

**Original research article****A Study of morphometric analysis of moderator band****<sup>1</sup>Dr. Deepak N Khedekar, <sup>2</sup>Dr. Ravikiran Gole, <sup>3</sup>Dr. Pritee M Meshram**<sup>1, 2, 3</sup>Associate Professor, Department of Anatomy, Lokmanya Tilak Municipal Medical College and General Hospital, Sion, Mumbai, Maharashtra, India**Corresponding Author:**

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**Abstract**

The moderator band is located within the right ventricle and contains the right bundle of His. Additionally, it is recognised for its ability to avoid excessive dilation of the right ventricle (RV). Its significance comes in its role in RV infarcts, distinguishing between RV and LV in congenital malformations, VPDs and VTs, and VSDs. The current literature is severely deficient in its analysis of morphometry.

**Keywords:** Morphometric analysis, moderator band, prospective, anatomy, heart

**Introduction**

The moderator band is endorsed to marginal trabeculae in the right ventricle of the heart. It is intended to reinforce the septal wall of the right ventricle and is connected to the anterior papillary muscle and the parietal ventricular wall [1]. The moderator band is responsible for regulating the distension of the right ventricle, which is why it is called the "moderator" band, as it contains the right bundle of His. The moderator band is a poorly researched structure of the human heart. There is a lack of research conducted on the moderator band. The primary cause for this insufficiency is the practical challenge of visualising it in the echocardiography. This study focuses on examining the different morphological characteristics of the moderator band in human cadaveric hearts. The investigation encompasses several criteria, such as length, thickness, distance from the tricuspid orifice, appearance, number of connections to the anterior papillary muscle, the nature of tissue (either muscular or fibrous), and any other differences observed throughout the study. Therefore, the objective of this study is to compile comprehensive data on the moderator band.

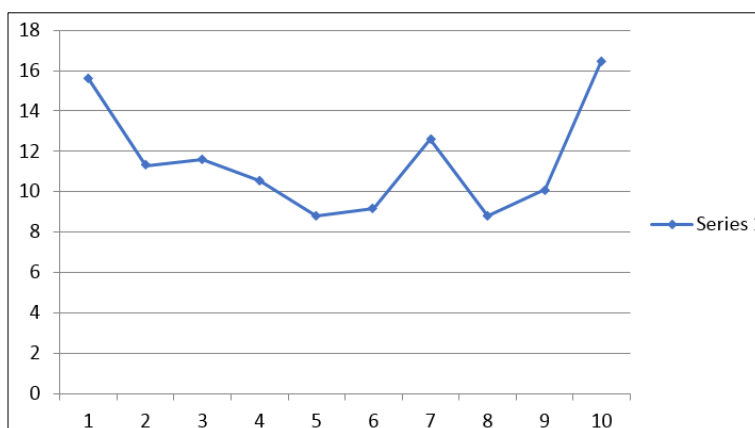
**Materials and Methods**

The investigation on the moderator band was conducted in the Department of Anatomy. For this investigation, a total of ten hearts were dissected. All of these hearts were kept in a 10% formalin solution. The pericardium was excised, followed by a longitudinal incision made parallel to the anterior inter ventricular groove. The incision was further lengthened towards the right, somewhat above the lower margin of the heart. Special attention was given to avoid causing any harm to the anterior papillary muscle or the moderator band. The digital Vernier calliper was utilised to measure multiple criteria. The length was measured between the two attachment points of the moderator band, specifically the septal wall and the anterior papillary muscle. The thickness was determined by measuring across the widest section of the moderator band. The distance from the tricuspid valve (TV) was measured from the annulus of the TV to the attachment of the moderator band to the septal wall. It was further split into three categories: near the TV, midway, or near the peak. The study involved examining the amount of connections to the front papillary muscle and identifying the type of tissue, whether it was muscular or fibrous. Furthermore, there were trabeculations found in the septal end of the moderator band, and they were also recorded.

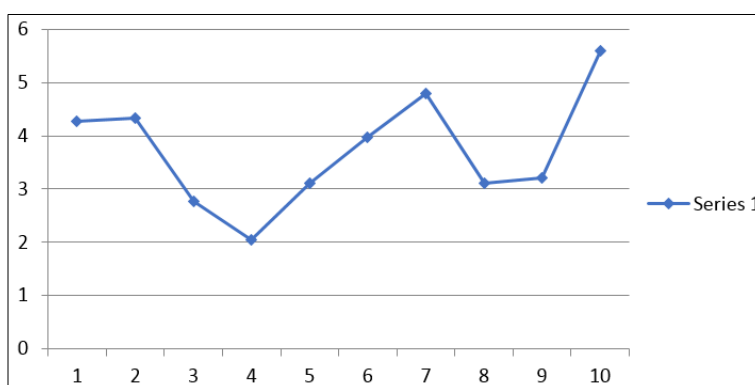
**Results****Table 1: Morphometry**

Specimen no	Length(mm)	thickness(mm)	Distance from tricuspid valve(cm)
1	15.6	4.27	2.6
2	11.3	4.33	4.5
3	11.6	2.76	4.0
4	10.54	2.04	3.2
5	8.82	3.11	3.2
6	9.18	3.98	4.0
7	12.6	4.8	2.4
8	8.82	3.11	3.2
9	10.12	3.2	3.6

10	16.5	5.6	3.2
Mean	11.508	3.72	3.39
SD	4.17	1.06	1.13



Graph 1: Morphometry (length)



Graph 2: Morphometry (Breadth)

**Discussion**

The moderator band is typically present in 90% of hearts [2]; nevertheless, this study discovered its presence in all 50 hearts examined, indicating a 100% occurrence rate. Trabeculae carnea is frequently mistaken for one another. It is a crucial anatomical feature that houses the primary right bundle of His, which is part of the heart's conduction system and plays a role in the depolarization of the right ventricular free wall. Additionally, it aids in the prevention of excessive stretching of the right ventricle (RV) by serving as a connection between the septal wall and the anterior wall of the RV. In addition to these duties, it also aids in guiding the blood from the inflow route to the outflow tract of the right ventricle. The moderator band is supplied by the septal artery, which forms several connections with various branches of the septal branches of the right coronary artery [3]. The many anastomoses play a crucial role in protecting against a large right ventricular infarction when there is a blockage in the proximal portion of the right coronary artery. The moderator band is a factor that can lead to misdiagnosis of intracardiac masses. Even in the early stages of development, it is recognised to create specular reflections in as many as 5.5% of the cases [5]. According to Andre Keren *et al.*, the moderator band may be seen in 79% of their cases utilising two-dimensional echocardiography and an apical four-chamber view. However, the usual occurrence of the moderator band is approximately 90%. Using M-mode echocardiography, researchers have seen a substantial challenge in distinguishing the right side of the interventricular septum from the moderator band. In cases of ventricular septal defects (VSD), if the region of the moderator band is affected, it is referred to as component 3 of VSD, as described by Richard Van Praagh *et al.* [7]. The condition is referred to as septalband or proximal conal defect. When addressing such flaws, it is necessary to carefully preserve the moderator band. Moderator bands are recognised as distinct locations where ventricular tachyarrhythmias and ventricular premature depolarizations originate. In the disorder known as arrhythmogenic right ventricular dysplasia (ARVD), the moderator band is observed as a significantly thick echogenic band. This characteristic aids in distinguishing ARVD from right ventricular ischemia. The user's text is "[8]." The same is also useful in distinguishing right ventricle from left ventricle. There are no muscular or trabecular attachments on the left ventricle, resulting in incongenital anomalies. Mamata *et al.* [10] have categorised the attachment of the moderator band into two types: single and double. The solitary variant exhibited a singular

uninterrupted band of moderator tissue extending from the septal wall of the right ventricle to the anterior papillary muscle. The single type was further subdivided into simple and complicated types. The simple type did not exhibit a branching pattern in the attachment to the papillary muscle, while the complex type showed a branching pattern. In our investigation, there were eight moderator bands that belonged to a single yet complicated type. In contrast, Mamata *et al.* [10] found ten such specimens out of the 28 hearts they analysed. They have additionally reported another type as double, in which there are two moderator bands that extend separately from the septal wall to the anterior papillary muscle. The positioning of the moderator band in relation to the tricuspid valve is crucial in the treatment of apical ventricular septal abnormalities. In their study, Marios Lukas *et al.* [11] discovered that the occurrence of the origin of moderator bands at the TV was 13% (12 out of 96 hearts), whereas it was 47% (45 out of 96 hearts) at a midpoint between the TV and the apex, and 40% (39 out of 96 hearts) closer to the apex. In the present study, these percentages were 25%, 40%, and 35% correspondingly. Therefore, the most prevalent origin is the halfway origin, followed by the apical origin, and then the origin closer to the TV origin in both investigations. The thickness measurements in both trials were extremely similar, with values of  $4.5\pm 1.8$  mm and  $4.97\pm 1.64$  mm. The average length was  $16.23\pm 2.3$  mm. In the present study, Marios Lukas *et al.* found that the average study time was  $14.71\pm 4.99$  minutes.

### Conclusion

The moderator band holds great clinical significance. During echocardiography, it is possible for a right ventricular mass to be observed, which might lead to diagnostic misunderstanding. Myocardial infarction of the right ventricle causes additional stress to the RV and prevents it from expanding. The moderator band, when isolated, is a recognised factor in the occurrence of ventricular premature depolarizations (VPD).

Ventricular tachyarrhythmias (VT) can impede pacing surgeries. As previously stated, its connection to VSD is extremely important as it may be inadvertently severed during VSD repair procedures. Therefore, it is crucial to have knowledge of the morphometry of the moderator band in order to prevent any clinical misinterpretation.

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