Content of this journal is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

Myocardial Venous Bridge: Images of the First Cases Detected by Conventional Angiography and Venography

Ercan Akşit[1], Gökay Taylan[2], Uğur Küçük[1], Bahadır Kırılmaz[1]

[1]Department of Cardiology, Çanakkale Onsekiz Mart University Faculty of Medicine, Çanakkale, Türkiye
[2]Department of Cardiology, Trakya University Faculty of Medicine, Edirne, Türkiye

A myocardial bridge refers to the partial or complete encasement of coronary arteries by the myocardium.[1] In contrast, the myocardial venous bridge is less well-known and has only been identified in cadaver studies.[2] Its clinical relevance remains unclear. Watanabe et al.[2] described two forms of myocardial bridge: one involving the artery and another involving both the artery and the vein, with both structures enveloped by myocardial tissue in the latter type. Coronary artery disease (CAD) continues to be the leading cause of death globally. However, coronary venous disorders have received significantly less attention in research compared to CAD. Coronary veins-particularly the coronary sinus-are frequently utilized for guiding ablation procedures.[3] These veins have been the focus of anatomical and imaging studies, with several anomalies in the coronary venous system reported.[4-6] A better understanding of the microvascular and coronary venous physiology may help clarify some unresolved aspects of cardiology. For instance, the pathophysiology of Takotsubo syndrome remains not fully understood.[7] Advances in imaging technology, which have enhanced the study of coronary arteries, could similarly be applied to investigating diseases of the coronary venous system.[8]

The three myocardial venous bridge images discussed in this article should be categorized as anomalies of the coronary venous system. Since coronary angiography is performed more frequently than venography, and venographic imaging typically lacks comprehensive multi-projection views, myocardial venous bridges have likely gone unrecognized. Even if observed, they may not have been reported in scientific literature. This may be because during coronary angiography, the focus is usually on detecting CAD, while during venography, the aim is usually often to identify a suitable coronary sinus branch for lead placement in cardiac resynchronization therapy. To our knowledge, this article presents the first clear conventional angiography and venography images of myocardial venous bridges in the literature (Figure 1). Informed written and verbal consent was obtained from the patients.

Treatment strategies for myocardial bridges are not yet well-defined enough to be included in clinical guidelines. Stent implantation raises concerns due to the increased risk of stent fracture, vessel perforation, and thrombosis.[9] Since stents are placed within arteries, they are not effective for treating myocardial venous bridges. In surgical management, saphenous vein grafts are preferred for bypass procedures because the left internal mammary artery may compete with the left anterior descending artery and become occluded.[9] Myotomy has shown more favorable midterm outcomes and angiographic results compared to bypass surgery.[10] If future studies confirm that myocardial venous bridges are linked to negative cardiac outcomes, myotomy may become the preferred treatment option for bridges involving both the coronary artery and vein.

Corresponding author: Ercan Akşit, Department of Cardiology, Çanakkale Onsekiz Mart University Faculty of Medicine, Çanakkale, Türkiye
e-mail: ercanaksit@comu.edu.tr
Received: February 11, 2025 **Accepted:** March 03, 2025 • **DOI:** 10.4274/balkanmedj.galenos.2025.2025-2-33
Available at www.balkanmedicaljournal.org
ORCID iDs of the authors: E.A. 0000-0002-4478-4324; G.T. 0000-0002-7015-4537; U.K. 0000-0003-4669-7387; B.K. 0000-0002-5929-1426.
Cite this article as: Akşit E, Taylan G, Küçük U, Kırılmaz B. Myocardial Venous Bridge: Images of the First Cases Detected by Conventional Angiography and Venography. Balkan Med J.;
Copyright@Author(s) - Available online at http://balkanmedicaljournal.org/

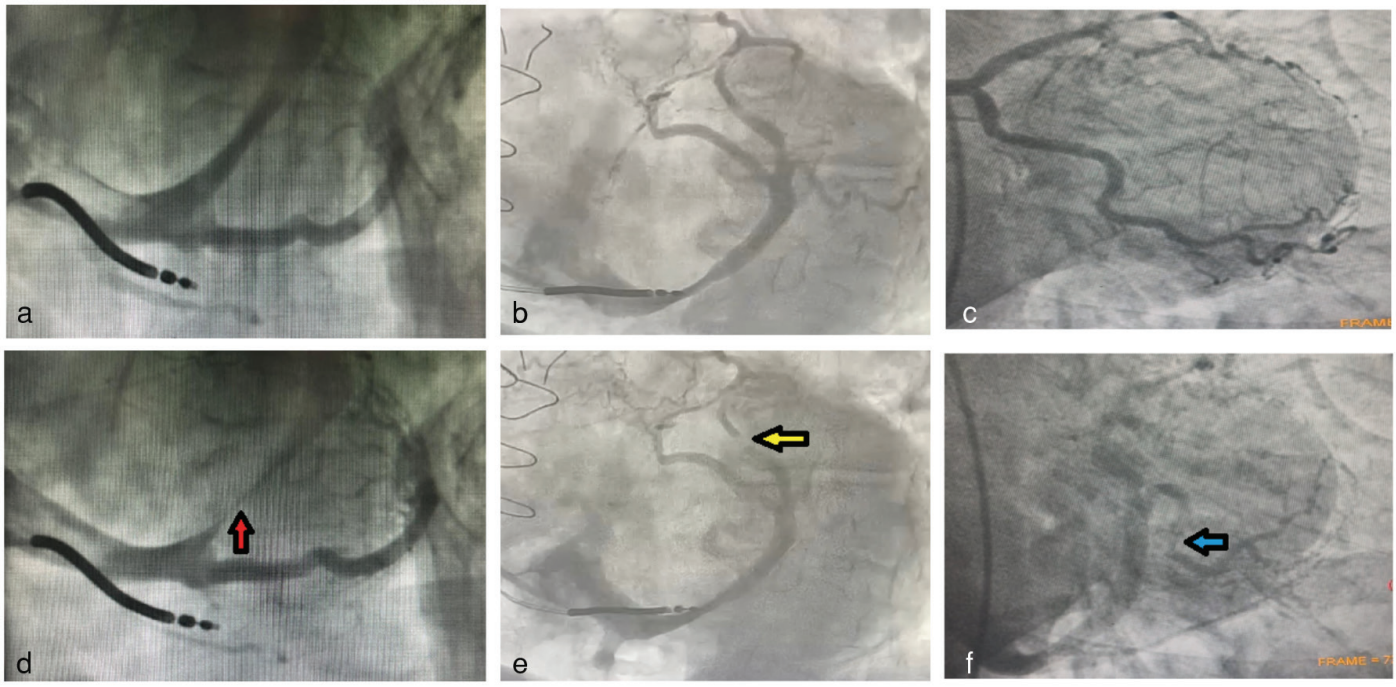

FIG. 1. (a-f) Venography of a patient with heart failure (HF) during cardiac resynchronization (CRT) therapy (a). A myocardial venous bridge causing 95% narrowing of the great cardiac vein is indicated by the red arrow (b). Venography from another HF patient during a CRT procedure (c). A myocardial venous bridge (yellow arrow) causing near-total segmental occlusion of the anterior interventricular vein (d). Coronary artery system of a patient who underwent coronary angiography due to non-ST elevation myocardial infarction (e). A myocardial venous bridge in the left marginal vein (blue arrow), incidentally identified during extended imaging to assess collateral circulation to the right coronary artery in the same patient (f). During coronary angiography, while the compression in the obtuse marginal artery is minimal, a prominent bridge is observed in the left marginal vein running parallel to the artery. This may be attributed to the relatively weaker structure of venous muscle tissue, making it more susceptible to compression from the myocardial bridge

Informed Consent: Informed written and verbal consent was obtained from the patients.

Authorship Contributions: Concept- E.A.; Design- E.A.; Supervision- G.T., U.K., B.K.; Data Collection or Processing- E.A., G.T., U.K., B.K.; Analysis or Interpretation- E.A., G.T., U.K., B.K.; Literature Search- G.T., U.K., B.K.; Writing- E.A.; Critical Review- B.K.

Conflict of Interest: No conflict of interest was declared by the authors.

REFERENCES

1. Sternheim D, Power DA, Samtani R, Kini A, Fuster V, Sharma S. Myocardial bridging: diagnosis, functional assessment, and management: JACC State-of-the-art review. *J Am Coll Cardiol*. 2021;78:2196-2212. [Crossref]
2. Watanabe Y, Arakawa T, Kageyama I, 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. *Clin Anat*. 2016;29:333-341. [Crossref]
3. Meisel E, Pfeiffer D, Engelmann L, et al. Investigation of coronary venous anatomy by retrograde venography in patients with malignant ventricular tachycardia. *Circulation*. 2001;104:442-447. [Crossref]
4. Şengül FS, Ayyıldız P, Türkvatan A, Yıldız O, Güzeltaş A. Total or partial? Rare cases of partial anomalous pulmonary venous return: three pulmonary veins connected to the coronary sinus. *Balkan Med J*. 2023;40:226-227. [Crossref]
5. Sirajuddin A, Chen MY, White CS, Arai AE. Coronary venous anatomy and anomalies. *J Cardiovasc Comput Tomogr*. 2020;14:80-86. [Crossref]
6. Kesieme EB, Buchan KG. Clinical anatomy of the coronary venous system and relevance to retrograde cardioplegia and cardiac electrophysiological interventions. *Clin Anat*. 2025;38:43-53. [Crossref]
7. Yalta K, Madias JE, Kounis NG, et al. Takotsubo syndrome: An International Expert Consensus Report on Practical Challenges and Specific Conditions (part-2: Specific entities, risk stratification and challenges after recovery). *Balkan Med J*. 2024;41:442-457. [Crossref]
8. Hayıroğlu Mİ, Altay S. The role of artificial intelligence in coronary artery disease and atrial fibrillation. *Balkan Med J*. 2023;40:151-152. [Crossref]
9. Matta A, Roncalli J, Carrié D. Update review on myocardial bridging: new insights. *Trends Cardiovasc Med*. 2024;34:10-15. [Crossref]
10. Ji Q, Shen J, Xia L, Ding W, Wang C. Surgical treatment of symptomatic left anterior descending myocardial bridges: myotomy vs. bypass surgery. *Surg Today*. 2020;50:685-692. [Crossref]