The first septal perforating artery in the setting of percutaneous coronary interventions: More than just a side branch

Kenan Yalta, Murat Gok, Muhammet Gurdogan

Department of Cardiology, Trakya University, Edirne, Turkey

Correspondence to:
Kenan Yalta, MD, PhD,
Department of Cardiology,
Trakya University, Balkan Yerleşkesi,
22030, Edirne, Turkey,
phone: +90 505 657 98 56,
e-mail: kyalta@gmail.com,
akenanyalta@trakya.edu.tr

DOI: 10.33963/v.kp.97242

Received:
August 24, 2023

Accepted:
August 28, 2023

Early publication date:
September 3, 2023

In patients undergoing percutaneous coronary interventions (PCIs), occlusion of small side branches, including the first septal perforating artery (SPA), has been generally ignored by performing operators [1]. However, the first SPA might have a pivotal role in the perfusion of critical areas of the cardiac conduction system with important implications [1–3]. The recent article by Pavlov et al. [1] has reported a case of heart failure complicated by the occlusion of the first SPA and consequent atrioventricular (AV) block during PCI and has also described the management strategy of this challenging case [1]. Accordingly, we would like to comment on clinical and practical implications regarding the acute occlusion of the first SPA during PCI.

First, perfusion of the major conduction structures, including the His bundle, right bundle branch, anterior and posterior fascicles of the left bundle branch, was previously demonstrated to have a significant variation in the population [2]. Accordingly, each of these structures may be perfused exclusively by the first SPA or AV node artery or both (dual perfusion) [2]. Therefore, occlusion of the first SPA may result in any of the following scenarios during PCI [2, 3]:

- No impact on the conduction system due to dual or AV node artery perfusion in these structures;
- Right bundle branch block (RBBB);
- Bifascicular block (RBBB mostly with anterior fascicular block);
- Isolated fascicular block;
- Rarely, left bundle branch block (LBBB);
- Even more rarely, intra-Hisian block (since the perfusion of the His bundle is mostly dual or from the AV node artery) [2, 3].

The patient had a transient AV block possibly due to acute intra-Hisian or infra-Hisian ischemia (possibly due to a co-existing new-onset RBBB and LBBB) [1]. Patients with this kind of AV block are well known to present with wide QRS morphology, along with severe bradycardia and hemodynamic compromise due to the ventricular origin of the escape rhythm [2]. Therefore, we wonder about the clinical features of the AV block in the patient (morphology, rate, and associated symptoms) [1].

Second, the size of the occluded first SPA might also matter in terms of clinical outcomes including infarct size and emerging conduction blocks. An earlier study suggested that RBBB might be strongly associated with SPA occlusion accompanied by a substantial anteroseptal scar in patients with severe systolic dysfunction [3]. This may also suggest that the magnitude of septal ischemia, and consequent scar formation in the setting of the first SPA occlusion may be correlated with the size of the occluded artery. Moreover, occlusion of large first SPAs (as in the patient [1]) during PCI is more likely to be associated with any of the aforementioned conduction blocks (mostly RBBB with or without fascicular block [1, 3]). Therefore, an existing large first SPA during PCI of the proximal left anterior descending (LAD) artery should prompt the operator to take necessary measures (wiring the SPA before LAD stenting, venous access for possible temporary pacemaker implantation, etc.). Moreover, new-onset conduction blocks following uneventful PCI may denote late SPA occlusion and warrant a repeat coronary angiogram, and where necessary, PCI for SPA before considering radical therapeutic modalities such as permanent pacemaker or re-synchronization therapy.

Finally, wiring of the first SPA, particularly with ostial stenosis, may be extremely challenging due to its perpendicular take-off from the LAD in most cases. This may be even more challenging following stent implantation in the proximal LAD (as in the patient [1]). Therefore, safeguarding a large first SPA with a stiff guidewire (mostly with the assistance of a microcatheter for guidewire exchange to avoid SPA dissection) might significantly reduce its take-off angle, and might significantly facilitate re-wiring of the SPA following LAD stenting (re-wiring with another soft guidewire while the stiff guidewire in SPA is left jailed under the stent). Thereafter, the procedure may be completed with kissing balloon inflation. This might have been a reasonable strategy for the patient as well [1]. Notably, stenting of the SPA should be avoided due to its intramural course [4]. Stent misplacement in the SPA was previously reported to be associated with a variety of complications including septal hematoma and coronary-cameral fistula [4].

In conclusion, the article by Pavlov et al. [1] should be highly commended due to its didactic features. The first SPA should not be regarded as just a side branch; it is an artery that might have important clinical and practical implications in patients undergoing PCI [1–4].

Article information

Conflict of interest: None declared.

Funding: None.

REFERENCES

1. Pavlov M, Hadžibegović I, Pavlović N, et al. Septal branch in heart failure: Significant implications of an insignificant branch. Kardiol Pol. 2023; 81(12): 1302–1303, doi: 10.33963/KP.a2023.0169, indexed in Pubmed: 37537916.
2. Frink RJ, James TN. Normal blood supply to the human His bundle and proximal bundle branches. Circulation. 1973; 47(1): 8–18, doi: 10.1161/01.cir.47.1.8, indexed in Pubmed: 4686608.
3. Strauss DG, Loring Z, Selvester RH, et al. Right, but not left, bundle branch block is associated with large anteroseptal scar. J Am Coll Cardiol. 2013; 62(11): 959–967, doi: 10.1016/j.jacc.2013.04.060, indexed in Pubmed: 23707313.
4. Demir M, Gök M, Gürdoğan M, et al. A stent misplaced in the septal perforating artery: Right ventricular fistula, interventricular septal hematoma, and right ventricular outflow tract obstruction. Arq Bras Cardiol. 2023; 120(8): e20220901, doi: 10.36660/abc.20220901.