	Mean $\pm$ SD	P	Remark
A	20	6.62 $\pm$ 1.80	9.02 $\pm$ 1.27	6.62 $\pm$ 1.80	A vs B, p<0.001	Signifant between Group A and B and A and C
B	32			9.02 $\pm$ 1.27	A vs C, p<0.001	
C	18			8.73 $\pm$ 1.33	B vs C, p=0.504	

Data were expressed as mean  $\pm$ SD n : number of specimen  
Group - A : 9 - 21 Years Group - B : 22 - 41 Years  
Group - C : 42 - 70 Years SD : Standard deviation  
P : probability value

##### Distribution of circumference of right atrio-ventricular orifice between male and female:

The circumference of right atrio-ventricular orifice was  $8.56 \pm 1.57$  cm in male and  $7.54 \pm 2.05$  cm in female. There was significant difference of circumference of right atrio-ventricular orifice of heart between male and female ( $t = 2.266$ ;  $p = 0.027$ ). Distribution of circumference of right atrio-ventricular orifice between male and female was shown in table II.

**Table-II: Distribution of circumference of the right atrio-ventricular valve of heart between male and female (n=70).**

Sex	n=70	Minimum cm	Maximum cm	Mean $\pm$ SD	t	p	Remark
Male	49	4.47 $\pm$ 2.53	10.47 $\pm$ 1.33	8.56 $\pm$ 1.57	2.266	0.027	Significantly greater in male
Female	21	2.03 $\pm$ 1.03	8.56 $\pm$ 1.54	7.54 $\pm$ 2.05			

Data were expressed as mean  $\pm$ SD n : number of specimen  
SD : Standard deviation P : probability value

#### Discussion:

This study showed that the circumference of right atrio-ventricular orifice was  $6.62 \pm 1.80$  cm in the age group-A (9-21 years),  $9.02 \pm 1.27$  cm in the age group-B (22-41 years) and  $8.73 \pm 1.33$  cm in the age group-C (42-70 years). There was significant difference of circumference

of right atrio-ventricular orifice between age group-A and age group-B ( $p < 0.001$ ); and age group-A and age group-C ( $p < 0.001$ ); but no significant difference between age group-B and age group-C ( $p = 0.504$ ). The circumference of right atrio-ventricular orifice was  $8.56 \pm 1.57$  cm in male and  $7.54 \pm 2.05$  cm in female. There was significant difference of circumference of right atrio-ventricular orifice of heart between male and female ( $p = 0.027$ ).

Farzana<sup>8</sup> stated that the mean circumference of right atrioventricular orifice was  $7 \pm 1.57$ ,  $9.03 \pm 1.15$  and  $9.51 \pm 0.94$  cm respectively. The mean difference of circumference of right atrioventricular orifice between Groups A and B, B and C and A and C was statistically significant at  $p < .05$  level.

Begum<sup>9</sup> found that the mean circumference of the tricuspid orifice in male hearts was  $9.24 \pm 1.19$  cm and in females was  $9.35 \pm 1.13$  cm. Statistical analysis however, showed no significant difference ( $P > 0.05$ ) in the circumference of tricuspid orifice between males and females.

Yavuz et al<sup>10</sup> measured the mean circumference of the tricuspid orifice was  $12.4 \pm 1.1$  cm in males and  $11.8 \pm 1.3$  cm in females.

Mannan<sup>11</sup> measured the mean circumference of the tricuspid orifice and found 9.12 cm in males and 8.53 cm in females.

Datta<sup>12</sup> described that the right atrio-ventricular orifice is somewhat oval or circular in outline (depending upon the phase of the cardiac cycle) and the circumference of the opening, on an average, varies between 10 cm and 12 cm.

Standing et al<sup>1</sup> stated that circumference of the tricuspid orifice in males 11.4 cm and 10.8 cm in females.

The difference of the values of present study with the above cited literature is assumed to be due to racial cause.

#### Conclusion:

From the results a single set of conclusion could not drawn, but are expected to provide an idea about the circumference of the tricuspid orifice of the heart and their changes in relation to age and gender of Bangladeshi people.

**Conflict of Interest:** None.

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