AI enabled IVUS-Guided PTCA: Advancing Clinical Excellence in Interventional Cardiology

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Introduction

Problem Statement: Angiography is limited in assessing plaque burden and stent expansion.

Goals: Show how IVUS improves accuracy and safety in PTCA.

Key Takeaways: IVUS enhances decision-making, optimizes stent placement, and improves outcomes.

Vision & Strategy

- Centers of Excellence: Position IVUS-guided PCI as standard in complex interventions.
- Strategic Objectives: Reduce complications, improve stent optimization, standardize practice.
- Innovation:AI, fusion imaging, 3D reconstructions with IVUS.

Implementation & Action Plan

- Key Strategies: Adopt guideline-directed IVUS use in complex PCI.
- Methodology: Training, protocols for stent sizing and optimization.
- Technology Integration: Combine IVUS with OCT, physiology, AI.

Current State Analysis

Performance Data: Outcomes with angiography-guided PCI vs. IVUS-guided PCI.
Areas of Concern:
- Underestimation of lesion severity
- Inadequate stent expansion
- Higher restenosis risk

Progress & Impact

- Results & Metrics: Trials (ULTIMATE, IVUS- XPL) show reduced TLR, improved outcomes.

- Lessons Learned:

Operator expertise is critical

Cost and learning curve remain barriers

WHY AI-ENABLED?

- Vessel Imaging with High quality enhanced images
- Complete control to adjust key frame markers on IVUS run to focus on area of interest
- Area & length measurement graphics in the cross-sectional and long view images
- Automated lumen and vessel measurement to aid in diagnosis and planning
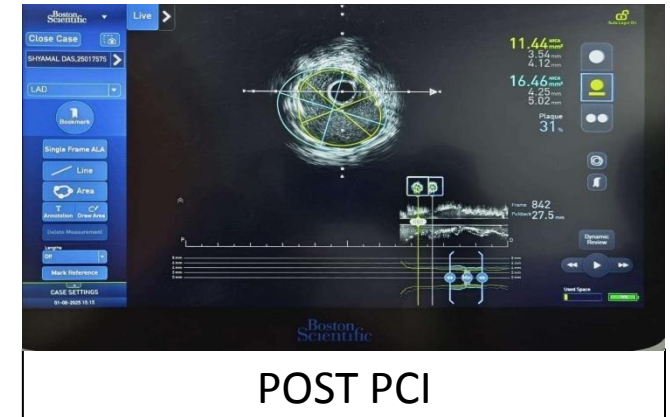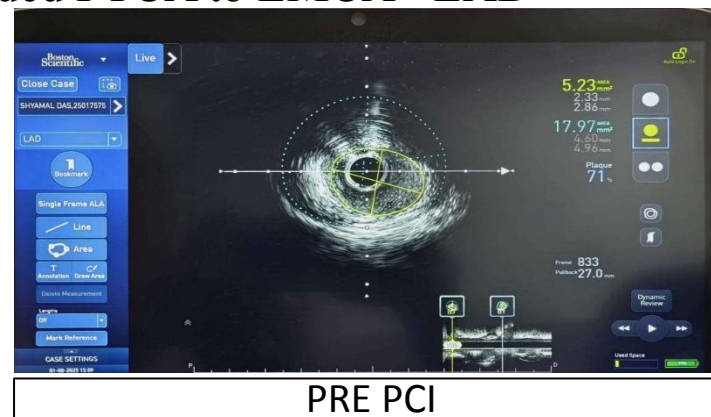- Rule out artifacts, improves accuracy

Patient 1:

- Presentation: Acute coronary syndrome
- Diagnosis: Critical coronary artery disease with Left Main coronary artery involvement
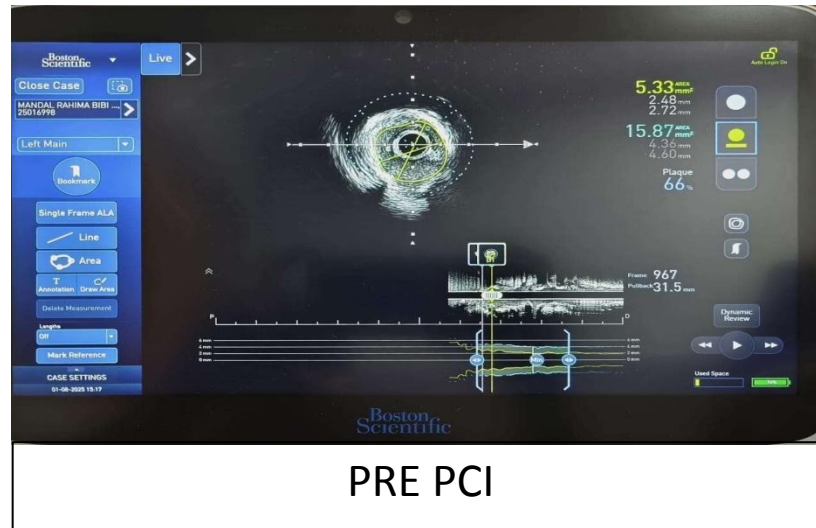- Treatment: IVUS guided PTCA to LMCA-LAD and to RAMUS and OM1

PRE PCI

POST PCI
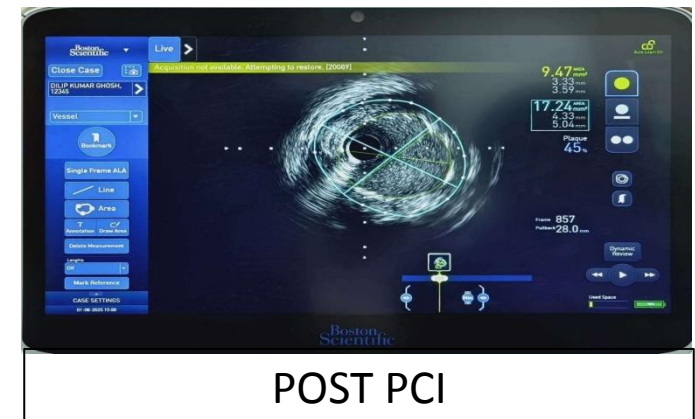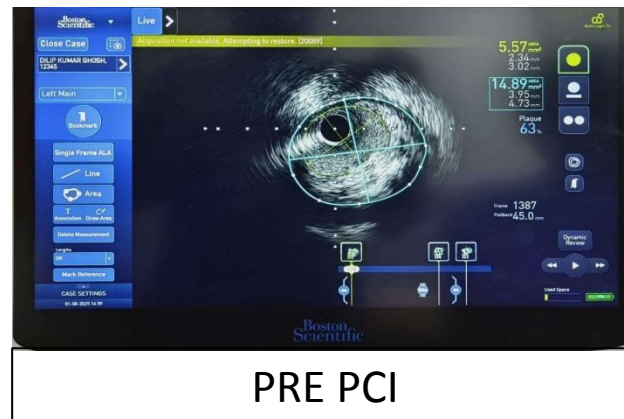
Patient 2:

- Presentation: Recent Antero septal wall myocardial infarction
- Diagnosis: Critical coronary artery disease in LAD with LMCA involvement
- Treatment: IVUS guided PTCA to LMCA - LAD
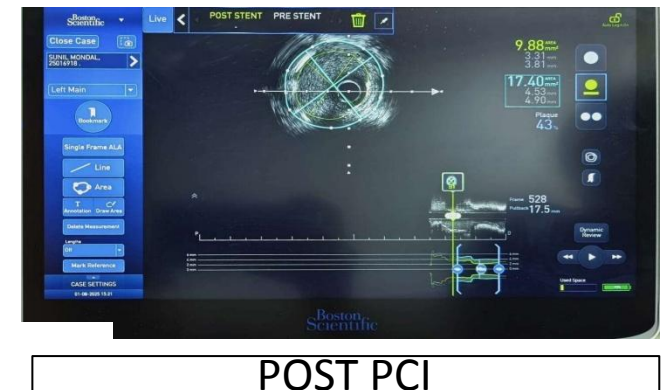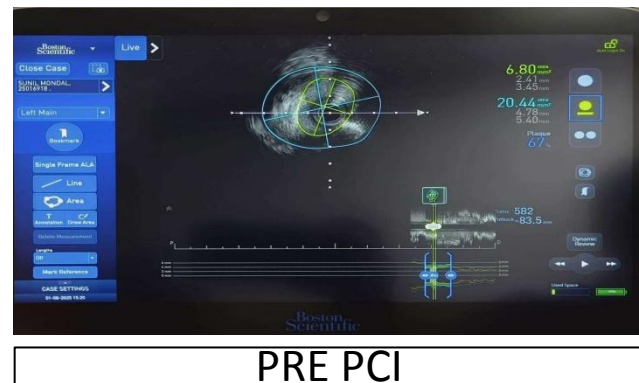

PRE PCI

POST PCI

Patient 3

- Presentation: Old ACS
- Diagnosis: Critical coronary artery disease in LAD with LMCA involvement
- Treatment: IVUS guided PTCA to LMCA-LAD done

PRE PCI

POST PCI

Patient 4

- Presentation: Chronic Coronary syndrome
- Diagnosis: Critical coronary artery disease in Left Main and RCA
- Treatment: IVUS guided PTCA to LMCA and RCA

PRE PCI

POST PCI

Month	PTCA	IVUS
June-2025	118	20
July-2025	90	10
August-2025	107	26

CONCLUSION

- Summary: IVUS-guided PCI reduces complications, improves precision.

- Future Outlook: Wider adoption, cost reduction, integration with AI imaging.

- Call to Action: Adopt IVUS-guided PCI as standard of care in complex interventions.

SMART GOAL STATEMENT

To integrate AI-enabled IVUS technology in all PTCA procedures in upcoming months to reduce stent malapposition by at least 20% and improve post-PCI minimal luminal area by at least 15% compared to baseline IVUS – guided PTCA, through staff training and workflow optimization.