Role of Intravascular Imaging in Optimising PCI Outcomes

EMJ Int Cardiol. 2025;13[1]:72-73. https://doi.org/10.33590/emjintcardiol/VCRM1120

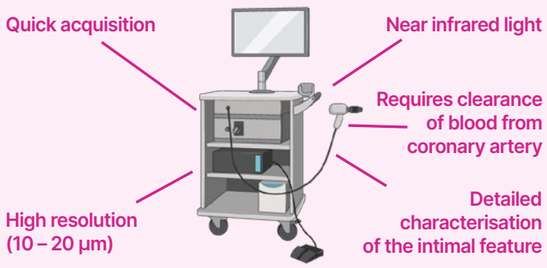
EMJ European Medical Journal

Types of Intravascular Imaging: IVUS and OCT

Techniques like OCT and IVUS are revolutionising PCI guidance.[1]

OCT and **IVUS** provide more detail on plaque composition, vessel size, and stent optimisation.[1]

OCT[1,2]



IVUS[1,2]

Improving PCI Outcomes

Summary of Characteristics[1,2]

	OCT	IVUS
Plaque Characterisation	High-resolution imaging of fibrous, calcific, and lipid-rich plaques	Effective for calcified/fibrotic plaques; measures plaque burden; deeper penetration aids ambiguous caps
Stent Optimisation	Improves stent positioning; detects malapposition and edge dissection	Assesses stent expansion/apposition; measures vessel size and lesion length for optimised deployment
Thrombus Visualisation	Excellent for intracoronary thrombus, especially in acute coronary syndromes	Limited thrombus visualisation
Technical Advantages	Superior surface detail resolution and faster acquisition	Greater tissue penetration for deeper vessel assessment
Special Applications	Less useful for ambiguous caps or subintimal navigation	Guides antegrade/retrograde wire positions; useful in reverse CAR-T and subintimal navigation

Cost Effective?

High Costs
IVUS generally more accessible and cost-effective than OCT.[2]

Operator Expertise
Needed for IVUS, especially in subintimal approaches.[1]

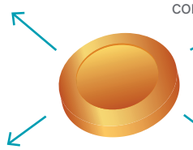
AI Algorithms
May mitgate the need for operator expertise and enhance diagnostic accuracy.[1]

Blood Clearance
Needed for OCT; can cause procedural complications.[1]

Benefit in High-risk Groups

Very cost effective in Type 2 diabetes, chronic kidney disease, distal left main coronary artery lesions, and acute coronary syndromes.[6,7]

These patients are prone to procedural complications like stent thrombosis or restenosis, so stent placement optimisation with OCT/IVUS reduces procedural complications through superior vessel assessment.[6,7]



In patients with complex coronary lesions, intravascular imaging guidance reduced the risk of TVF. The greatest benefits were observed in Stage 3 CKD.[8]

Compared to angiography alone, IVUS-guided PCI has an incremental cost-effectiveness ratio of 3,649 GBP to 5,706 GBP per quality-adjusted life year gained.[9]

IVUS may be preferred in chronic kidney disease as OCT requires additional contrast to clear the blood pool.[1,2]

Real World Data

OCCUPI Trial[3]

1,604 patients underwent PCI with drug-eluting stents for complex lesions

OCT-guided PCI resulted in a lower incidence of MACE at 1 year compared with angiography guidance

ILUMIEN IV Randomized Controlled Trial[4]

1,233 underwent OCT-guided PCI

1,254 underwent angiography-guided PCI

OCT resulted in a larger minimum stent area, but did not significantly reduce target vessel failure at 2 years.

ADAPT-DES Study[5]

2 YEAR OUTCOMES

In **8,582 patients**, IVUS lowered rates of stent thrombosis (0.7% vs. 1.0%), MACE (8.4% vs. 11.2%) and myocardial infarction (2.9% vs. 4.6%).

Other studies with real world data include the **ULTIMATE** trial, the **IVUS-XPL**, trial, and the **RENOVATE COMPLEX PCI** trial.

Abbreviations
CKD: chronic kidney disease; IVUS: intravascular ultrasound; MACE: major adverse cardiac events; OCT: optical coherence tomography; PCI: percutaneous coronary intervention; vs: versus.

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