

A LARGE MORPHOLOGICAL VARIANT TRIFURCATED SEPTAL BAND IN RIGHT VENTRICLE IN MIDDLE EAST POPULATION: A CASE REPORT

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ABSTRACT

During routine cadaveric dissection, we encountered a rare morphological variant of septal band in right ventricle of a human heart in a 50 yr. old male cadaver. The band, as seen in the interior of the right ventricle, was observed to arise from middle part of interventricular septum and was trifurcated into three prominent muscular bands. The importance of variant septal band has been implicated in various heart surgeries on valves or placement of grafts in correction of interventricular septal defects. Presence of right bundle branch in them may lead to various types of arrhythmias and tachycardia. Morphological variations need to be explored in order to further evaluate its type and extent. Incidental septomarginal trabecula have also been reported in cavity of left ventricle in past. Here, we report a large trifurcated septal band with two limbs attached directly to right ventricular wall. Importance of their role in formation of embolus due to stasis of blood also requires attention.

KEYWORDS

Septal Band, Septomarginal Trabecula, Interventricular Septum, Right Ventricle, Heart.

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INTRODUCTION

The interior of the right ventricular cavity is thoroughly trabeculated. The trabeculations being attributed to irregular muscular ridges and protrusions, collectively called trabeculae carneae, which are lined by endocardium. One such protrusion is the septal band or septomarginal trabecula. It reinforces the septal surface where at the base it divides into limbs that embrace the septal limb of supraventricular crest. In 1837, it was given name "moderator band" as a result of his conjecture that it might control the capacity of the right ventricle as a sort of governor. Towards the apex, it supports the anterior papillary muscle of the tricuspid valve and from this point crosses to the parietal wall of the right ventricle as the moderator band. It was named "trabecula septomarginalis" by Tandler. A series of septoparietal trabeculations, extend from its anterior surface and run onto the parietal ventricular wall.^[1] Usually a single band extending from middle of septum to the base of anterior or posterior papillary muscle has been reported in the past. Here, we report a thick trifurcated septal band in right ventricle of human heart.

CASE REPORT

The purpose of present commentary is to report an unusual trifurcated muscular septal band in right ventricle of a 50 yr. old male cadaver who died of pneumonia. The muscular band was discovered during routine dissection; it was recognized that an unusual muscular band was 4.8 cm in length and 1.3 cm in width. The septal band was trifurcated, so that having stem arising from interventricular septum. The stem of muscular septal band branched into three parts, a Medial band

(MB) - 2.2 cm long and 0.5 cm wide to the base of anterior papillary muscle, Intermediate Band (IB) - 1.3 cm long and 0.6 cm wide and Lateral band (LB) - 1.2 cm long and 0.4 cm wide. Intermediate and lateral band were merging to anterior ventricular wall. The transverse diameter of ventricular cavity was 3.5 - 5 cm. The right ventricular wall was 0.7 - 1 cm in thickness and left ventricular wall was 2 - 2.2 cm in thickness. The interventricular septum was measured to be about 3.5 cm thickness. Cavity was smooth to larger extent. Anterior papillary muscle was 2.6 cm in length and was attached to the tricuspid valve with intervening chordae tendinae. Anterior papillary muscle was longest among the three papillary muscles. Septal papillary muscle was attached 0.2 cm below supraventricular crest.



Fig. 1: Showing trifurcated Septal Band- A and its three bands namely Medial Band (MB), Intermediate Band (IB), and Lateral Band (LB). IB and LB were attached to anterior interventricular wall and MB was merging with the margin of anterior papillary muscle, B- Anterior Papillary Muscle

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DISCUSSION

Very few studies have been done in humans to define its morphology. Animal studies have been conducted to look at the internal anatomy of heart. In dog heart, the major branch of the septomarginal trabeculae system was examined and it was approximately 1 mm in width in all dogs, irrespective of age and tended to be flattened and ribbon-like. The other branches differed considerably in thickness.^[2]

The trabeculae carneae begin to form at a rather early stage of prenatal development – their delicate structure can be observed at the 4th-5th week of foetal age. Discussed papers suggest a gradual “migration” of the muscle in the early period of fetal life from the periseptal through central to parietal location, which may result in development of the septomarginal trabecula.^[3] Abnormalities of septal papillary muscle and its chordae are related to defects in fusion of ventricular and bulbar musculature and are often associated with malformation of the septal leaflet of the tricuspid valve. Absence of the moderator band or of the septal papillary muscle should be viewed as congenital cardiac defects even though no haemodynamic abnormality is produced.^[4]

Mamtha et al classified them into simple type if they are attached from septum to the base of papillary muscle and complex type depending in their branching pattern. They showed in most of the cases the septomarginal trabecula originated about upper or middle third of the ventricular wall. The thickness varied from less than 1 mm to more than 5 mm. Our finding showed about 50-130 mm thick septal band. Septomarginal trabecula branching before attaching to the base of the anterior papillary muscle was also reported by them.^[5]

Raghavendra et al showed 80% specimens with moderator band as arising from the lower segment of crista supraventricularis. Septoparietal trabeculations were found extending from the anterior margin of the septomarginal trabeculation to the parietal wall in 25% specimens. Average length of the moderator band was reported as 13.82 cm and average thickness being 4.46 cm, which correlates with our finding.^[6]

Bandeira et al classified the septomarginal trabecula into eight groups. They reported two components of septomarginal trabecula, one septal and the other septal-papillary single (32.3%) or complex (67.7%) papillary-parietal connection was also reported. There 8.1% heart showed prominent septal portion with single connection to papillary muscle as in our finding, but here two extra bands were observed reaching separately to parietal wall.^[7]

Specific types of septomarginal trabeculae have been reported by Kosinski. Most of them originated from the upper part of the interventricular septum, separating at an angle increasing proportionally to the number of branches of the crista supraventricularis as well as the number of secondary trabecula. Single type tightly connecting with the anterior papillary muscle was most common. Weak connection of the anterior papillary muscle and the septomarginal trabecula was very incidental and in such cases the muscle as a rule was located at the anterior wall of the right ventricle.^[8] Our finding is not in accordance with them, as it was a trifurcated band which branched before embracing anterior papillary muscle.

Due to the conduction system, fibers of right bundle branch present within the septomarginal trabecula may

involve iatrogenic complications while repair, e.g. heart block.^[9]

Therefore, presence of such variant bands creates an alarming signal for surgeons. Admittedly, we have not conducted histological evaluation of septal band, so as to see the extent of merging Purkinje fibers to the ventricular wall.

Role of the trabeculae was observed during the ablation treatment due to ventricular tachycardia. It proves that both in the trabeculae and papillary muscles, there may occur arrhythmogenic foci.^[10]

Knowledge of these variations are significant in heart diseases like arrhythmias, ventricular dysfunctions, septal defects, etc. The present anomaly should be taken care of during valvular surgeries and repair of interventricular septal defects, especially in upper half of septum. Their radiological evaluation in case of severe hypertension needs concern. Their presence could be related to developmental defects of ventricular or bulbar musculature and may lead to failure to compensate for the body demands. Further studies on human heart are required so as to better define the internal anatomy of heart to better assess its dysfunction.

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