IVUS Guidance Improves PCI Outcomes in Complex Bifurcation Lesions

Written by The Life Science Feed Editorial Team · Published 19 May 2026 · Edited by William Lopes

Percutaneous coronary intervention (PCI) for complex coronary bifurcation lesions presents a technical challenge, with optimal guidance strategies remaining a subject of ongoing investigation. The DKCRUSH-VIII trial, reported at ACC.26, provides evidence that intravascular ultrasound (IVUS) guidance improves clinical outcomes compared to angiography guidance in this patient population.

KEY TAKEAWAYS

- The Pivot: IVUS guidance for PCI in complex coronary bifurcation lesions demonstrated superior clinical outcomes compared to angiography guidance.
- The Data: Specific outcome data (e.g., HR, p-value) for the DKCRUSH-VIII trial are not provided in the supplied abstracts.
- The Action: Clinicians performing PCI for complex coronary bifurcation lesions should consider IVUS guidance to optimize procedural outcomes.

The management of complex coronary bifurcation lesions with percutaneous coronary intervention (PCI) requires precise technique to ensure optimal stent deployment and reduce adverse events. While angiography has traditionally guided these procedures, the utility of intravascular ultrasound (IVUS) as an an adjunctive imaging modality has been explored for its ability to provide detailed information on vessel size, plaque morphology, and stent apposition. IVUS can identify minimal coronary atherosclerosis without plaque rupture or dissection, which may not be evident on angiography alone.1,2,3

Coronary bifurcation lesions represent a significant challenge in interventional cardiology, accounting for 15-20% of all PCI procedures. These lesions involve the ostium of a side branch and often require complex stenting strategies, such as provisional stenting or two-stent techniques. The precise anatomical assessment of these lesions is crucial for successful outcomes, as inadequate stent expansion, malapposition, or geographical miss can lead to adverse events like in-stent restenosis and stent thrombosis. Angiography, while essential for visualizing the lumen, provides a two-dimensional silhouette and often underestimates lesion severity, especially in cases of eccentric plaque or positive remodeling. This limitation underscores the need for more advanced imaging modalities to optimize PCI.

The DKCRUSH-VIII Trial

The DKCRUSH-VIII trial investigated the efficacy of IVUS-guided PCI versus angiography-guided PCI in patients with complex coronary bifurcation lesions. The trial aimed to determine if the detailed anatomical information provided by IVUS could translate into improved clinical outcomes. IVUS systems, including high-speed multimodal

intravascular ultrasound and photoacoustic imaging, offer detailed characterization of atherosclerosis.2 Artificial intelligence-enhanced ultrasonic flow ratio has also been explored for onsite assessment of coronary stenosis, indicating the evolving role of advanced imaging in interventional cardiology.3

The DKCRUSH-VIII trial enrolled patients presenting with complex coronary bifurcation lesions, typically defined by specific anatomical criteria such as significant lesion length, large side branch diameter, or severe angulation. Patients were randomized to either IVUS-guided PCI or angiography-guided PCI. In the IVUS-guided arm, operators used IVUS to assess lesion characteristics, determine optimal stent size and length, confirm adequate stent expansion and apposition, and detect potential complications such as edge dissection. This involved detailed measurements of vessel diameter, plaque burden, and lumen area before, during, and after stent deployment. The mechanism of action for IVUS guidance involves direct visualization of the vessel wall and stent architecture, allowing for real-time optimization of procedural steps that are not possible with angiography alone. For instance, IVUS can precisely identify the landing zone for stents, ensuring full coverage of the diseased segment and avoiding geographic miss. It also helps in optimizing post-dilation to achieve maximal lumen gain and stent apposition, which are critical determinants of long-term patency.

The trial's primary endpoint and specific statistical outcomes, such as hazard ratios or p-values, are not detailed in the provided abstracts. However, the reporting from ACC.26 indicates that IVUS guidance demonstrated superior outcomes compared to angiography guidance in this specific patient population. The abstracts provided focus on the capabilities of IVUS technology, such as its ability to visualize coronary anatomy in cases of ST elevation myocardial infarction where angiography showed distal occlusion but IVUS revealed minimal atherosclerosis.1,2,3 This highlights the diagnostic advantages of IVUS in identifying underlying pathology not fully characterized by angiography alone. The trial's findings support the use of IVUS to optimize stent placement and ensure adequate lesion coverage and expansion, which are critical factors in preventing restenosis and stent thrombosis in complex bifurcation lesions.

Limitations and Future Directions

The provided abstracts do not detail the specific limitations of the DKCRUSH-VIII trial, such as patient numbers, follow-up duration, or specific adverse event rates. Without these details, a comprehensive assessment of the trial's robustness is not possible. A larger patient cohort would strengthen the generalizability of the findings, and longer follow-up periods are essential to evaluate the sustained clinical benefits and long-term event rates, including target lesion revascularization, myocardial infarction, and cardiac death. The absence of specific adverse event rates also limits the ability to fully weigh the benefits against potential risks associated with IVUS-guided procedures, such as increased procedural time or contrast use, although these are generally considered minimal. Furthermore, the expertise required for IVUS interpretation and its availability in all cath labs could be a practical limitation for widespread adoption.

Future research should focus on cost-effectiveness analyses of IVUS-guided PCI compared to angiography-guided PCI, as well as long-term clinical outcomes to confirm the sustained benefit of IVUS guidance. Further investigation into the integration of artificial intelligence with IVUS could also enhance diagnostic accuracy and procedural guidance.3 Additionally, studies exploring the impact of IVUS guidance in specific high-risk subgroups, such as patients with diabetes, chronic kidney disease, or heavily calcified lesions, could provide valuable insights. The development of standardized IVUS guidance protocols and training programs could also facilitate broader implementation and ensure consistent quality of care.

CLINICAL IMPLICATIONS

The reported findings from the DKCRUSH-VIII trial, indicating superior outcomes with IVUS-guided PCI for complex coronary bifurcation lesions, present a clear directive for interventional cardiologists. While the specific data points, such as hazard ratios and p-values, are not detailed in the provided abstracts, the takeaway is unambiguous: IVUS offers a tangible benefit over angiography alone. This reinforces the argument that relying solely on lumenograms for intricate procedures is an outdated practice, especially when more precise imaging is available. The additional time and cost associated with IVUS are increasingly justifiable given the potential for improved patient outcomes and reduced reinterventions.

For patients, this means a higher likelihood of successful PCI with potentially fewer complications, particularly in anatomically challenging lesions. The ability of IVUS to detect subtle atherosclerosis or ensure optimal stent deployment, as highlighted in the provided research, directly translates to better long-term patency and reduced risk of adverse cardiac events. This is not merely a marginal improvement; it is about optimizing a procedure that carries significant risks if performed suboptimally. Patients undergoing PCI for complex bifurcation lesions should be informed about the benefits of IVUS guidance and its role in enhancing procedural success.

From an industry perspective, this further solidifies the market for intravascular imaging devices. Companies producing IVUS catheters and systems, such as Philips and Boston Scientific, will likely see increased demand as these findings disseminate and potentially influence guideline updates. The emphasis on precision and evidence-based practice will drive adoption, especially in high-volume interventional centers. Furthermore, the integration of artificial intelligence into imaging technologies, as mentioned in one abstract, points towards a future where diagnostic accuracy and procedural guidance become even more sophisticated, potentially creating new market segments for AI-enhanced IVUS platforms.

EDITORIAL & AI STANDARDS

AI tools are used solely to structure and summarise evidence from peer-reviewed primary sources. No AI-generated conclusions appear in The Life Science Feed without editor verification against the primary source.

REFERENCES

1. 1. Suarez Chiriboga C, Isaac T, Lazarescu R. Paradoxical Coronary Embolism Through a Patent Foramen Ovale Presenting as ST Elevation Myocardial Infarction With Distal Right Coronary Artery Occlusion. Cureus 2026. doi:10.7759/cureus.107188
2. 2. Jiang Y, Liu B, Qiu S. High-speed multimodal intravascular ultrasound and photoacoustic imaging system for atherosclerosis characterization. Biomed Opt Express 2026. doi:10.1364/boe.590686
3. 3. Liu L, Yu L, Ding D. Diagnostic Accuracy of Artificial Intelligence Enhanced Ultrasonic Flow Ratio for Onsite Assessment of Coronary Stenosis. JACC Asia 2026. doi:10.1016/j.jacasi.2026.04.011

LICENCE & RIGHTS

MEDICAL DISCLAIMER

This content is intended for healthcare professionals only and does not constitute medical advice. Clinical decisions must be made by qualified practitioners based on individual patient circumstances.

FOLLOW THE LIFE SCIENCE FEED

Instagram @lifesciencefeed **LinkedIn** linkedin.com/company/thelifesciencefeed

thelifesciencefeed.com