



Circumaortic Configuration of the Left Coronary Arteries

MULTIMODALITY
MUSEUM IMAGES

DAMANDEEP SINGH, MD**

NIRAJ NIRMAL PANDEY, DM**

VINEETA OJHA, DM

SATYAVIR YADAV, DM

*Author affiliations can be found in the back matter of this article

**Contributed equally to the manuscript and share the first authorship

HOUSTON
Methodist
DEBAKEY HEART &
VASCULAR CENTER

ABSTRACT

Coronary artery anomalies can be divided into anomalies of origin, course, or terminations of any of the epicardial coronary arteries. Coexistence of anomalous origin of the left circumflex artery with retroaortic course and anomalous origin of left anterior descending artery arising from the right coronary sinus with interarterial course is an exceedingly rare anatomical configuration. In the presence of this anomaly, conventional catheter angiography is challenging due to technical reasons and may lead to an inadvertent misdiagnosis of significant stenosis or occlusion of the coronary artery. This case highlights the importance of coronary computed tomography angiography in identifying a rare coronary artery anomaly and providing guidance for future endovascular or surgical procedures.

CORRESPONDING AUTHOR:

Niraj Nirmal Pandey, DM

Department of Cardiovascular
Radiology & Endovascular
Interventions, All India Institute
of Medical Sciences, New
Delhi-110029, India

nirajpandey2403@gmail.com

KEYWORDS:

coronary artery anomalies;
coronary computed
tomography angiography;
interarterial course; retroaortic
course

TO CITE THIS ARTICLE:

Singh D, Pandey NN, Ojha
V, Yadav S. Circumaortic
Configuration of the Left
Coronary Arteries. Methodist
DeBaKey Cardiovasc J.
2026;22(1):53-56.doi:[10.14797/
mdcvj.1830](https://doi.org/10.14797/mdcvj.1830)

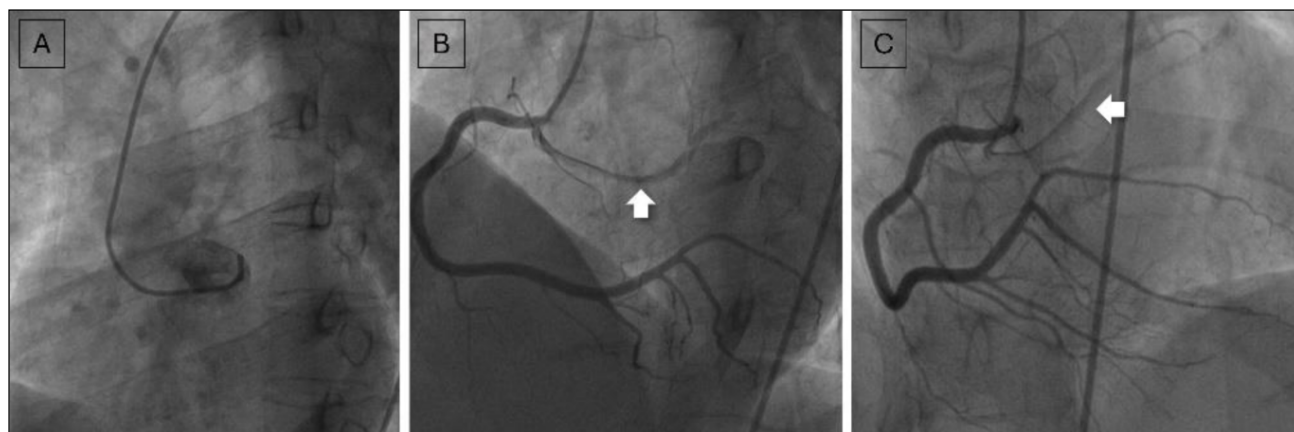


Figure 1 (A) Nonselective contrast injection in the left coronary sinus does not show the left main coronary artery. (B, C) Selective right coronary artery (RCA) angiograms show orthotopically arising RCA and anomalous origin of the left circumflex artery (thick white arrow) from the ostio-proximal RCA. The left anterior descending artery was not seen in this injection.

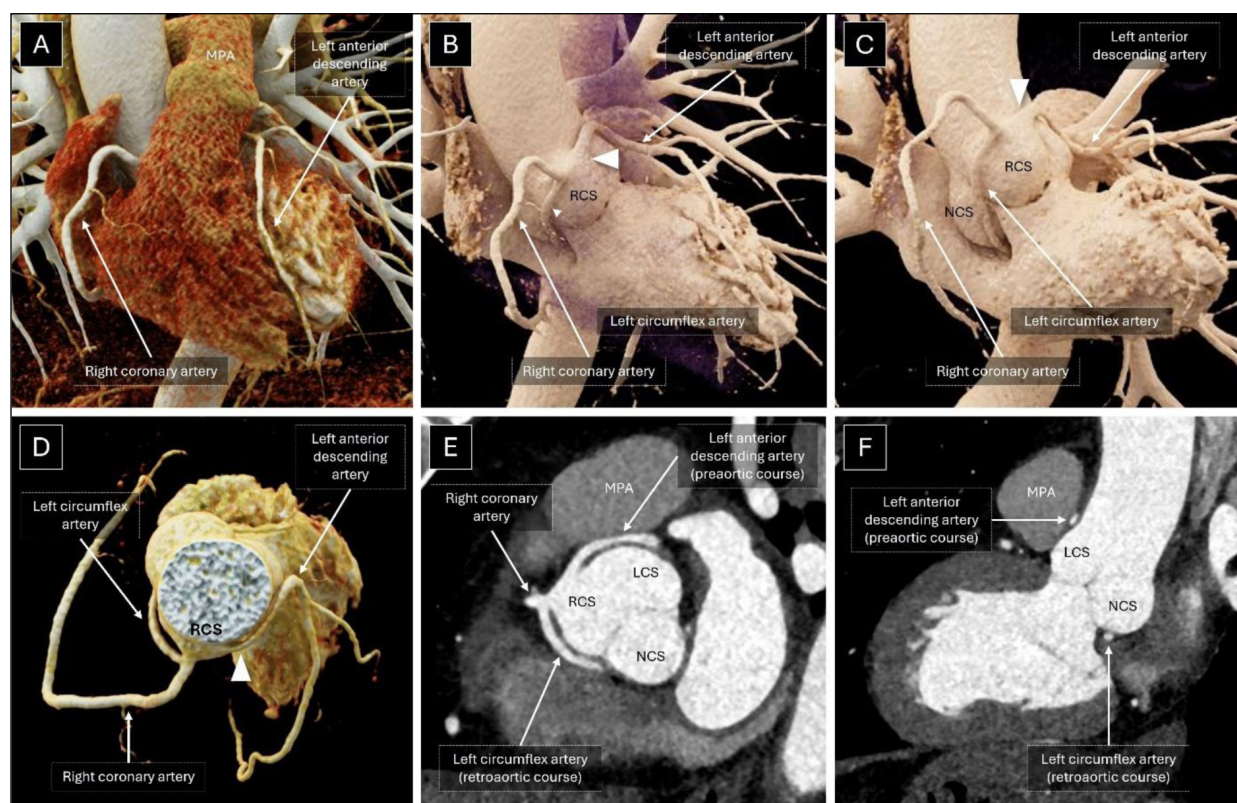


Figure 2 Volume-rendered images (A-D) of coronary computed tomography angiography shows normal origin and course of the RCA. Note the anomalous origin of the LCx from the proximal RCA, taking a retroaortic course to reach the left atrioventricular groove. The LAD artery (white arrowhead) is seen arising from the RCS, adjacent to the RCA ostium, taking a pre-aortic, interarterial course (between the aorta and MPA) to reach the anterior interventricular groove. A short axis reconstruction (E) at the level of the aortic root and an oblique sagittal reconstruction (F) demonstrate the unique circum-aortic (retroaortic and preaortic) configuration of the left coronary arteries (LCx and LAD arteries respectively). MPA: main pulmonary artery; LCS: left coronary sinus; NCS: non-coronary sinus; RCA: right coronary artery; LAD: left anterior descending; RCS: right coronary sinus; LCx: left circumflex

A 45-year-old man with a history of smoking presented to the emergency department with complaints of acute chest pain radiating to the left shoulder. Electrocardiogram demonstrated normal sinus rhythm

with Q wave in lead III. No ST elevation was seen. Cardiac troponin levels were elevated, suggesting a clinical diagnosis of non-ST segment elevation myocardial infarction.

The patient subsequently underwent a catheter coronary angiography. The left main coronary artery (LMCA) could not be selectively cannulated and, in addition, was not visualized on nonselective contrast injection in the left coronary sinus. Selective angiogram of the right coronary artery (RCA), which was orthotopically arising from the right coronary sinus (RCS), revealed no obstructive disease; however, the left circumflex (LCx) artery was seen arising from the ostio-proximal RCA coursing caudally and then moving cranially towards the obtuse margin of the heart, suggesting anomalous origin of the LCx from the RCA. The left anterior descending (LAD) artery was not seen in this injection (Figure 1).

The patient underwent an electrocardiogram-gated coronary computed tomography angiography (CCTA) to further delineate the anomalous coronary anatomy. CCTA confirmed the anomalous origin of the LCx artery from the proximal RCA, taking a retroaortic course to reach the left atrioventricular groove. Additionally, the LAD artery was seen arising from the RCS, adjacent to the RCA ostium, taking a pre-aortic, interarterial course (between the aorta and main pulmonary artery) to reach the anterior interventricular groove. Thus, a unique circumaortic (retroaortic and preaortic) configuration of the left coronary arteries (LCx and LAD arteries, respectively) was demonstrated on CCTA (Figure 2). No obstructive coronary artery disease or dynamic compression of the LAD artery was seen. The patient was managed conservatively.

DISCUSSION

Coronary artery anomalies can be divided into anomalies of origin, course, or terminations of any of the epicardial coronary arteries. The estimated prevalence of anomalous aortic origin of coronary arteries in adults undergoing coronary imaging is around 2%, with the most common entity being anomalous origin of the RCA from the left coronary sinus, seen in approximately 1.2% cases.¹ Of the 1,549 adult patients included in the study, 4 (0.26%) patients had anomalous origin of the LCx artery with retroaortic course, while 1 (0.06%) patient had the LAD artery arising from the RCS with an interarterial course. Coexistence of these two variants as seen in our case is an exceedingly rare anatomical configuration with only a few case reports previously published.²⁻⁴ While an anomalous origin of the LCx artery with a retroaortic course is a benign entity, an anomalous LAD artery arising from the RCS with an interarterial course may predispose to myocardial ischemia and sudden cardiac death.⁵

Recent 2025 American College of Cardiology/American Heart Association/Heart Rhythm Society/International Society for Adult Congenital Heart Disease/Society for

Cardiovascular Angiography & Interventions guidelines recommend exercise testing or dobutamine stress testing with echocardiographic, nuclear, or magnetic resonance imaging to assess for inducible hypoperfusion and regional wall motion abnormalities in asymptomatic patients. Patients who are symptomatic or show ischemic changes in stress testing are recommended for surgical intervention.⁶ Among asymptomatic patients, surgical intervention is reasonable in cases with high-risk imaging findings, including a slit-like ostium, acute ostial angulation or ostial stenosis, or an intramural course.⁷ In asymptomatic patients without high-risk imaging features and no signs of inducible ischemia on stress testing, surgical intervention does not demonstrate reduction in risk of sudden cardiac death.⁸ Surgical intervention options include a coronary artery bypass graft or coronary ostium reimplantation.⁹ In the presence of this anomaly, conventional catheter angiography is challenging due to technical reasons and may lead to an inadvertent misdiagnosis of significant stenosis or occlusion of the coronary artery.

CONCLUSION

CCTA provides multiplanar reconstruction and volume rendering capabilities, allowing for accurate delineation of uncommon entities. The present case highlights the importance of CCTA in identifying a rare coronary artery anomaly and providing guidance for future endovascular or surgical procedures.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR AFFILIATIONS

Damandeep Singh, MD  orcid.org/0000-0001-6835-1323

Department of Cardiovascular Radiology & Endovascular Interventions, All India Institute of Medical Sciences, New Delhi-110029, India

Niraj Nirmal Pandey, DM  orcid.org/0000-0001-6786-8304

Department of Cardiovascular Radiology & Endovascular Interventions, All India Institute of Medical Sciences, New Delhi-110029, India

Vineeta Ojha, DM  orcid.org/0000-0003-4371-5615

Department of Cardiovascular Radiology & Endovascular Interventions, All India Institute of Medical Sciences, New Delhi-110029, India

Satyavir Yadav, DM  orcid.org/0000-0002-0859-4048

Department of Cardiology, All India Institute of Medical Sciences, New Delhi-110029, India

REFERENCES

1. **Al-Balas H, Mouhsen AM, Ababneh GE**, et al. Prevalence and spectrum of coronary artery anomalies detected on coronary CT angiography. *Int J Cardiol Cardiovasc Risk Prev*. 2026 Feb 24;29:200614. doi: [10.1016/j.ijcrp.2026.200614](https://doi.org/10.1016/j.ijcrp.2026.200614)
2. **Barman P, John A**. Anomalous Origin of Left Anterior Descending and Left Circumflex Arteries From the Proximal Right Coronary Arteries Individually With an Absent Left Main Coronary Artery: A Case Report. *Cureus*. 2024 Oct 11; 16(10):e71281. doi: [10.7759/cureus.71281](https://doi.org/10.7759/cureus.71281)
3. **Al-Sadawi M, Ihsan M, Garcia AN, Dogar M, Celenza-Salvatore J, McFarlane SI**. Congenital Absence of Left Main Coronary Artery with Anomalous Origin of Left Anterior Descending and Left Circumflex Arteries Presenting with Acute Non-ST Elevation Myocardial Infarction. *Am J Med Case Rep*. 2019 Aug 21;7(10):264-266. doi: [10.12691/ajmcr-7-10-10](https://doi.org/10.12691/ajmcr-7-10-10).
4. **Limaye SV, Easwaran S, Phadke MS, Nathani PJ**. The Coronary Crown: Anomalous Left Anterior Descending and Circumflex From the Right Coronary Sinus. *JACC Case Rep*. 2025 Aug 27;30(25):104824. doi: [10.1016/j.jaccas.2025](https://doi.org/10.1016/j.jaccas.2025)
5. **Ali M, Hanley A, McFadden EP, Vaughan CJ**. Coronary artery anomalies: a practical approach to diagnosis and management. *Heart Asia*. 2011 Jan 1;3(1):8-12. doi: [10.1136/ha.2010.003244](https://doi.org/10.1136/ha.2010.003244)
6. **Writing Committee Members*, Gurvitz M, Krieger EV, Fuller S**, et al. 2025 ACC/AHA/HRS/ISACHD/SCAI Guideline for the Management of Adults With Congenital Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2026 Feb 24;153(8):e115-e251. doi: [10.1161/CIR.0000000000001402](https://doi.org/10.1161/CIR.0000000000001402). Erratum in: *Circulation*. 2026 Apr 7;153(14):e1115. doi: [10.1161/CIR.0000000000001432](https://doi.org/10.1161/CIR.0000000000001432)
7. **Gaudino M, Di Franco A, Arbustini E**, et al. Management of Adults With Anomalous Aortic Origin of the Coronary Arteries: State-of-the-Art Review. *J Am Coll Cardiol*. 2023 Nov 21;82(21):2034-2053. doi: [10.1016/j.jacc.2023.08.012](https://doi.org/10.1016/j.jacc.2023.08.012)
8. **Krasuski RA, Magyar D, Hart S**, et al. Long-term outcome and impact of surgery on adults with coronary arteries originating from the opposite coronary cusp. *Circulation*. 2011 Jan 18;123(2):154-162. doi: [10.1161/CIRCULATIONAHA.109.921106](https://doi.org/10.1161/CIRCULATIONAHA.109.921106)
9. **Stout KK, Daniels CJ, Aboulhosn JA**, et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019 Apr 2;73(12):1494-1563. doi: [10.1016/j.jacc.2018.08.1028](https://doi.org/10.1016/j.jacc.2018.08.1028). Erratum in: *J Am Coll Cardiol*. 2019 May 14;73(18):2361. doi: [10.1016/j.jacc.2019.03.017](https://doi.org/10.1016/j.jacc.2019.03.017)

TO CITE THIS ARTICLE:

Singh D, Pandey NN, Ojha V, Yadav S. Circumaortic Configuration of the Left Coronary Arteries. *Methodist DeBakey Cardiovasc J*. 2026;22(1):53-56. doi: [10.14797/mdcvj.1830](https://doi.org/10.14797/mdcvj.1830)

Submitted: 27 March 2026

Accepted: 18 June 2026

Published: 30 July 2026

COPYRIGHT:

© 2026 The Author(s). This is an open-access article distributed under the terms of the Attribution-NonCommercial 4.0 International (CC BY-NC 4.0), which permits unrestricted use, distribution, and reproduction in any noncommercial medium, provided the original author and source are credited. See <https://creativecommons.org/licenses/by-nc/4.0/>.

Methodist DeBakey Cardiovascular Journal is a peer-reviewed open access journal published by Houston Methodist DeBakey Heart & Vascular Center.