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

Short title: The first septal perforating artery in coronary interventions

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In patients undergoing percutaneous coronary interventions (PCIs), occlusion of small side branches including the first septal perforating artery (SPA) have been generally ignored by the 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 were 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 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; intrahisian 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 an acute intrahisian or infrahisian (possibly due to a co-existing new-onset RBBB and LBBB) ischemia [1]. Patients with this kind of AV blocks are well known to present with a 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 significantly matter in terms of clinical outcomes including infarct size and emerging conductions blocks. A previous study suggested that RBBB might be strongly associated with the occlusion of the SPA accompanied by substantial anteroseptal scar in patients with severe systolic dysfunction [3]. This may also suggest that magnitude of septal ischemia and consequent scar formation in the setting of 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 an uneventful PCI may denote a late SPA occlusion, and warrants repeat coronary angiogram, and where necessary, PCI for SPA before decision-making for radical therapeutic modalities including permanent pacemaker or re-synchronization therapy.

Finally, wiring of the first SPA, particularly with an 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 the 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 a kissing balloon inflation in this context. This might have been a reasonable strategy in the patient as well [1]. Of note, 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 Pavlovet al. [1] should be highly commended due to its didactic features. The first SPA should not be regarded just as a side branch, yet; an artery that might have important clinical and practical implications in patients undergoing PCI [1–4].

Article information

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