

Intercoronary Continuity between the Right Coronary Artery and the Left Anterior Descending Coronary Artery in the Acute Coronary Syndrome: An Anatomical View

 Tayfun Aygün,¹  Sait Altıntaş,²  Hasan Ali Barman,³  Nurullah Yücel,⁴
 Gulam Hekimoğlu,⁵  Hakan Hasdemir,⁶  Mustafa Yıldız³

¹Department of Anatomy, Giresun University Faculty of Medicine, Giresun, Türkiye

²Department of Cardiology, İstanbul University of Health Sciences Training and Research Hospital, İstanbul, Türkiye

³Department of Cardiology, İstanbul University-Cerrahpaşa, Cardiology Institute, İstanbul, Türkiye

⁴Department of Anatomy, University of Health Sciences, Hamidiye International Faculty of Medicine, İstanbul, Türkiye

⁵Department of Histology, University of Health Sciences, Hamidiye International Faculty of Medicine, İstanbul, Türkiye

⁶Department of Cardiology, Acıbadem University Faculty of Medicine, İstanbul, Türkiye

Abstract

Intercoronary continuity, a rare variant of the coronary circulation, is a congenital open-ended connection between two major epicardial coronary arteries. This connection may play a protective role against possible obstructive coronary artery disease or may be related to the phenomenon of coronary steal. In this case, we discuss intercoronary continuity between the right coronary artery and the left anterior descending coronary artery in the acute coronary syndrome by the anatomical view.

Keywords: Coronary anatomy; intercoronary continuity; stenting.

Akut Koroner Sendromda Sağ Koroner Arter ile Sol Ön İnen Koroner Arter Arasındaki Interkoroner Devamlılık: Anatomik Bakış

Özet

Koroner dolaşımın nadir görülen bir çeşidi olan interkoroner devamlılık, iki majör epikardiyal koroner arter arasında konjenital açık uçlu bir bağlantıdır. Bu bağlantı potansiyel obstrüktif koroner arter hastalığına karşı koruyucu bir rol oynayabilir veya koroner çalma fenomeniyle ilişkili olabilir. Akut koroner sendromlu bir olgu nedeni ile sağ koroner arter ile sol ön inen koroner arter arasındaki interkoroner devamlılık anatomik bakış açısı ile tartışılmaktadır.

Anahtar sözcükler: Koroner anatomi; interkoroner devamlılık; stent.

Introduction

Intercoronary continuity is a congenital open-ended connection between two major epicardial coronary arteries.^[1,2] This connection can be between the left circumflex coronary artery and the right coronary artery or between the left anterior descending coronary artery and the posterior descending coronary artery. The importance of intercoronary continuity is not fully understood due to very low incidence. This connection may play a protective role against possible obstructive coronary artery disease or may be related to the phenomenon of coronary steal.^[3] In our case, we discuss intercoronary continuity between the right coronary artery and left anterior descending coronary artery in the acute coronary syndrome (namely unstable angina pectoris) via the anatomical view.

Cite This Article: Aygün T, Altıntaş S, Barman HA, Yücel N, Hekimoğlu G, Hasdemir H, Yıldız M. Intercoronary Continuity between the Right Coronary Artery and the Left Anterior Descending Coronary Artery in the Acute Coronary Syndrome: An Anatomical View. Koşuyolu Heart J 2024;27(1):57–59.

Address for Correspondence:

Tayfun Aygün

Department of Anatomy, Giresun University Faculty of Medicine, Giresun, Türkiye

E-mail: tayfun.aygun@giresun.edu.tr

Submitted: February 15, 2024

Revised: March 01, 2024

Accepted: March 02, 2024

Available Online: April 01, 2024



©Copyright 2024 by Koşuyolu Heart Journal - Available online at www.kosuyoluheartjournal.com

OPEN ACCESS This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.



Case Report

A 62-year-old female admitted with a complaint of typical chest pain (acute coronary syndrome, namely unstable angina pectoris). Physical examination and chest X-ray were normal. On blood test, troponin T was slightly high. Surface ECG showed sinus rhythm (heart rate 90/min) and minimal ST segment depression at DI, DII, aVF, and V4-6 derivation. Transthoracic echocardiography was normal; ejection fraction was 53%. The patient was transferred to coronary angiography. Written informed consent was obtained from the patient before the procedure. The patient was administered loading doses of acetylsalicylic acid 300 mg and clopidogrel 600 mg before intervention. During percutaneous intervention, 7500 IU iv bolus was given followed by 1000 IU an hour later and then additional heparin to achieve an activated clotting time of 250–350 s. In coronary angiography, the right coronary artery was 95% occluded in the distal region and left anterior descending coronary artery was completely occluded in the proximal region. Left anterior descending coronary artery chronic total occlusion region was being filled with intercoronary continuity from right coronary artery. The right coronary artery lesion was crossed with a floppy guidewire, and a 3.0×24 mm drug eluting stent was implanted (Fig. 1a). The patient, who described angina and detected anterior ischemia (>10%) in myocardial perfusion scintigraphy, underwent an intervention for the left anterior descending coronary artery chronic total occlusion 1 month later. The 7F Ebu catheter was placed in the left main coronary artery and the left anterior descending coronary artery chronic total occlusion was crossed with a Fielder XT wire, accompanied by a microcatheter. Then, another Fielder XT wire was placed in the diagonal artery. The wire in the microcatheter was replaced with a floppy wire, and after subsequent balloons, a 3.0×32 mm drug eluting stent was placed distally and a 3.0×18 mm drug eluting stent was placed proximally by overlap (Fig. 1b-d). The left anterior descending coronary artery was opened successfully. After the procedure, acetylsalicylic acid and clopidogrel was prescribed continuously for 1 year. During the follow-ups, an increase in functional capacity was observed.

Discussion

Intercoronary continuity is a rare variant of the coronary circulation.^[4] It is distinguished from collaterals that occur in occlusive coronary artery disease according to its angiographic features and histological findings.^[5] Collateral vessels provide an alternative blood flow to the myocardium threatened by occlusive coronary artery disease and help preserve myocardial function.^[6,7] Although it is thought to be frequently initiated by ischemia, it is stated that other factors such as genetics also play an important role in collateral development.^[8]

Although coronary artery variations are quite common, a very rare case with a direct link has been identified. In 2015, direct connection and continuity between the circumflex artery and the posterior descending artery were reported during postmortem dissection.^[9]

The intercoronary communication is single, extramural, straight or slightly curved, and usually has a diameter of over 1 mm.^[5] Histologically, while intercoronary communications are similar to an epicardial vessel, endothelium of collateral vessels consists of poorly organized collagen, elastic fibers, and muscle.^[4,5] Intercoronary communications were usually diagnosed coronary angiography, cardiac multislice computed tomography, or postmortem study.^[10] The importance of intercoronary continuity is not fully understood due to very low incidence. However, this large anastomotic connection (>1 mm) might have a potential role in protecting the myocardium in the presence of significant stenosis in main arteries.^[1,3]

Conclusion

Supporting this hypothesis, our case showed that there was intercoronary continuity between the stenotic right coronary artery and the left anterior descending coronary artery in acute coronary syndrome, but it was hemodynamically stable. However, it should not be ignored that this anomaly itself may trigger ischemia through the coronary steal phenomenon.

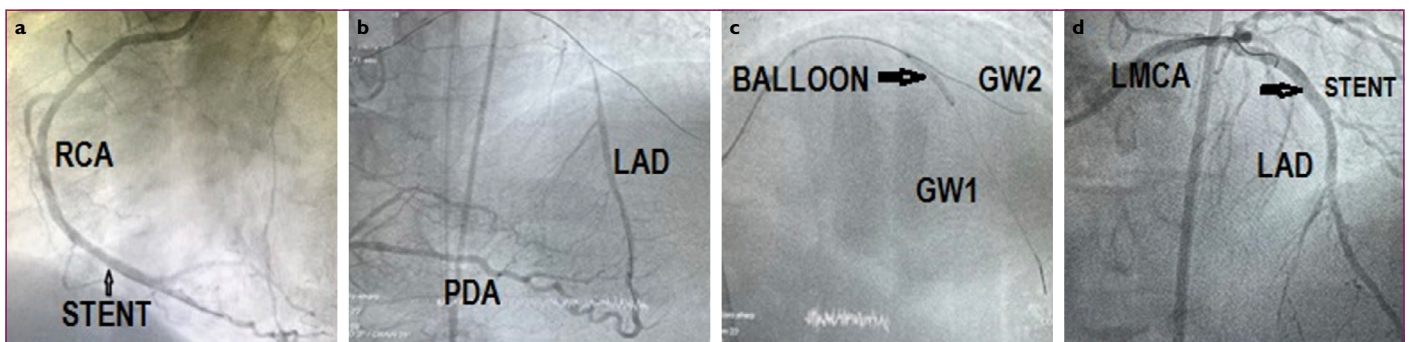


Figure 1. (a) Distal RCA lesion was crossed with a floppy guidewire and a 3.0×24 mm drug eluting stent was implanted. (b) Intercoronary continuity between PDA (branch of RCA) and LAD. (b-d) The 7F Ebu catheter was placed in the LMCA and LAD chronic total occlusion was crossed with a fielder XT wire, accompanied by a microcatheter. Then, another Fielder XT wire was placed in the diagonal artery. After subsequent balloons, a 3.0×32 mm drug eluting stent was placed LAD.

RCA: Right coronary artery; LAD: Left anterior descending coronary artery; PDA: Posterior descending coronary artery; LMCA: Left main coronary artery; GW: Guidewire.

Disclosures

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying image.

Authorship Contributions: Concept – T.A., H.H., M.Y.; Design – T.A., M.Y., N.Y.; Supervision – M.Y., N.Y.; Funding – M.Y., H.A.B., S.A.; Materials – H.A.B., S.A.; Data collection and/or processing – H.A.B., S.A.; Data analysis and/or interpretation – T.A., G.H., M.Y.; Literature search – T.A., G.H., M.Y.; Writing – T.A., G.H., M.Y.; Critical review – T.A., H.H., M.Y., N.Y.

Conflict of Interest: All authors declared no conflict of interest.

Use of AI for Writing Assistance: Not declared.

Financial Disclosure: The authors declared that this study received no financial support.

Peer-review: Externally peer-reviewed.

References

1. Karabay KO, Bagirtan B, Gozukara I. Intercoronary continuity: A case report. *Int J Angiol* 2013;22(3):177-80. doi: 10.1055/s-0032-1325166.
2. Donaldson RF, Isner JM. Intercoronary continuity: An anatomic basis for bidirectional coronary blood flow distinct from coronary collaterals. *Am J Cardiol* 1984;53(2):351-2. doi: 10.1016/0002-9149(84)90462-4.
3. Nigam A, Anandaraja S. Protective intercoronary continuity. *Clin Anat* 2007;20(8):984-5. doi: 10.1002/ca.20524.
4. Gavrielatou G, Letsas KP, Pappas LK, Markou V, Antonellis J, Tavernarakis A, et al. Open ended circulation pattern: A rare case of a protective coronary artery variation and review of the literature. *Int J Cardiol* 2006;112(3):e63-5. doi: 10.1016/j.ijcard.2006.02.034.
5. Fournier JA, Cortacero JA, Díaz de la Llera L, Sánchez A, Arana E, Morán JE. Distal intercoronary communication. A case report and medical literature review. *Rev Esp Cardiol*. 2003;56(10):1026-8. doi: 10.1016/s0300-8932(03)77003-1.
6. Seiler C. The human coronary collateral circulation. *Eur J Clin Invest* 2010;40(5):465-76. doi: 10.1111/j.1365-2362.2010.02282.x.
7. Meier P, Schirmer SH, Lansky AJ, Timmis A, Pitt B, Seiler C. The collateral circulation of the heart. *BMC Med* 2013;11:143. doi: 10.1186/1741-7015-11-143.
8. Meier P, Antonov J, Zbinden R, Kuhn A, Zbinden S, Gloekler S, et al. Non-invasive gene-expression-based detection of well-developed collateral function in individuals with and without coronary artery disease. *Heart* 2009;95(11):900-8. doi: 10.1136/hrt.2008.145383.
9. Stankovic I, Jesic M, Nikolic V. An extremely rare coronary variation: Direct communication between the circumflex and right coronary arteries. *Int J Angiol* 2015;24(2):143-4. doi: 10.1055/s-0033-1358783.
10. Yamada Y, Sugj K, Fukushima K, Muramatsu T, Nakano S. Computed tomography image of a coronary arcade, an intercoronary communication. *Circ J* 2022;86(3):475. doi: 10.1253/circj.CJ-21-0763.