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Variations in coronary arteries in human cadaver

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Abstract
Variations of the coronary arteries have been recorded numerously by many authors. However, the number of newer cases found and reported cases have increased. In this research article, a number of variations in the coronary arteries and the main branch such as the additional anterior and posterior interventricular branches and a new mode of the termination of the right coronary artery have been noted. The methodology of sampling of the cadavers only included 40 years old cadavers with a written consent from the legal guardian to participated in the research. 60 cadevers was selected and among these cadavers selected all the organs were present. The study was observational where the team observed the origin, branching, and pattern, length, bridging and looping of arteries. The results of the study pointed out the measurements taken and the variations in the branching of the coronary arteries. In conclusion, the most common variations are totally benign that caused by some errors of the embryological development timing or in some cases due to the persistence of an embryologic condition. Coronary artery variations are viewed as very crucial and important when being looked at from a clinical and surgical point of view.

Keywords: coronary variations, cadavers, posterior interventricular

Introduction
The myocardium part of the heart has the coronary arteries which are responsible for supplying blood to this part and they arise from the aorta. Coronary arteries are much-enlarged vasa vasora and supply blood to the heart in form of a ring and sling (Patel, 2016) [6]. This supply to the heart muscles by the arteries is very key to the normal functioning of the heart. Variations existing in the branches have become important due to the bypass procedures are done such as the angiographic procedures that are done (Patel, 2016) [6]. The variation of the coronary arteries is important in clinical manifestation as it has the ability to cause the sudden death of a person. Sudden death due to variation in the coronary arteries will in most cases occur when the person is engaging in strenuous activity (Roy, 2018) [7].

Methods
A cadaver were only included in this study if their legal guardian agreed to sign a written consent to participate in the study (Genain, 2018) [2]. The cadavers were forty years old and above and all the cardiac organs were present for evaluation. Coronary arteries in 60 cadavers' hearts that were fixed in 10% formalin were dissected by the anatomy team. The coronary arteries and their branches were dissected in the atrioventricular and interventricular grooves of the surface of the heart. Then the team studied the origin, branching pattern, length, bridging of the myocardial and the arteries looping. Using a thread and millimeter scale the length of the arteries was measured (Hilton, 2017) [4].

Results
Among the 60 cases that were studying the right coronary arteries that were dissected the right coronary artery was seen to rise from the inside of the anterior aortic sinus. In approximately 65% of the case, I was found that the length of the Right coronary artery was 8 to 14 centimeters and that the artery was dominant. The dominance is noted due to the fact that the posterior descending branch and that branch to the atrioventricular node are seen to branch from the right coronary artery. Additionally, the sinoatrial nods in all the cases being studied were seen to branch from the right coronary artery (Wurita, 2016) [12].

Furthermore, from the study, it was noted that in 92% of cases the conus was seen to rise from the right coronary artery. However, it was noted that in 8% of the cases under study the conus had an independent origin from the anterior aortic sinus. The acute marginal branch was seen to rise from the right coronary arteries in the right border of the heart. This branch length ranged from 3 to 4.5 centimeters in 23 % of the cases, 4.5 to 7 centimeters in approximately 66% of the cases studies and finally, 7 to 10 centimeters in approximately 10 of the cases studied. Posterior descending artery and the arteries to the atrioventricular node are seen to branch from the right coronary arteries and 10% of the cases branch from the circumflex. In the study among 60% of the study cadavers, the length of the Posterior descending arteries was seen to have a range of 5 to 7.5 centimeters (Sumalatha, 2015) [8].

In the sixty cases that were studied the dissected left coronary artery was seen to originate from the left posterior aortic sinus of the ascending aorta. On average the length of the left coronary artery was seen to be 7 millimeters and was either bifurcated or trifurcated. In about 17% of the cases being studied, it was noted that left coronary artery trifurcated to the left anterior descending, circumflex and the ramus intermedius branch. On the other hand among 83% of the cases studied the left coronary arteries are seen to be bifurcated into the left

anterior descending arteries and the circumflexed branch (Dhobale, 2015) [1]. In all the cases that were studied, the left anterior descending arteries and the circumflexed arteries were seen to branch from the left coronary arteries.

Fig 1: Circumflex descending and anstromosing with AIV branch green pointer

The length of the circumflexed arteries was seen to be 3 to 5 centimeters in 20% of the cases studies and 5 to 9 centimeter in 10% of the cases studied (Dhobale, 2015) [1].

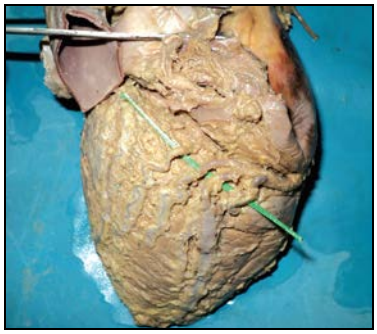

Fig 2: Parallel PIV branches from RCA

Additionally among the ten percent another 10% was found to have a maximum length of the circumflexed coronary artery and was seen to be dominant. Furthermore, the length of the left anterior descending artery was found to be 4 to 7 centimeters in 3% of the research subjects, 7 to 10 centimeter in 16%, between 11 to 14 centimeter in 66% of the study subjects and between 14 to 17 centimeter in 13% of all the subjects (Ullah, 2015) [9]. Another range of length that is between 10 to 17 centimeters of the left anterior descending artery was seen to turn around the apex of the heart with the posterior descending branch. Furthermore, the obtuse marginal artery was seen to be a branch of the circumflexed arteries in all the sixty cases (Ullah, 2015) [9].

Fig 3: RCA giving 4m PIV branches and ascending and terminating in the left artrium CX descending

Discussion

It is important to discover the incidence of variations of the coronary that have the capacity to cause sudden death. In many cases and studies, the presences of the right conus from the aortic sinus was determined at 8% and showed that the presence of accessory ostium and the anterior aortic sinus (Lakshmi, 2016) [5]. In the case where the ostium is considered very small, there is a high chance that it will fail to get opacified during the procedure of angiographic. This study showed that there was the anomalous origin of the right coronary artery from the left anterior descending artery. In the study, there were multiple attempts to cannulate the artery which were unsuccessful and this confirmed that absence of the aortic flush injection (Lakshmi, 2016) [5].

In the study 90% 0f the cases studied the right coronary artery was dominant. In the case where the right coronary artery is dominant in the posterior lateral ventricular branches. In many cases, the variation of the coronary arteries and their branching will cause difficulty in imaging and therefore creating a problem in their diagnosis and therapeutic interventions (Vasuki, 2017) [10]. In studies done in the past, the prevalence of myocardial bridging in general and looping was seen to be 88% of the cadaver dissections. This was found to be common in the left coronary system that is when compared to the right coronary system. Myocardium bridging was most seen in the left anterior descending artery (Gohain, 2015) [3]. Another variation was encountered by the presence of the myocardial bridging in the proximal and distal segments. Furthermore, the right coronary artery showed myocardial looping that was anatomic variation in nature. Additionally, the myocardial bridge has the ability to cause myocardial ischemia. This requires surgical repair and the decompression of the mytotomy by the supra arterials. However, the myocardial bridges require further in-depth analysis to be able to understand it better (Watanabe, 2016) [11].

Conclusion

The most common variations are totally benign that caused by some errors of the embryological development timing or in some cases due to the persistence of an embryologic condition. Coronary artery variations are viewed as very crucial and important when being looked at from a clinical and surgical point of view. This study was important as it helps in preventing the false interpretation of the coronary artery angiograms and in the management of the diseases that are caused and related to issues in the coronary arteries.

References

1. Dhobale MR, Puranik MG, Mudiraj NR, Joshi UU. Study of third coronary artery in adult human cadaveric hearts. Journal of clinical and diagnostic research: JCDR. 2015; 9(10):AC01.
2. Genain MA, Morlet A, Herrtage M, Muresian H, Anselme F, Latremouille C, *et al*. Comparative anatomy and angiography of the cardiac coronary venous system in four species: human, ovine, porcine, and canine. Journal of Veterinary Cardiology. 2018; 20(1):33-44.
3. Gohain N, Saikia R. An anatomical study of coronary artery dominance in human cadaveric hearts. Journal of

Evolution of Medical and Dental sciences. 2015; 4(57):9897-9902.
4. Hilton A, Jorgensen A, Gardiner B, Robison S, Lambert HW, Morton D, *et al*. Visualization of Differential Myelinated Cardiac Plexus Fiber Innervation in Heart Failure Using the Sihler's Stain Technique. The FASEB Journal, 31(1_supplement), 2017, 585-8.
5. Lakshmi KNV, Dhoot M, Mishra P. A Study on the Branching Pattern of Left Coronary Artery in Human Cadaveric Hearts. International Journal of Health Sciences and Research (IJHSR). 2016; 6(7):159-161.
6. Patel JP, Desai JN, Bhojak NR. A cadaveric study of variation in branching pattern of left coronary artery. Journal of the Anatomical Society of India. 2016; 65(2):101-103.
7. Roy M. Anomalous origins of coronary arteries-a literature review. Global journal for research analysis, 2018, 7(2).
8. Sumalatha S, Hari V, Quadros LS, Souza AS. Anatomical variations of coronary venous system and its tributaries: A cadaveric study. In Journal of cardiothoracic surgery, BioMed Central. 2015; 10(1):A255.
9. Ullah QW, Waheed N, Saleem S, Qamar K. Variation in the Number and Location of Coronary Ostia-A Cadaveric Study. Int. J Pathol. 2015; 13(3):95-100.
10. Vasuki AK, Jamuna M, Joy D, Devi MN, Radhika K. Anatomical study of right coronary artery and its variations-Cadaveric study. Indian Journal of Clinical Anatomy and Physiology. 2017; 4(2):185-189.
11. Watanabe Y, Arakawa T, Kageyama I, Aizawa Y, Kumaki K, Miki A, *et al*. Gross anatomical study on the human myocardial bridges with special reference to the spatial relationship among coronary arteries, cardiac veins, and autonomic nerves. Clinical Anatomy. 2016; 29(3):333-341.
12. Wurita A, Hasegawa K, Minakata K, Gonmori K, Nozawa H, Yamagishi I. *et al*. Postmortem redistribution of methamphetamine and amphetamine in blood specimens from various blood vessels and in the specimens from pericardial fluid, bile, stomach contents and various solid tissues collected from a human cadaver. Forensic Toxicology. 2016; 34(1):191-198.