



## Morphological Study of Human Hearts of Adults Died in Accidents - A Study in Central Rajasthan

### KEYWORDS

Heart, mitral valve, aortic valve, ostia,

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**ABSTRACT** Heart is a hollow muscular organ with resemblance to a cone or a pyramid. It has an apex a base and borders occupying the middle mediastinum between the lungs and their pleural covering. The present study was carried out at the department of forensic medicine J.L.N. Medical College Ajmer during the period of dec - 2012 to dec - 2014 and was carried out in case of sudden accidental death a total of 150 cases were studied. The present study verify the data regarding the heart in various text books. To study anatomical characteristic of aortic valve, so that they may be useful in diagnostic situations and surgical management

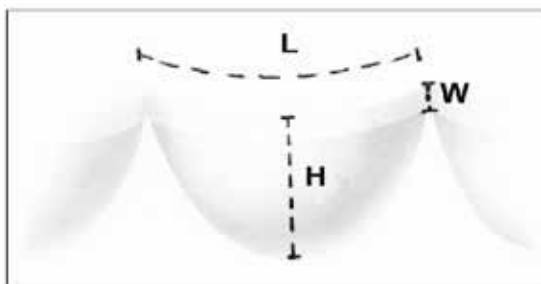
### Materials And Methods

Total 150 hearts were included in present study. The mitral valve descriptions and measurements are based upon observations made during dissections of human hearts who died in accident preserved in 10% formalin after removal from body. Specimens were in good condition after removal from body during dissection and retain their true features, relationships. The measurements of the valve were taken from 150 normal hearts. The mitral leaflets with the annulus, chordae and papillary muscles were removed, and the valve was flattened out in a single plane by dividing its ring at the lateral commissure and by half splitting the medial papillary muscle mass as described by Louis a. Du Plessis and Paul Marchand (1964) with slight modification. The opened-out valves were then pinned to white Thermancol sheet. Measurements were made with an ordinary metric ruler. This is simple method to use require no complicated instruments. But limitation of this method is that it may cause human error during measurements.

### AORTIC VALVE ASSESSMENT

Using a vernier caliper and a # 0 cotton thread, the Valsalva's sinuses were assessed as well as the 3 cusps of

the aortic valve: left coronary cusp (LC), right coronary cusp (RC), and noncoronary cusp (NC), according to the following parameters: Number and height of the cusps (fig. 1):



(fig. 1)

Height obtained by stretching the cotton thread from the bottom of the Valsalva's sinus until the free margins of the cusps in the middle point between the commissures,

respecting its curve. This measure was then transferred to the pachymeter; Size of the lunula (fig. 1) according to two parameters: width – assessed at the commissural level; and length –

measured by stretching the cotton thread at the surface of each cusp at the free margins, following its curve;

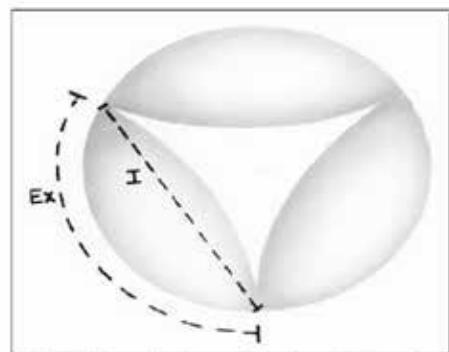


Fig. 2 – Sketch demonstrating the external (Ex) and internal (I) intercommissural distances.

Intercommissural distances (fig. 2) external – measured by stretching the cotton thread along the aortic wall

uniting one commissure with the other, so that the addition of the 3 measures represents the aortic circumference; internal – obtained by uniting the commissures with the cotton thread at the smaller distance between them;

### Position of the ostium and its relation with the corre-

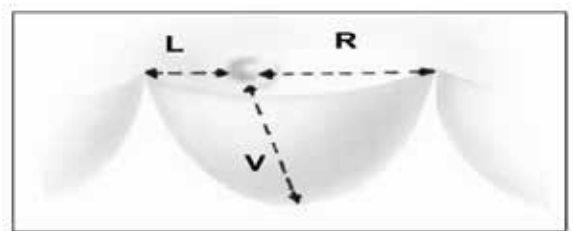


Fig. 3 – Sketch of the position of the ostium in relation to the left commissure (L); right commissure (R) and bottom of the Valsalva's sinus (V).

### spondent Valsalva's sinus

using the cotton thread, the distance between the ostium

and the commissures and the bottom of the Valsalva's sinus was measured; Position of the ventricular septum in relation to the aortic valve (fig. 4),

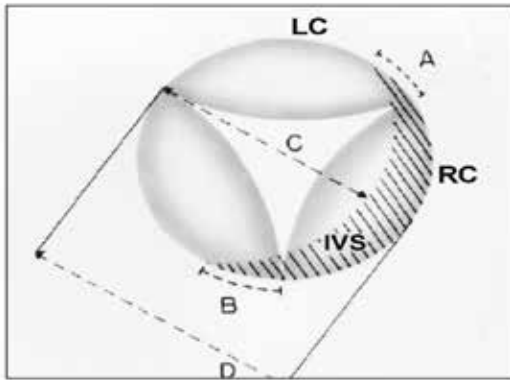


Fig. 4 – Sketch of the position of the ventricular septum (IVS) in relation to the aortic valve. LC – left coronary; RC – right coronary; NC - noncoronary; A- distance between the septal extremity and the RC-LC commissure; B- distance between the septal extremity and the RC-NC commissure; C- distance between the septum and the NC-LC commissure; D- aortic diameter.

assessed in the following parameters: distance between the septal extremity and the RC-LC commissure (measure A); distance between the septal extremity and the RC-NC commissure (measure B); distance between the septum and the NC-LC commissure (measure C); aortic diameter (measure D). The ratio C/D x 100 was also established to determine

the percentage of free area of the aortic valve annulus and, consequently, to evaluate the position and percentage of the area occupied by the septum in relation to the left ventricle outflow tract (LVOT). Thickness of the cusps (fig. 5): grossly assessed at 3 different points of the surface of each cusp: free margins, bottom of the Valsalva's sinus, and the intermediate point between the other 2. The assessment of thickness was performed

by visual inspection without using specific instruments

because the tissue of the cusps is very delicate. Even though a histological study of the cusps would provide more accurate information, it was not carried out because the specimen had to be kept intact for further studies. All parameters analyzed were related to sex, age and race.



Fig. 5 - Sketch (front and side view) demonstrating the 3 sites of evaluation of the thickness of the cusps.

Table 1 (Average of all values)

s.no.	Length of Annular Attachment of Leaflet (cm)		Total Length of valve ring (cm)(valve circumference)	Length of free edge of valve (cm)	Maximum length of leaflet (attached margin to free margin) (cm)	
	Anterior	Posterior			Anterior	Posterior
Average	3.46	4.913	8.432	7.458	1.924	1.112

Out of 150 hearts annular circumference is maximum in range of 7-7.99cm (40%) followed by 8-8.99(30%), 9-9.99(18%) and lowest in range of 10-10.99cm (6%) and 6-6.99cm (6%). (Table 2)

Figure 4  
Table 2 (Annular circumference)

Range in Cm	6-6.99	7-7.99	8-8.99	9-9.99	10-10.99	Total
Total Numbers	9	60	45	27	9	150
Percentage	6	40	30	18	6	100

In case of length of free edge of valve curtain the length was maximum in range 6-6.99 (36%) followed by 8-8.99(28%) 7-7.99(26%),5-5.99(6%) lowest in range 9-9.99(4%).(Table3)

Figure 7  
Column chart 2

length of free edge						
Range in Cm	5-5.99	6-6.99	7-7.99	8-8.99	9-9.99	Total
Total Numbers	9	54	39	42	6	150
Percentage	6	40	30	18	6	100

S.No	Length of Annular Attachment of Leaflet (cm)		Total Length of valve ring (cm) (valve circumference)	length of free edge of valve curtain (cm)	Maximum length of leaflet attach margin to free margin (cm)	
	Anterior	Posterior			Anterior	posterior
Dissection Method (formalin Preserved)						
Walmsley T 1929	-	-	-	-	1.5-1.8	1.0-1.2
Fusted I.E. 1952			9.9 (8.5 - 11) MALE 8.3 (7.5-10.5) FEMALE		2.2	1.25
R C BROCK 1932			10.05		1.5-1.8	1.0-1.2
CHIECHI - et al 1936			10 MALE 9 FEMALE			
E.W.T. MORRIS 1960					2.7	1.3
BULKLE & ROBERT 1915			9 (7-11)			
MCAL PINE 1915			13.4			
TETSURO SAKAI 1999			9.3+-1.1			
MEHTA et al 2007	3.32	4.928	8.248		1.924	1.104
Present study	3.46	4.913	8.432	7.458	1.924	1.112
Dissection method ( fresh hearts )						
Louis A Da Plessis 1964	3.5	6.7	10.1	9.1	2.7	1.3
Two Dimensional echo cardiography method						
T A crumlein 1981			9.3+-0.9			

Intercommissural Distance	Value	Mean Value	Sex	
			Male	Female
EXTERNAL	LC	23.66	23.99	23.33
	RC	23.42	23.34	23.5
	NC	22.62	23.34	21.9
INTERNAL	LC	19.25	20	18.5
	RC	18.95	19.2	18.7
	NC	19.6	20.1	19.1

### Conclusion

The present study verify the data regarding the heart in various text books. To study anatomical characteristic of aortic valve, so that they may be useful in diagnostic situations and surgical management. Dimensions of mitral valve will be helpful to anatomist and surgeons. To study the incidence and severity of coronary artery stenosis at autopsy. To study B.M.I(Body mass index) in relation to heart. To study weight of heart in relation to myocardial ischaemia. This study aims to assess the anatomy of aortic valve. Data about the cusps ,the position of ostia and anatomical relations, facilitate the conservative surgeries as well as those involving valve replacements.

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