

Drug-coated balloon for the treatment of bifurcation lesions: high enthusiasm, but still limited evidence

El balón farmacoactivo en el tratamiento de las bifurcaciones coronarias: mucho entusiasmo y todavía pocas evidencias

Manuel Pan^{a,b,*}

^a Servicio de Cardiología, Hospital Reina Sofía, Universidad de Córdoba (IMIBIC), Córdoba, Spain

^b Centro de Investigación Biomédica en Red de Enfermedades Cardiovasculares (CIBERCV), Instituto de Salud Carlos III, Madrid, Spain

SEE RELATED CONTENT:

<https://doi.org/10.24875/RECICE.M26000574>

Drug-coated balloon (DCB) is a therapeutic tool that has been available for the treatment of coronary artery disease for more than 20 years. Initially developed for in-stent restenosis,^{1,2} its use has expanded given its potential in native coronary lesions. In Spain, annual registry data show a marked increase in DCB utilization, from approximately 4% of percutaneous coronary interventions in 2012 to 15% in the most recent report,³ accompanied by a parallel decline in drug-eluting stent (DES) use. This growing adoption over the past few years has been driven largely by the “leave nothing behind” concept rather than by robust clinical evidence. Accordingly, American clinical practice guidelines do not recommend DCB over DES,⁴ and European clinical practice guidelines restrict their indication to in-stent restenosis.⁵ Nevertheless, DCB use has extended to increasingly complex clinical scenarios, including small vessels, diffuse disease, chronic total coronary occlusions, calcified lesions, acute coronary syndrome, patients at high bleeding risk, and bifurcation lesions.

In bifurcation lesions, 2 principal approaches have been described. The pure DCB technique involves treatment of both the main vessel and the side branch (SB) with DCB, and is limited to the SB in Medina 0,0,1 lesions. In contrast, the hybrid technique combines DES implantation in the main vessel with DCB dilation in the SB. Two variants of the hybrid approach exist: SB predilation with DCB before DES implantation in the main vessel, and SB postdilation with DCB after DES deployment in the main vessel through the stent struts. The former allows direct access to the SB with the DCB without compromising drug delivery but may be affected by carina shift following DES implantation, potentially requiring repeat dilation of the new segment treated with DCB. The latter carries the risk of DCB drug loss when crossing the stent struts, and the need to correct the deformation induced in the DES when dilating the SB.

The hybrid strategy has been evaluated in multiple observational studies for years. Its rationale lies in the ability of DCB to reduce late lumen loss through an antiproliferative effect in SB lesions, thereby decreasing restenosis, and the need for repeat revascularization, with a potential reduction in clinical events during

follow-up. A reduction in late lumen loss at the SB ostium has indeed been demonstrated in most studies.⁶⁻⁹ However, the translation of this favorable effect into fewer clinical events is more difficult, with most studies reporting neutral results. The randomized DCB-BIF study, which had sufficient statistical power, compared the hybrid strategy with the provisional stenting technique.¹⁰ Although a significant reduction in events during follow-up was demonstrated, this was driven by myocardial infarction (periprocedural and spontaneous) and not by the need for repeat target lesion revascularization. After excluding periprocedural myocardial infarctions, no significant differences in major adverse events were observed at 1 year (5.1% vs 2.6%; $P = .09$). Although the study concludes that there is a significant reduction of events in the DCB-treated group, the higher incidence rate of periprocedural myocardial infarction in the control group (counted as an event) complicates the interpretation of the results. Although meta-analyses in this field provide another form of evidence, they are strongly influenced by the weight of this study. Thus, although most conclude that the hybrid strategy reduces events compared with the provisional stenting technique,¹¹⁻¹³ these meta-analyses present the same interpretative limitations as the DCB-BIF study.

Regarding the use of the pure DCB strategy, there is still no evidence available, and we will have to wait for the results of the EBC-DCB study [NCT06822322], which is still in the patient inclusion phase.

In a recent article published in *REC: Interventional Cardiology*, Valencia et al. reported a nonrandomized comparison of patients with left anterior descending/diagonal artery bifurcations treated with the hybrid strategy and a DCB in the SB ($n = 86$) compared with patients treated with the provisional stenting technique ($n = 88$), with a mean follow-up of 3 years.¹⁴ The study concludes that the strategy of DES in the left anterior descending coronary artery and DCB in the diagonal branch reduced clinical events at the 3-year follow-up compared with the provisional DES strategy.

This study is timely, given the ongoing controversy in this field. However, several limitations warrant consideration beyond those

* Corresponding author.

E-mail address: manuelpanalvarez@gmail.com (M. Pan).

✉ @MPAOSS

Online 04 June 2026.

2604-7322 / © 2026 Sociedad Española de Cardiología. Published by Permanyer Publications. This is an open access journal under the CC BY-NC-ND 4.0 license.

already discussed. The use of the proximal optimization technique was notably low, particularly in the control group (only 12%). With the exception of Medina 0,0,1 bifurcations, this maneuver is recommended and generally considered mandatory in current consensus documents from the European Bifurcation Club.¹⁵ The presence of significant differences between the 2 groups penalizes the control group. Another noteworthy finding is the absence of myocardial infarction and target lesion revascularization in the DCB group over a 3-year period. Given the prolonged enrollment period (approximately 6 years), incomplete data capture at the time of analysis cannot be excluded, and some events may have been underreported.

Overall, this study provides relevant insights into a highly topical and debated issue, and the authors should be acknowledged for their effort in comprehensive data collection and long follow-up. Although the impact of DCB on clinical event reduction remains controversial, these findings support the potential clinical utility of this therapeutic strategy in the management of bifurcation lesions.

FUNDING

None declared.

CONFLICTS OF INTEREST

M. Pan declares having received minor payments for lectures from Abbott and Boston Scientific.

REFERENCES

- Scheller B, Hehrlein C, Bocksch W, et al. Treatment of coronary in-stent restenosis with a paclitaxel-coated balloon catheter. *N Engl J Med.* 2006; 355:2113-2124.
- Alfonso F, Scheller B. State of the art: balloon catheter technologies — drug-coated balloon. *EuroIntervention.* 2017;13:680-695.
- Bastante T, Arzamendi D, Martín-Moreiras J, Cid-Álvarez AB; ACI-SEC. Spanish cardiac catheterization and coronary intervention registry. 34th official report of the Interventional Cardiology Association of the Spanish Society of Cardiology (1990-2024). *Rev Esp Cardiol.* 2025;78:992-1003.
- Neumann FJ, Sousa-Uva M, Ahlsson A, et al.; ESC Scientific Document Group. 2018 ESC/EACTS Guidelines on myocardial revascularization. *Eur Heart J.* 2019;40:87-165.
- Lawton JS, Tamis-Holland JE, Bangalore S, et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol.* 2022;79:e21-e129.
- Herrador JA, Fernandez JC, Guzman M, Aragon V. Drug-eluting vs. conventional balloon for side branch dilation in coronary bifurcations treated by provisional T stenting. *J Interv Cardiol.* 2013;26:454-462.
- López Mínguez JR, Nogales Asensio JM, Doncel Vecino LJ, et al. A prospective randomised study of the paclitaxel-coated balloon catheter in bifurcated coronary lesions (BABILON trial): 24-month clinical and angiographic results. *EuroIntervention.* 2014;10:50-57.
- Jing QM, Zhao X, Han YL, et al. A drug-eluting Balloon for the treatment of coronary bifurcation lesions in the side branch: a prospective multicenter randomized (BEYOND) clinical trial in China. *Chin Med J [Engl].* 2020;133:899-908.
- Dohi T, Ishihara T, Kida H, et al. Comparison of drug-coated versus conventional balloons for the side branch of the bifurcation lesion — multicenter randomized controlled study — (OCVC-BIF): Design and rationale. *Cardiovasc Revasc Med.* 2025;81:57-61.
- Gao X, Tian N, Kan J, et al. Drug-Coated Balloon Angioplasty of the Side Branch During Provisional Stenting: The Multicenter Randomized DCB-BIF Trial. *J Am Coll Cardiol.* 2025;85:1-15.
- Rocchetti M, Tua L, Cereda A, et al. Drug-Coated Balloons Versus Non-Coated Balloons for Side Branch Treatment in Bifurcation Lesions: A Systematic Review and Meta-Analysis. *Catheter Cardiovasc Interv.* 2025;106:530-539.
- Dillen DMM, van Beek KAJ, Vermeer AJE, et al. Hybrid drug-coated balloon strategy for coronary bifurcation lesions: a systematic review and meta-analysis. *BMJ Open.* 2026;16:e114024.
- Quevedo-Candela F, Cieza T, Ruhl A, Nolte C, Bertrand OF. Drug-Coated Balloons Versus Drug-Eluting Stents for Side Branch Lesions in Coronary Bifurcations: An Updated Comparative Meta-Analysis. *Am J Cardiol.* 2026. <https://doi.org/10.1016/j.amjcard.2026.03.041>.
- Valencia J, Torres-Mezcua F, Herrero-Brocal M, et al. Drug-coated balloon for the side branch compared with conventional strategy in left anterior descending-diagonal bifurcation lesions. *REC Interv Cardiol.* 2026. <https://doi.org/10.24875/RECICE.M26000574>.
- Burzotta F, Lassen JF, Lefèvre T, et al. Percutaneous coronary intervention for bifurcation coronary lesions: the 15th consensus document from the European Bifurcation Club. *EuroIntervention.* 2021;16:1307-1317.