Cath Lab Digest

A product, news & clinical update for the cardiac catheterization laboratory specialist

CATH LAB SPOTLIGHT

The Heart Institute at Huntsville Hospital

Arin Hornsby, RN, BSN
Director of the Heart Institute (Cardiac Pre/Post Recovery, Electrophysiology Lab, Cardiac Catheterization Lab, Cardioversion/TEE Lab)
Huntsville, Alabama.

Tell us about your institution and cath lab.

Huntsville Hospital is a community-based, not-for-profit hospital that is part of a 13-hospital system and is a regional referral center. It is located in one of the fastest-growing metropolitan areas in Alabama, employing over 18,000 employees across northern Alabama. The 881 patient beds at the Huntsville Hospital main campus continue to maintain The Blue Cross Distinction Centers in Cardiac Care. In addition to being accredited by the Joint Commission, the hospital has received numerous recognitions for excellence in patient care for cardiac services.

Since our community is growing at a rapid pace, so must our cardiac service line.

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In This Issue

In Transition: Early-Career Interventional Cardiologists

Morton J. Kern, MD

This editor's page was stimulated by Rymer et al[1], who reported on cath lab procedure volumes and outcomes among early-career interventional cardiologists. In an accompanying editorial, Shah et al[2] help us understand what we can do to assist our younger, less-experienced colleagues navigate their first years without undue problems and risk to patients.

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Talking With the ACC's New President: Cathie Biga, MSN, FACC

"My heart is still in the cath lab, always and forever," says Cathie Biga, MSN, FACC, the 2024-2025 President of the American College of Cardiology. "[Even as] VP of a hospital, I used to go to the cath lab just to get my sanity back."

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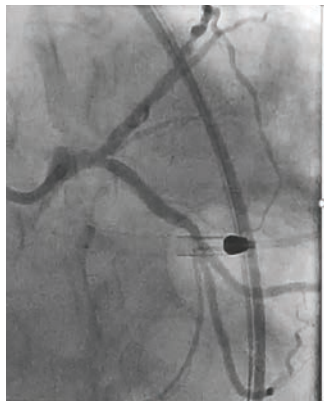
CASE REPORT

Making Complex Simple

Ori Waksman, MD; Hayder Hashim, MD, FSCAI



Revascularization of patients with unprotected left main disease poses a significant challenge due to the heightened risk of mortality and periprocedural hemodynamic collapse. Historically, such patients were managed surgically via coronary artery bypass grafting (CABG); however, randomized controlled trials (RCTs) demonstrating similar mortality and long-term outcomes with percutaneous coronary intervention (PCI) have shifted contemporary practice trends and broadened the use of unprotected left main percutaneous coronary intervention (ULM-PCI).

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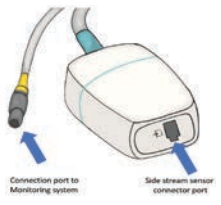
CATH LAB REVIEW

Waveform Capnography: Part of Comprehensive Vital Sign Monitoring

Richard J. Merschen, EdS, RT(R)(CV), RCIS; Madalynne Ruth, RT/ICVT student



Comprehensive vital sign monitoring is an essential patient safety requirement in the cath lab and includes invasive and non-invasive blood pressure, electrocardiogram (ECG), heart rate, and pulse oximetry. Another vital sign, used by anesthesia, respiratory therapy, and other care providers, is waveform capnography. Waveform capnography is a continuous, non-invasive measurement of a patient's ventilation effort and measures the amount of carbon dioxide (CO_2) in exhaled air.[1,2] It consists of two major elements: capnometry and waveform capnography.[1,2] Capnometry is the quantitative numerical value of CO_2 concentration, and focuses on end-tidal CO_2 ($ETCO_2$). $ETCO_2$ ranges from 35-45 mmHg, the same as CO_2 in a blood gas sample. Waveform capnography is a square-shaped graph measurement with slightly rounded corners that measures the entire respiratory cycle[2] (Figure 1). On the vertical axis of the capnography waveform, $ETCO_2$ is captured at the top right side of the square, which represents end expiration (Figure 1). Measuring the $ETCO_2$ on capnography is similar to measuring a hemodynamic pressure that has respiratory variance, with the measurement taken at the same point of end expiration (Figure 2).

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Making Complex Simple

Ori Waksman, MD; Hayder Hashim, MD, FSCAI

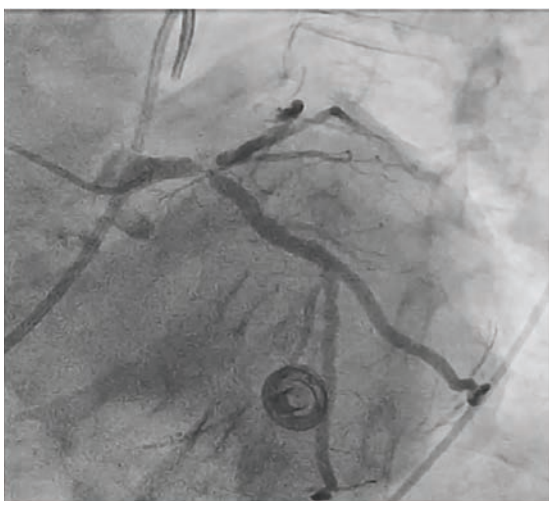

Figure 1. Coronary angiography revealed a co-dominant system, calcified Medina 1,1,1 critical left main disease, and ostial right coronary artery disease.

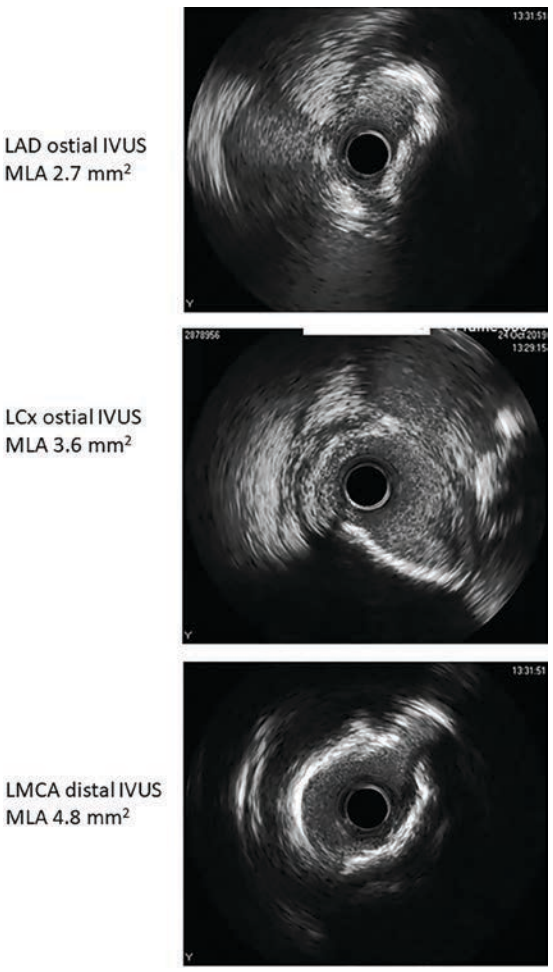

Figure 2. Intravascular ultrasound (IVUS) demonstrated dense calcification at the ostial left circumflex (LCx) and left anterior descending (LAD) coronary arteries. However, the LCx calcium was found to be fractured and extended to less <180 degrees, while the LAD calcification was severe and concentric at ~320 degrees.

As the role of PCI expands, in order to address the challenges posed by difficult anatomy and complex lesion subtypes, interventional cardiologists and cardiac catheterization lab staff should be made aware of the array of available and innovative devices at their disposal.

To illustrate this point, we present the case of an 86-year-old male with diabetes mellitus, paroxysmal atrial fibrillation (anticoagulated with apixaban), hypercholesterolemia, and left bundle branch block who presented to the emergency department with acute onset chest pain, shortness of breath and hypotension with a blood pressure of 88/62 mmHg. The patient was diagnosed with non-ST-elevation myocardial infarction (NSTEMI) and was emergently transferred to the cardiac catheterization lab, where the patient underwent left and right heart catheterization. Right heart catheterization demonstrated low cardiac output with elevated filling pressures. Coronary angiography revealed a codominant system, calcified Medina 1,1,1 critical left main disease, and ostial right coronary artery (RCA) disease (Figure 1).

Given these findings and systemic hypotension, an intra-aortic balloon pump (IABP) was placed and the patient was transferred to our hospital for coronary artery bypass grafting (CABG) evaluation. Due to advanced age, high frailty index, and patient preference, he was not considered to be a good surgical candidate and within 24 hours, he was brought back to the cardiac catheterization lab for intervention.

Planning

We opted to upgrade the IABP for an Impella CP (Abiomed) in order to provide greater hemodynamic support for this ULM-PCI. Distal left main Medina (1,1,1) bifurcation classification was to be reassessed using intravascular imaging.

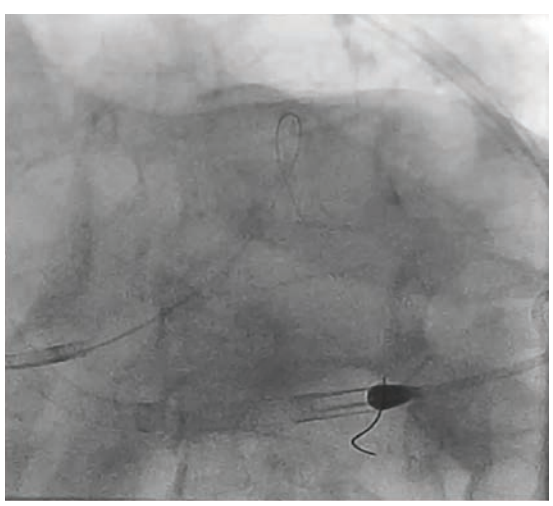

Figure 3. Orbital atherectomy of the LAD.

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Access

Due to the challenging anatomical and atherosclerotic peripheral vasculature, a single-access technique was preferred. A Perclose ProStyle closure device (Abbott Vascular) was deployed in a pre-close fashion, then the 8 French (F) IABP sheath was upgraded to a 14F short Impella CP sheath. Using a micro-puncture access kit, the hemostasis diaphragm of the 14F sheath was then accessed and a 7F 45cm PINNACLE® DESTINATION® Guiding Sheath (Terumo Interventional Systems) was inserted.

Intervention

A Launcher 7F Extra Backup (EBU) 3.5 (Medtronic) catheter was used to engage the left main coronary artery. Once the left main was successfully engaged, both limbs of the bifurcation, the left anterior descending (LAD) and left circumflex (LCx) arteries, were wired with the blue and white RUNTHROUGH® NS Izanai Coronary Guidewires (Terumo Interventional Systems). The different colors of the same quality Runthrough NS Izanai wires (ie, a white wire was used for the LAD and a blue wire was used for LCx) are essential in bifurcation cases to help differentiate branches and minimize procedural confusion.

Given angiographic severe calcifications and the potential need for atherectomy, we opted to use Opticross HD intravascular ultrasound (IVUS) (Boston Scientific) for a better qualitative assessment of the lesion.

In order to facilitate delivery of the IVUS catheter, a 1.5 mm RX Takeru™ PTCA Balloon Dilatation Catheter (Terumo Interventional Systems) was used to predilate the ostium of the LCx and LAD, respectively. IVUS demonstrated dense calcification at the ostial LCx and LAD. However, the LCx calcium was found to be fractured and extended to less than <180 degrees, while the LAD calcification was severe and concentric at ~320 degrees (Figure 2).

Based on the above assessment with IVUS, we elected to proceed with orbital atherectomy (Diamondback 360 orbital atherectomy system, Abbott Vascular) of the LAD, before which the LCX wire was removed and the LAD wire was swapped for a ViperWire with Flex Tip (Abbott Vascular) using a 1.7F distal tip FINECROSS® M3 Coronary

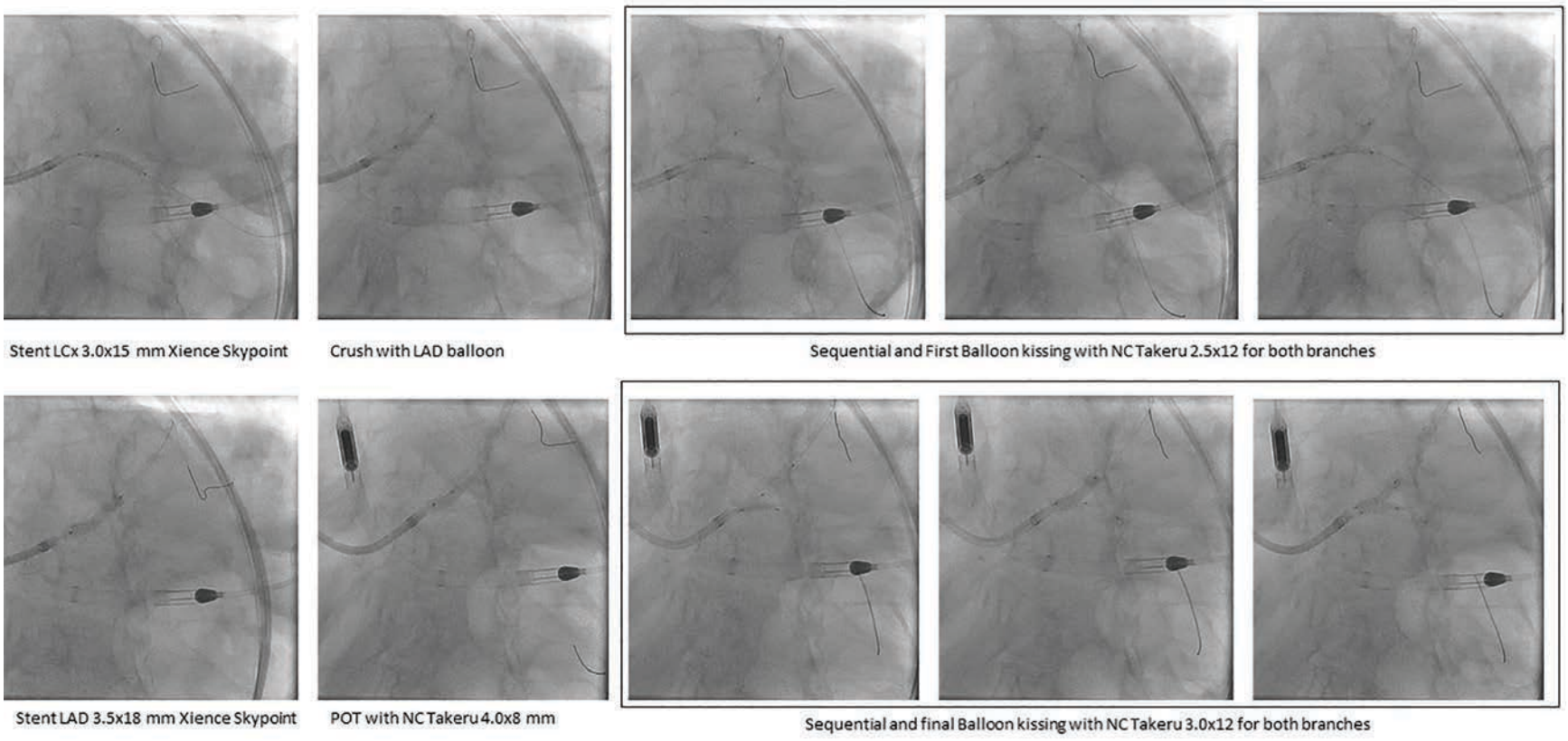

Figure 4. **The sizes and steps of the double kissing (DK) crush technique.**

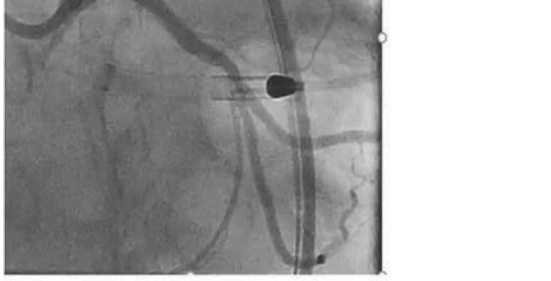

Figure 5. **IVUS assessment demonstrated well-opposed and well-expanded stents from the LAD and LCx into the distal left main coronary artery.**

Micro-Guide Catheter (Terumo Interventional Systems). Orbital atherectomy was performed with 4 passes at 80,000 RPM. The LAD (Figure 3) was treated with a 3.0 mm x 15 mm Takeru NC balloon. The LCX was rewired with the same Runthrough wire and a double kiss (DK) crush technique was used to stent the LM distal bifurcation with two Xience Skypoint drug-eluting stents (Abbott Vascular) (Figure 4 highlights the sizes and steps of the DK crush technique). IVUS assessment demonstrated well-opposed and well-expanded stents from the LAD and LCx into the distal LM (Figure 5).

At the conclusion of the procedure, the Impella CP was removed and the 14F sheath was removed over the wire. The pre-deployed ProStyle closure device was fully deployed and enforced with an 8F ANGIO-SEAL® Vascular Closure Device (Terumo Interventional Systems) with instantaneously effective hemostasis.*

**Angio-Seal Vascular Closure Device is not indicated for use in hybrid vascular closures as used in this article. Refer to the product labels and packaging insert for complete warnings, precautions, complications, and instructions for use.*

Take-Home Points

It is imperative to have full knowledge and understanding of available equipment and technology in the catheterization lab to ensure smooth sailing and successful interventions in complex clinical scenarios. While the use of intravascular ultrasound confirmed Medina (1,1,1) angiographic classification, it was essential to select the right option for plaque modification and sizing of the vessels. IVUS also highlighted the importance of post intervention assessment of deployed stents, especially in critically important anatomical locations. ■

This case is sponsored by Terumo Interventional Systems.

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Read the case by Waksman and Hashim online:

Ori Waksman, MD[1]; Hayder Hashim, MD, FSCAI[2]

[1]Fellow, Cardiovascular Disease MedStar/Georgetown University; [2]Assistant Professor, Division of Cardiology, Georgetown University; Interventional Cardiologist – Medstar Washington Hospital Center, Washington, D.C.