

Case Report



Independent origin of the entire coronary system along with the right conus artery within the right sinus of Valsalva associated with intramyocardial tunneling

Published online November 29th, 2010 © <http://www.ijav.org>Anu V RANADE^[1] ✦Rajalakshmi RAI^[2]Soubhagya R NAYAK^[3]Rajanigandha VADAGOVKAR^[2]Nermine NOSSEIR S^[1]Nada Ali KADHUM^[1]

Department of Anatomy, Gulf Medical College, Ajman, UAE [1], Department of Anatomy, CBS, Kasturba Medical College, Mangalore, KA [2], Department of Anatomy, College of Medicine & JNM Hospital, WBUHS, Kalyani, Nadia, WB [3], INDIA.



✦ Anu V Ranade, PhD
Lecturer and Research Assistant
Department of Anatomy
Gulf Medical College
P.O. Box 4184 Ajman
UNITED ARAB EMIRATES.
☎ +971 6 7431333
✉ anuranade@gmail.com

Received February 24th, 2010; accepted October 30th, 2010

ABSTRACT

Coronary artery variations are considered to be important as they may lead to or predispose the patients to develop myocardial ischemia or sudden cardiac death. We report an anatomic variation with independent origin of the entire coronary system along with the right conus artery within the right sinus of Valsalva and intramyocardial tunneling of the anterior descending branch of the right coronary artery which is very rare. The present case contributes to better understanding of the coronary artery variations as this type of combined anatomical variation of the coronary arteries has not been described in the literature before. © *IJAV*. 2010; 3: 194–196.

Key words [coronary artery] [conus artery] [myocardial tunneling]

Introduction

Congenital anomaly of the coronary arteries is regarded as an uncommon clinical condition and also is a matter for concern as it can cause symptoms ranging from chest pain, dyspnea, cardiorespiratory arrest and sudden death [1]. The incidence of variant origin of the coronary arteries was found in 0.3–1% of the individuals, with the left coronary artery arising from right coronary artery having an incidence of 0.019% [2]. We report a case of independent origin of the entire coronary system along with the right conus artery from the right sinus of Valsalva and intra myocardial tunneling of the anterior descending branch of the right coronary artery which was observed during routine dissection for undergraduates. The variation in the present case was studied and compared with the previous reports.

Case Report

During a routine dissection of the thorax, for undergraduates, an unusual variation in the origin and course of the entire coronary system was observed. The left coronary artery arose from the right sinus of Valsalva through a separate ostium and crossed to the left via prepulmonic course and trifurcated into a left anterior descending coronary artery (LAD) running in the anterior interventricular groove to reach the apex of the heart, a large intermediate branch (IB) and a circumflex branch which coursed through the left anterior coronary sulcus, supplying the anterior surface of the left ventricle and the atrium (Figure 1). On the other hand the right

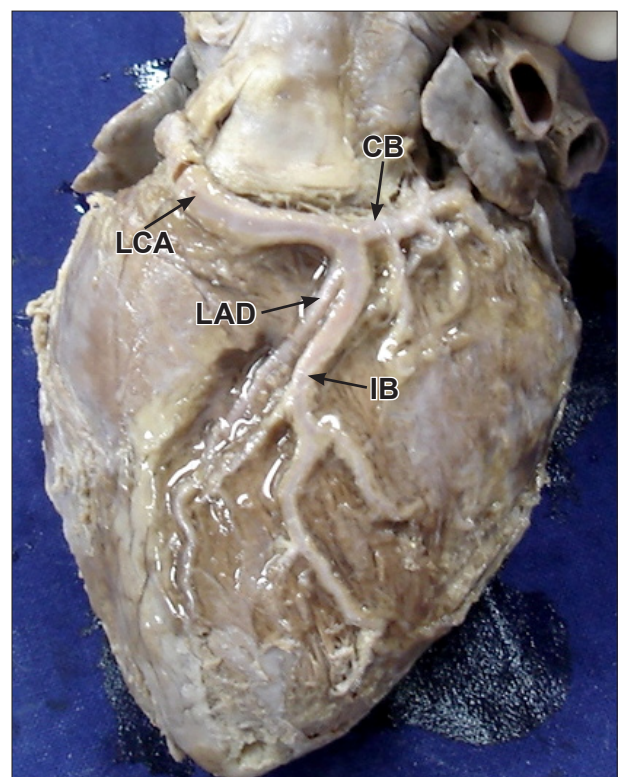


Figure 1. Photograph showing the branches of left coronary artery. (LCA: left coronary artery; LAD: left anterior descending branch; IB: intermediate branch; CB: circumflex branch)

coronary artery, being right dominant, was normal in its origin and followed a usual course until the right border of the heart where it divided into two branches, transverse and posterior right diagonal artery (PRDA). The diagonal branch coursed close to the right border of the heart and later traversed the lower half of the posterior interventricular sulcus to end at the apex of the heart. Just before it deviated into the posterior interventricular groove, it underwent an intramural course. The transverse branch of the right coronary artery traversed the right posterior coronary sulcus and continued into the left posterior coronary sulcus and ended by providing branches to the left ventricle and atrium from its posterior aspect (Figure 2). At the crux of the heart the transverse branch gave a very thin posterior interventricular branch which occupied the upper half of the right coronary sulcus. The right conus artery, which normally is the first branch of the right coronary artery, was seen as a separate artery arising from the sinus of Valsalva (Figure 3).

Discussion

Coronary artery anomalies are considered as rare occurrences. The angiographic studies show that the

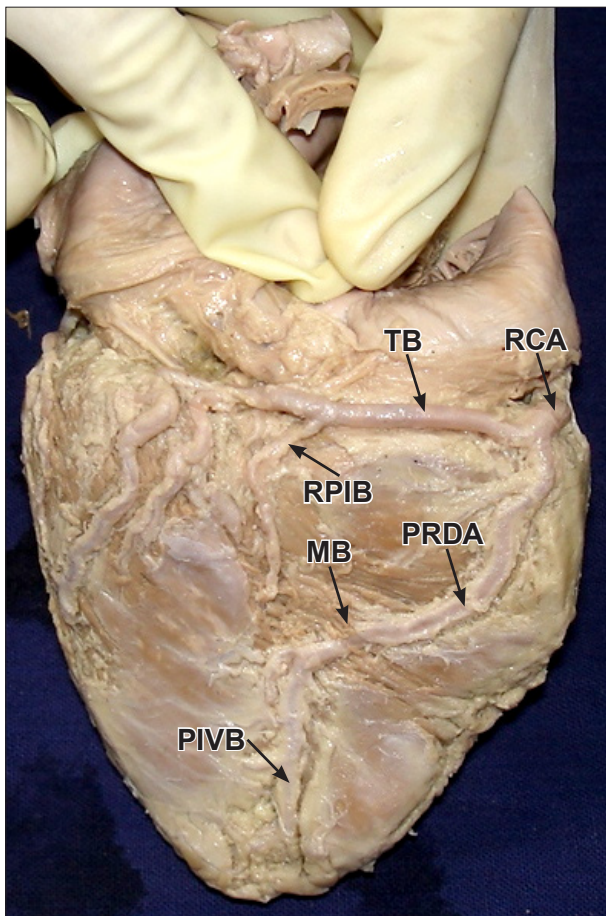


Figure 2. Photograph showing the branches of right coronary artery. (RCA: right coronary artery; TB: transverse branch; RPIB: right posterior interventricular branch; MB: myocardial bridging; PRDA: posterior right diagonal artery; PIVB: posterior interventricular branch)

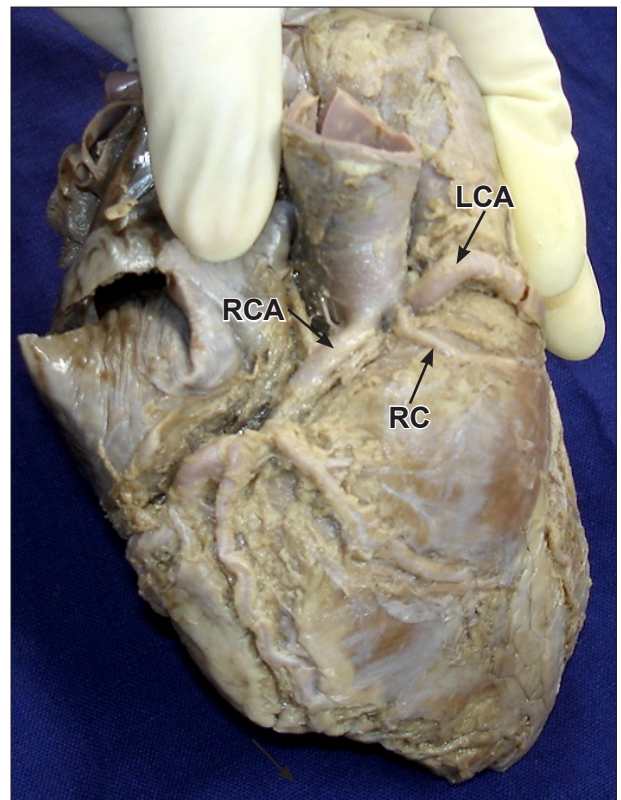


Figure 3. Photograph showing the branches from the right coronary sinus. (RCA: right coronary artery; LCA: left coronary artery; RC: right conus artery)

coronary artery anomalies are most often preceded by symptoms of ischemia and approximately one third of the patient will have symptoms of myocardial ischemia or dysfunction [3]. Among the 126 young adults who suffered non-traumatic sudden death, 64 cases (51%) were having cardiac abnormality, 39 of 64 patients (61%) having coronary artery anomaly [4]. Ischemia, compromise in the bloodflow and factors like abnormalities of the coronary ostium are the mechanisms that are responsible for such an adverse outcome [5].

Several studies have been reported on the incidence of unusual origin of left coronary artery from the sinus of Valsalva. On the basis of angiographic studies, Kimbris et al. reported that in 0.06% to 0.19% of their patients, the left coronary artery arose from the sinus of Valsalva [6]. The left coronary artery in our case had an unusual origin from the sinus of Valsalva and was prepulmonic in its course. It trifurcated into a LAD branch, a large intermediate branch and a circumflex branch (Figure 1). The intermediate branch is reported to have a prevalence of 33% by Dewey and Kroft [7], with a size ranging from a very small to a very large branching vessel and may substitute the need for LAD diagonals or circumflex marginal [8]. In the present case, the intermediate branch was larger in size and the diagonal artery was arising from it and supplied the anterior surface of the left ventricle. The presence of the PRDA in the distal part of the posterior interventricular groove, as

observed in the present study, was reported in 14% of the 50 cases studied by Christos et al. [9]. Literature survey shows that the myocardial bridging of the left anterior descending artery is not uncommon [10]. However, the bridging of right coronary artery, as observed in the present study, is indeed found to be a rare occurrence with regard to focal clinical presentation.

It is, therefore, essential and imperative to search for and document the variations in the origin and course of the

coronary artery, as the cardiac surgeons can encounter such variations during their surgeries and can avoid intraoperative complications. Moreover, any young patient with angina pectoris, myocardial infarction, or cardiac syncope should undergo non-invasive imaging to rule out such anomalies so as to enable correct diagnosis and treatment plan for the patient.

References

- [1] Hoffman JI, Kaplan S, Liberthson RR. Prevalence of congenital heart disease. *Am Heart J.* 2004; 147: 425–439.
- [2] Angelini P, Velasco JA, Flamm S. Coronary anomalies: incidence, pathophysiology, and clinical relevance. *Circulation.* 2002; 105: 2449–2454.
- [3] Roberts WC. Major anomalies of coronary arterial origin seen in adulthood. *Am Heart J.* 1986; 111: 941–963.
- [4] Eckart RE, Scoville SL, Campbell CL, Shry EA, Stajduhar KC, Potter RN, Pearse LA, Virmani R. Sudden death in young adults: a 25-year review of autopsies in military recruits. *Ann Intern Med.* 2004; 141: 829–834.
- [5] Chaitlin MD, De Castro CM, McAllister HA. Sudden death as a complication of anomalous left coronary origin from the anterior sinus of valsalva, a not-so-minor congenital anomaly. *Circulation.* 1974; 50: 780–787.
- [6] Kimbiris D, Iskandrian AS, Segal BL, Bemis CE. Anomalous aortic origin of coronary arteries. *Circulation.* 1978; 58: 606–615.
- [7] Dewey M, Kroft LJM. Anatomy. In: Dewey M, ed. *Coronary CT Angiography.* Berlin, Springer. 2009; 11–26.
- [8] Ortale JR, Filho JM, Paccota AMF, Leal JGPG, Scaranari CA. Anatomy of the lateral, diagonal and anterosuperior arterial branches of the left ventricle of the human heart. *Braz J Cardiovasc Surg.* 2005; 20: 149–158.
- [9] Nerantzis CE, Letkidis CA, Smirnov TB, Agapitos EB, Davaris PS. Variations in the origin and course of the posterior interventricular artery in relation to the crux cordis and the posterior interventricular vein: An anatomical study. *Anat Rec.* 1998; 252: 413–417.
- [10] Kulkarni M, Sodani A, Rosita, Purnik C, Sullere S, Saha B. Right myocardial bridge on CT coronary angiography. *J Assoc Physicians India.* 2004; 52: 661–662.