TURKISH JOURNAL OF MEDICAL AND HEALT SCIENCES
https://journals.academicianstudies.com/TTSB
E-ISSN; 3062-1720
https://doi.org/10.71284/tjmhs.2025233

KADAVRA ÜZERINDE KORONER ARTERİN VARYASYONE DURUMLARININ İNCELENMESİ: BİR DERLEME ÇALIŞMASI

INVESTIGATION OF VARIATIONAL STATES OF THE CORONARY ARTERY ON CADAVERS: A REVIEW STUDY

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Article Info

Article Type
Research Article

Dates
Received: 29.11.2025
Accepted: 18.12.2025
Published: 30.12.2025

Keywords
Bifurcation
Right Coronary Artery
Left Coronary Artery
Coronary Artery Variation

Abstract

This study aimed to shed light on clinical sciences by analyzing articles on coronary artery anomalies and variants performed on cadavers. Cadaver studies conducted between 1988 and December 2025 were examined using Google Scholar, Google, and PubMed databases. A total of 45 original cadaver articles were included in the study, comprising 4 case presentations and two autopsy studies. Coronary arteries are divided into two main groups: the left coronary artery (LCA) and the right coronary artery (RCA). An additional coronary artery, running over the anterior surface of the right ventricle, is defined as the third coronary artery. The most common variant of the coronary artery is the LCA. Examining the types of branching in the coronary artery reveals bifurcation, trifurcation, quadrifurcation, and pentafurcation. In our study, the most frequent branching was observed in the bifurcation. RCA shows higher dominance compared to LCA. LCA dominance was detected more frequently in male cadavers than in female cadavers. In a study of 40 hearts, a rare finding was that the anterior descending artery had a double origin and gave rise to a branch; one branch originated from the right coronary artery and the other from the left coronary artery. A study of a 99-year-old Japanese male cadaver revealed three openings in the right Valsalva sinus. The course and type of coronary arteries were interarterial, and the left coronary artery showed an abnormal aortic origin-interatrial course, a variation observed for the first time in a cadaver. Coronary artery variations require attention in clinical diagnosis and practice, surgical interventions, and cardiac risk assessment.

Keywords: Bifurcation, Right Coronary Artery, Left Coronary Artery, Coronary Artery Variation

Anahtar Kelimeler
Bifurkasyon,
Sağ Koroner Arter,
Sol Koroner Arter,
Koroner Arter Varyasyonu

Özet

Bu çalışma, kadavralar üzerinde yapılan koroner arter anomalileri ve varyantları hakkındaki makaleleri analiz ederek klinik bilimlere ışık tutmayı amaçlamıştır. 1988 ile Aralık 2025 tarihleri arasında yapılan kadavra çalışmaları Google Scholar, Google ve PubMed veritabanları kullanılarak incelenmiştir. Çalışmaya toplam 45 orijinal kadavra makalesi dahil edilmiş olup, bunlar 4 vaka sunumu ve iki otopsi çalışmasını kapsamaktadır. Koroner arterler iki ana gruba ayrılır: sol koroner arter (LCA) ve sağ koroner arter (RCA). Sağ ventrikülün ön yüzeyinden geçen ek bir koroner arter, üçüncü koroner arter olarak tanımlanır. Koroner arterin en yaygın varyantı LCA'dır. Koroner arterdeki dallanma tipleri incelendiğinde bifurkasyon, trifurkasyon, kuadrifurkasyon ve pentafurkasyon görülür. Çalışmamızda en sık görülen dallanma bifurkasyonda gözlemlenmiştir. RCA, LCA'ya kıyasla daha yüksek oranda baskınlık göstermektedir. Erkek kadavralarda, kadın kadavralara göre LCA baskınlığı daha sık saptanmıştır. Erkek ve kadın kadavralar arasında LCA ve RCA dallarının sayısında farklılıklar bulunmuştur. 40 kalp üzerinde yapılan bir çalışmada, ön inen arterin çift kökenli olduğu ve bir dal oluşturduğu nadir bir bulgu olarak saptanmıştır; bir dal sağ koroner arterden, diğeri sol koroner arterden kaynaklanmıştır. 99 yaşında bir Japon erkek kadavra üzerinde yapılan bir çalışmada, sağ Valsalva sinüsünde üç açıklık olduğu ortaya çıkmıştır. Koroner arterlerin seyri ve tipi interarteriyel olup, sol koroner arter anormal bir aort kökenli-interatriyal seyir göstermiştir; bu varyasyon bir kadavrada ilk kez gözlemlenmiştir. Koroner arter varyasyonları, klinik tanı ve uygulamada, cerrahi müdahalelerde ve kardiyak risk değerlendirmesinde dikkat gerektirmektedir.

Anahtar Kelimeler: Bifurkasyon, Sağ Koroner Arter, Sol Koroner Arter, Koroner Arter Varyasyonu

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1. Introduction

Coronary arteries are the essential vital vascular structures of the heart that surround and supply blood to the myocardium (Alves & Aerts, 2011). Coronary arteries are divided into two main groups: arteria (a.) coronaria sinistra (LCA) and a. coronaria dextra (RCA); the LCA gives off branches to the left anterior descending artery (LAD) and the circumflex artery (LCx) (Kesieme et al., 2025) (Ogobuiro et al., 2025). These arteries are vital for maintaining myocardial function, and thus for preserving body homeostasis and physiological balance (Alves & Aerts, 2011).

When we examine the variations in the branching of the coronary artery, we see bifurcation (2 branches), trifurcation (3 branches), quadrifurcation (4 branches), and pentafurcation (5 branches) (Thiene et al., 2021). When we examine the coronary artery variants defined in the literature, we see that the most common variants are those belonging to the LCA (Fuenzalida et al., 2024).

Coronary arteries arise from the sinus region of the aortic root, and the location of their openings usually coincides with the sino-tubular junction; this position can vary by up to 2.5 mm between individuals. The left coronary ostium is located in the left anterior aortic sinus, while the right coronary ostium is located in the right anterior aortic sinus; therefore, the aortic sinuses face directly into the pulmonary artery. The RCA and LCA typically arise from the aorta at a right angle, a feature important for understanding the initial anatomy of the coronary circulation (Thiene et al., 2021). We can generally classify coronary arteries as epicardial and intramuscular vessels. Epicardial vessels are larger and located on the surface; their primary function is to transmit blood flow. In contrast, intramuscular vessels are smaller and run within the myocardium; their branches and arterioles allow for more precise control of blood flow and create greater resistance (Rehman et al., 2025). An additional coronary artery, originating independently from the right aortic sinus (sinus Valsalvae) and progressing through the subepicardial adipose tissue of the pulmonary conus, traversing the anterior surface of the right ventricle, is defined as the third coronary artery. This artery is also referred to in the literature as the "third coronary artery," "preinfundibular artery," or "superficial Vieussens artery." Morphological studies have shown that the third coronary artery is more frequently found in adult hearts compared to fetal hearts (Lujinović et al., 2008).

The anatomical arrangement of coronary arteries varies considerably among individuals; these person-to-person variations are an important factor to consider in clinical diagnosis and practice, surgical interventions, and cardiac risk assessment (Alves & Aerts, 2011). Abnormal or overlooked variations in these vessels can leave patients vulnerable to preventable coronary injuries and surgical complications, particularly in high-risk or repeat heart surgeries. Therefore, the anatomical arrangement and possible variations of the coronary arteries are of great importance in surgical planning and risk assessment (Kesieme et al., 2025) (Ogobuiro et al., 2025). Therefore, the aim of this study is to identify the various types of coronary arteries and determine the frequency of these variations by examining cadaver studies in the literature.

2. Material and Metods

A literature search was conducted using the Google, Google Scholar and PubMed databases. Keywords used in the search, which was conducted between 1988 and 2025, were ‘coronary artery’, ‘coronary artery anatomy’, ‘coronary artery variations’ and ‘coronary artery branching’. The searches were conducted in both Turkish and English. The title, content, and abstract were examined, and those deemed suitable were included in the study. A total of 45 original cadaver articles were included in the study. Of these, four were case reports, two were autopsy studies, and the remainder were anatomical dissection, morphometric analysis, and descriptive cadaver studies. The data obtained were classified and presented.

3. Results and Discussion

In the literature, various classifications have been defined for the evaluation of single coronary artery cases. In the Lipton classification, under the heading "Site of origin", there are L type and R type, and under the heading "Anatomical course", there are Group I, Group II, and Group III. Depending on their origin, coronary arteries are divided into two main groups based on their location in the Valsalva sinus. L-type refers to a single coronary artery originating from the left Valsalva sinus, while R-type describes a single coronary artery originating from the right Valsalva sinus. The anatomical course of a single coronary artery is evaluated in three groups. Group I refers to a condition where the abnormal coronary artery follows the natural course of the distal segments of the other coronary arteries. Group II includes variations where the abnormal coronary segment originates from the proximal portion of the normal contralateral coronary artery, passes the base of the heart, and reaches its natural anatomical position. Group III describes the situation where the LAD and LCx arteries arise independently from the proximal portion of the normal RCA (Khanal et al., 2015). Another classification found in the literature, according to Angelini's classification, defines coronary artery anomalies under main headings such as formation and course anomalies, intrinsic anatomical structure anomalies, coronary termination anomalies, and abnormal anastomotic vessels, and examines these headings in detail in subclasses (Angelini, 2007).

Gautam et al. reported that RCA was dominant in 96% (23 people) and LCA was dominant in 4% (1 person) (Gautam et al., 2023). One study found that the LAD, LCx, and ramus intermedius (RI) exhibited trifurcation (P M & Jayachandran, 2022). Fazıloğulları et al. found a close relationship between the presence of the median artery and myocardial bridges, and that the LCAs branch from the aortic sinus (Fazliogullari et al., 2010). In the study conducted by Chariha et al., LCA predominance was observed in 1 heart (2.86%) and the RCA was abnormally long (18.6 cm) in another heart (2.86%) (Charitha & Narayana, 2023). In the study conducted by Shah et al. (2024), RCA (76.6%) dominance was found to be greater than LCA (21.6%) dominance (Shah et al., 2024).

Studies examining coronary artery variations in cadavers have revealed numerous anatomical variations. Singh's study highlighted a trifurcation of the LCA (Large Coronary Artery) among the findings from the examined cadaver. Furthermore, it was observed that the

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accessory coronary artery, although located in the same plane as the RCA, originated from a separate ostium; this structure represents a variant not previously described in the literature (Singh, 2013).

Cavalcanti et al. reported that 38.18% of patients showed a trifurcation pattern of the LCA. In 35.70% of cases with trifurcation, branching occurred to the LAD, LCx, and left marginal branches, while in 64.30%, it occurred to the LAD, LCx, and lateral arteries. Furthermore, it was reported that in 60% of the hearts examined, the LCA showed a bifurcation pattern, branching into the LAD and LCx (Cavalcanti et al., 1995). Sobrinho et al., in their study of 63 hearts, found that trifurcated hearts had significantly longer main body lengths compared to bifurcated hearts, and similar findings were observed in tetrafurcated hearts compared to bifurcated hearts (Pereira da Costa Sobrinho et al., 2019). Babsista et al. LCA body reported that the hearts of Caucasian women (57.1%) and Caucasian men (54.9%) showed bifurcation more frequently, whereas the hearts of non-Caucasian women showed trifurcation more often (60%) (Baptista et al., 1991). The study reported by Lakshmiprabha et al. showed no significant anatomical variation regarding the origin of the LCA. In the series examined, the most common branching pattern of the LCA was bifurcation, observed in more than half of the cases (54.54%). This is followed by the trifurcation pattern, reported at a rate of 41.82%. Rare branching patterns such as tetrafurcation and pentafurcation have been reported in the literature at very low rates (1.82%) (Lakshmiprabha et al., 2018). In one study, RCA was observed to be trifurcation, quadrifurcation, pentafurcation, hexafurcation, heptafurcation at rates of 6.7% (2), 20% (6), 50% (15), 13.3% (4), 10% (3) respectively (Waheedullah et al., 2023).

In a study of heart samples from 154 Colombian mixed-race individuals, LCA branching patterns were examined; bifurcation was detected in 52% of cases (80 hearts), trifurcation in 42.2% (65 hearts), and tetrafurcation in 5.8% (9 hearts). In the same study, a short LCx artery was observed in 143 hearts (92.8%), and in 39 of these (25.3%) it was reported to terminate as a left marginal branch. Furthermore, it was noted that the most frequent termination point of the anterior interventricular branch is the lower third of the posterior interventricular sulcus, and this was observed in 63.6% of cases (Ballesteros & Ramirez, 2008).

In the study conducted by Pejković et al., it was reported that the proximal segment of the RCA showed an S-shaped course in 20% of the cases. In the same study, the average angle between the LCx and the LAD was reported to be 86° (range 60–120°). In cases where the LCA showed trifurcation (50%), the average angle between the LAD and the diagonal branch was reported to be 35° (15–50°), and the average angle between the diagonal branch and the LCx artery was reported to be 56° (Pejković et al., 2008).

A study in the literature identified a total of 13 anatomical variations. The most clinically significant and rare finding, constituting 33% of these variations, was found to be LAD dual origin, where one branch of the LAD originates from the RCA and the other from the LCA (Morais & Souza, 2024). Olgah et al., in their study of 72 hearts, found that the origin of the posterior descending artery from the LCA showed the highest variation frequency at 20.8%, while variations in the RCA system were most frequent at the sinoatrial nodal artery level (Otieno et al., 2023).

In the study conducted by Nijari et al., 1001 hearts were examined, and two or more coronary artery branches were detected in all cadavers. In cases where LCA dominance was observed, the frequency of variation was found to be higher in male cadavers compared to female cadavers. Furthermore, they stated that there were statistically significant differences in the number of LCA and RCA branches between male and female cadavers (Najari et al., 2018).

In cases where the presence of a third coronary artery (TCA) was detected, eight hearts showed that the RCA had a larger diameter and terminated at the inferior border of the heart. Additionally, in one case, the presence of a myocardial bridge over the large-diameter TCA was identified (Dhobale et al., 2015). Parmar et al. found that 16 out of 50 cadaver human hearts had TCA, meaning that 32% were considered to be separate openings from the anterior aortic sinus (Parmar et al.).

In the study conducted by Caetano et al., the hearts of a total of 100 individuals, 24 of whom were Caucasian and 36 non-Caucasian, were examined. According to their findings, the sinoatrial node artery most frequently originated from the RCA. They reported that the sinoatrial node artery was mostly of LCx origin (30%), and more likely to originate from the LCA trunk (12%) (Caetano et al., 1995).

In the study conducted by Sing et al., they found that in 50 hearts examined, 100% of the RCA sinuses originated from the anterior sinus (Singh et al., 2024). In 98 human hearts (2 excluded due to decay) examined by Roy et al., the LCA was found to originate from the left posterior aortic sinus via a single ostium in all samples. It has been reported that in approximately 65% of cases, the ostium is located below or at the level of the sinotubular junction (STJ), and in 35% of cases, it is located above this level (Roy et al., 2014). In a study conducted on a population in North India, it was determined that in all 52 hearts examined (100%), the RCA originated from the anterior aortic sinusThe exit level of the RCA was reported to be at the STJ level in 50 cases (96.15%) and at the STJ level in 2 cases (3.85%). Coronary artery predominance is determined by which RCA or LCA branch supplies the posterior portion of the interventricular sulcus (Narula et al., 2018).

Coronary artery predominance was evaluated in 76 cadaver heart specimens from a North Indian population, and it was reported that the posterior interventricular artery originated from the RCA in 83%, the LCA in 14%, and both the RCA and LCA in 3% (Singh et al., 2019).

In the North Indian population, the right RCA not only exhibits an anatomically consistent outflow pattern but also appears to play a decisive role in the blood supply to the posterior interventricular sulcus. Therefore, considering RCA dominance in coronary interventions, surgical approaches, and cardiac imaging assessments performed in this population is of clinical importance.

Milanuk's studies investigated the origins of the sinoatrial nodal artery (SANA) and atrioventricular nodal artery (AVNA), as well as coronary artery dominance. In 60 cadaver dissections, it was observed that SANA was fed via the RCA in 60.1% of cases, via the LCA or LCx artery in 35.3% of cases, and via dual feeding in 4.2% of cases. In imaging studies, it was reported that SANA received RCA in 61.8% of cases, LCA or LCx in 35.7% of cases, and dual feed in 2.5% of cases (Milanuk, 2017).

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Bansal et al. examined 40 cadaver hearts for the presence of the Brocq and Mouchet triangle. They reported that the triangle was present in 37 hearts (92.5%) and not observed in 3 hearts (7.5%). Regarding the distribution of triangle types, it was noted that 19 hearts (51.3%) had closed, 13 hearts (35.1%) had bottom-open, 3 hearts (8.1%) had top-open, and 2 hearts (5.4%) had completely open patterns (Bansal et al., 2023).

A cadaver study conducted in the Gujarat region of India examined 80 cadavers. In all cases, the LCA was reported to originate from the left posterior aortic sinus via a single ostium. However, the presence of two ostia in the LAD and LCx arteries has been reported as a rare finding in one case. Furthermore, it was reported that the most common location of the left coronary ostium (LCO) in the aortic sinus is below the STJ, and in 80 hearts examined, the LCO was located below the STJ in 71 cases (88.75%), at the STJ level in 5 cases (6.25%), and above the STJ in 4 cases (5%) (Bhardwaj et al., 2024).

Vasanthi et al. investigated the positions of the RCA and LCA ostia relative to the supravalvular process in 100 hearts. They reported that 82% of the right coronary ostium was located below the process, 4% at the same level, and 14% above the process, while for the left coronary ostium, these percentages were 86%, 6%, and 8%, respectively. These positional variations can be clinically significant during diagnostic imaging and interventional cardiovascular procedures (Vasanthi et al., 2025).

Villa and others. comprehensively discussed the embryological development of coronary arteries, their normal anatomy, and the most common examples of variations/anomalies. The study highlighted that coronary artery anomalies are relatively rare in the general population, but are a significant cause of sudden cardiac death, particularly in young athletes. Although congenital coronary artery anomalies are rare in the general population, they are considered the second most common cause of sudden cardiac death (SMD) among young athletes. The risk of acute coronary artery disease (ACD) associated with incidentally detected coronary anomalies in middle-aged or elderly individuals is uncertain and likely negligible. Among the anomalies most frequently associated with ACD, abnormal origins of the coronary arteries, particularly those running between the aorta and pulmonary artery, stand out (Villa et al., 2016).

In the autopsy study included in our research, it was observed that the RCA abnormally originated from the left coronary sinus in 100 hearts examined. Separate ostia for coronary artery branches were detected in 2% and 31% of cases in the left and right coronary systems, respectively. Furthermore, RCA was identified as predominant in 82% of the hearts, while wide variations in coronary ostium and lumen dimensions were reported. In the samples examined, atherosclerosis exceeding 75% of the lumen area was detected in only two hearts (Saidi et al., 2002).

In another autopsy study, 32 hearts were examined; in 6 cases where the left main coronary artery (LMCA) showed an abnormal origin, RCA predominance was detected, and 4 of these cases resulted in fatal outcomes. In contrast, LCx artery predominance was observed in only 1 case, and in this case, the anomaly was also fatal (Kragel & Roberts, 1988).

Kalpana's study reported that the origin of the sinus node artery (SNA) was from the RCA in 52% of cases, from the LCA in 24%, and in 24% it received dual nourishment from both the RCA and the LCA. Similarly, the origin of the AVNA was reported to be predominantly from the RCA (88%), and less frequently from the LCA (12%) (Kalpana, 2003).

Lujinović et al. found the presence of the conal artery in 8 out of 25 hearts (32%) that they examined by dissection. Researchers have suggested using the term "third coronary artery" to distinguish this artery from the conal branch of the RCA. Furthermore, it has been reported that there are four coronary arteries in a heart (4%), and in this case, both supernumerary coronary arteries originate from the right aortic sinus. It has been emphasized that the third coronary artery can form an important collateral coronary circulation pathway due to its frequent anastomosis with the anterior interventricular artery (Lujinović et al., 2008).

Table 1. Research articles using cadavers.

No	Author, Year	Number of Cadavers	Variations	Rate of Variation % (n)
1	(Gautam et al., 2023)	24	LCA Bifurcation Trifurcation	-
2	(P M & Jayachandran, 2022)	50	LCA Bifurcation Trifurcation Quadrifurcation	 74 (37) 24 (12) 2 (1)
3	(Fazliogullari et al., 2010)	50	LCA Bifurcation Trifurcation Quadrifurcation	 46 46 10

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4	(Charitha & Narayana, 2023)	35	Trifurcation	11.43 (4)
5	(Shah et al., 2024)	60	LCA Bifurcation Trifurcation Quadrifurcation	 45 41.6 13.3
6	(Cavalcanti et al., 1995)	110	-	
7	(Morais & Souza, 2024)	40	RCA dominant LCA trifurcation	87 38.4
8	(Tiwari & Budhathoki, 2022)	52	Right cardiac dominant Left cardiac dominant	 80.76 (42) 17.30 (9)
9	(Yassa et al., 2021)	30	LCA branching Bifurcation Trifurcation Tetrafurcation Right dominance Left dominance Codominance	 74.1 24.18 0.46 77 14 9
10	(Shakya et al., 2025)	32	LCA variation Trifurcation Right dominance Left dominance Codominant	 3.13 93.74 9.38 3.13
11	(Singh et al., 2024)	50	LCA Bifurcation Trifurcation Quadrifurcation Pentafurcation	 76 (38) 20 (10) 2 (1) 2 (1)
12	(Bhavya et al., 2025)	53	LAD termination at the apex circulating around the apex before the apex LCA Bifurcation Trifurcation Tetrafurcation Pentafurcation	 54.7 26.4 18.9 45.3 45.3 5.7 3.8
13	(Baptista et al., 1991)	150	bifurcation trifurcation quadrifurcation	54.7 38.7 6.7
14	(Otieno et al., 2023)	72	Posterior descending artery LCA	20.8
15	(Caetano et al., 1995)	100 (31F-69M)	-	

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16	(Chelladurai et al., 2025)	80	LCA Bifurcation Trifurcation Quadrifurcation	 68.7 23.8 7.5
17	(Ranjan, Mehta, 2023)	30	LCA Bifurcation Trifurcation Quadrifurcation	 66.6 (20) 26.6 (8) 6.6 (2)
18	(Najari et al., 2018)	1001	RCA Bifurcation Trifurcation Quadrifurcation LCA Bifurcation Trifurcation Quadrifurcation Right dominant Left dominant	 89 (889) 10 (96) 2 (15) 83 (833) 15 (148) 2 (20) 87.6 9.4
19	(Pereira da Costa Sobrinho et al., 2019)	63	trifurcation in the main body	52.38
20	(Dhobale et al., 2015)	150	TCA Single Dubble	 28 (42) 4 (6)
21	(Ogeng'o et al., 2014)	208	LCA Bifurcation Trifurcation Quadrifurcation Pentafurcation	 54.8 (114) 32.2 (67) 9.6 (20) 3.4 (7)
22	(Darvishi & Moayeri, 2020)	207 (182 M, 25F)	LCA dominant Balance type RCA dominant	6.28 4.30 79.0
23	(Parmar et al.)	50	TCA	32 (16)
24	(Roy et al., 2014)	100 (2 were eliminated due to spoilage)	LMCA Bifurcation Trifurcation Quadrifurcation	 56 (57) 40 (39) 4 (2)
25	(Narula et al., 2018)	52	Trifurcation	34.62 (18)
26	(Singh et al., 2019)	76	-	
27	(Lakshmiprabha et al., 2018)	55	LCA Bifurcation Trifurcation Tetrafurcation Pentafurcation	 54.54 (309 41.82 (23) 1.82 (1) 1.82 (1)
28	(Pejković et al., 2008)	150	-	
29	(Milanuk, 2017)	60	-	

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30	**(Patel et al., 2016)**	50	LCA Bifurcation Trifurcation Quadrifurcation Pentafurcation	 74 18 6 2
31	**(Bansal et al., 2023)**	40	Brocq and Mouchet triangle Triangle type Closed Inferior open Superior open Fully open	92.5 51.3 35.1 8.1 5.4
32	**(Bhardwaj et al., 2024)**	80	Left coronary ostium Below the STJ Above the STJ LCA Trifurcation Quadrifurcation Pentafurcation	 6.25 5 30 (24) 12.5 (10) 1.25
33	**(Vasanthi et al., 2025)**	100	-	
34	**(Villa et al., 2016)**		-	
35	(Waheedullah et al., 2023)	30	RCA Trifurcation Quadrifurcation Pentafurcation Hexafurcation Heptafurcation	 6.7 (2) 20 (6) 50 (15) 13.3 (4) 10 (3)
36	(Saidi et al., 2002)	100	Right ostium Left ostium	31 2
37	(Kragel & Roberts, 1988)	32	-	
38	(Ballesteros & Ramirez, 2008)	154	LCA Bifurcation Trifurcation Tetrafurcation	 52 (80) 42.2 (65) 5.8 (9)
39	(Kalpana, 2003)	100	Presence of 3 coronary arteries LCA Bifurcation Trifurcation Quadrifurcation Pentafurcation Single branch	24 47 40 11 1 1
40	(Reig & Petit, 2004)	100	LCA Bifurcation 3 or more branches	 62 38
41	(Lujinović et al., 2008)	25	Conal artery There are four CAs in the heart	32 (8) 4 (4)

In the study by Lichtenberg et al. (2023), a rare variation of the double RCA was observed in a 51-year-old male cadaver. Most previously reported cases were detected during angiography, with some limitations. In this study, however, the details of the division of the main RCA and the accessory RCA (aRCA) were examined in detail by cadaver dissection. Both vessels originate from a common ostium containing an internal carina-like septum. In this case, a rare variation of the RCA associated with the aRCA, a structure described in the literature as a double RCA anomaly, was observed (Lichtenberg et al., 2023).

In a study conducted by Daisuke Kiyoshima and colleagues, it was observed in cadaver dissection that the LCA arises from the aorta at a narrow angle, passes between the aorta and the pulmonary artery, and branches into the LAD and LCx. Furthermore, three openings

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https://doi.org/10.71284/tjmhs.2025233

were detected in the right Valsalva sinus of a 99-year-old Japanese male cadaver, and the course of the coronary arteries was classified as "interarterial," with CA intervascular course: abnormal aortic origin of LCA-interatrial course variation observed for the first time in a cadaver (Kiyoshima et al., 2024).
In a case reported by Mann and Beger, an abnormal left circumflex artery (ALCx) was shown to occur as a branch of the RCA in a 79-year-old formalin-fixed donor heart. The study noted that various imaging findings, including the aortic root sign on left ventriculography, could contribute to the identification of ALCx. The authors emphasized that knowledge of the presence of ALCx and the potential impact of this variation on cardiac health is clinically important for preventing diagnostic errors and potentially adverse treatment outcomes (Mann & Beger, 2023). As a result of the review, it was concluded that coronary artery dominance and its variations should be carefully examined in clinical sciences, cardiac image evaluations before surgery, and surgical approaches.

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TURKISH JOURNAL OF MEDICAL AND HEALT SCIENCES
https://journals.academicianstudies.com/TTSB
E-ISSN; 3062-1720
https://doi.org/10.71284/tjmhs.2025233

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Article type Research Artical

Article Arrival date 29.11.2025

Revision date 18.12.2025

Accepted Date 19.12.2025

Published date 30.12.2015

DOI **https://doi.org/10.71284/tjmhs.2025233**

Peer review Externally and internally peer-reviewed.

Ethical Statement It is declared that scientific, ethical principles have been followed while carrying out and writing this study, and that all the sources used have been properly cited.

Artificial intelligence usage statement In this study,generative artificial intelligence tools were used in a limited manner solely for writing support, in accordance with the ethical guidelines published by the Council of Higher Education (YÖK). The entire content was produced by the author(s), who bear full responsibility for the final manuscript.

Author Contribution Rate All authors contributed equally.

Plagiarism Checks Yes;Ithenticate/Turnitin.

Conflict of interest No conict of interest was declared by the authors.

Grant Support or funding Authors declared that this tudy received no financial support

ROR code https://ror.org/04wy7gp54

JEL code I12

Citation Küçüktepe, Y., Bakıcı, R.S. (2025). Investigation Of Variational States of The Coronary Artery on Cadavers: A Review Study. Turkish Journal of Medicine and Health Sciences, 2(3):17-27.