Cath Lab Digest

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

CATH LAB SYSTEMS

Long Island Jewish Medical Center: A New Cath Lab Offers Reduced Radiation Exposure to Better Serve Patients and Team Members

CLD talks with Alexander Lee, MD.

Can you tell us about your hospital and share some details about the updated cath lab?

Long Island Jewish Medical Center (LIJ), part of Northwell Health, is in Queens, New York, and is a tertiary hospital with 600-plus beds. We don't have cardiothoracic surgery on site, so we send our surgical cases to our sister hospital, North Shore University Hospital, just a few miles down the road. LIJ has all the necessary capabilities in performing primary percutaneous coronary intervention (PCI) including cardiogenic shock cases and most complex PCI, but for other high-risk cases like an unprotected left main or when there is a need for more advanced mechanical circulatory support, those patients are typically transferred to North Shore Hospital.

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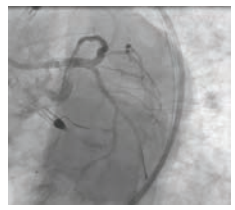
CLINICAL UPDATE

Data-Driven Decisions for Left Main Revascularization

CLD talks with Brian A. Bergmark, MD



Dr. Bergmark presented during the session "How Do I Treat Left Main Disease in 2024" at the American College of Cardiology Scientific Session.

Can you tell us about left main disease?

Left main disease obviously is clinically important for most people, as the left main coronary artery typically provides at least 80% of the blood supply to the heart. It is important to note that when we are talking about left main percutaneous coronary intervention (PCI), it is usually implied that we are talking about *unprotected* left main PCI, where the patient has not had prior coronary artery bypass graft (CABG) surgery with a graft to the left anterior descending (LAD) or left circumflex artery.

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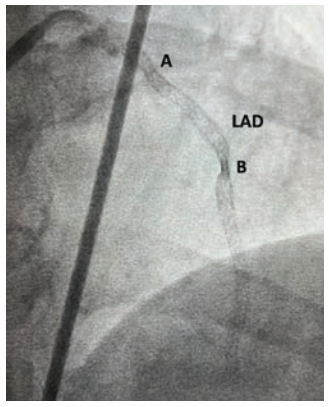
CASE REPORT

Successful Dilation of a Heavily Calcified LAD With 3 Layers of Under-Expanded Stents With the OPN NC Super High-Pressure Balloon

Vikramjit Purewal, DO; Raehan Ahmed, DO; Chad F. Goerndt, RT(R); Nachiket J. Patel, MD

Severe calcification of an obstructive coronary lesion can adversely impact its successful dilation during stent implantation, increasing the likelihood of stent under-expansion, which is associated with higher rates of restenosis and repeat revascularization.[1,2] Herein, we describe a patient with persistent anginal symptoms after undergoing placement of 4 drug-eluting stents to a heavily calcified left anterior descending (LAD) artery with severe stent under-expansion, treated with the OPN NC super high-pressure balloon (SIS Medical AG).



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Data-Driven Decisions for Left Main Revascularization

CLD talks with Brian A. Bergmark, MD

We know that if left unrevascularized, people with left main disease do not do well. The two major areas where we have relevant data are first, whether someone should undergo revascularization with PCI versus surgery, and second, for people who are undergoing PCI, how we can use physiology, intracoronary imaging, and calcium modification to get an optimal PCI result.

What do the data tell us?

The first challenge is figuring out whether someone needs PCI versus CABG. Here is where we have the most robust data, as we reviewed at the ACC Scientific Session this year.[1,2] At times, the decision will be relatively straightforward, as some patients will clearly not be a candidate for either PCI or CABG. For example, someone who is quite elderly with multiple comorbidities may have unacceptably high risk with bypass; conversely, for a young patient with diabetes and multivessel disease in addition to the left main, most people would agree that this patient probably should have CABG. However, there exists a large patient population for whom the choice is not as clear. We do have some randomized trial data for these patients from SYNTAX, PRECOMBAT, NOBLE, and EXCEL, four trials reporting from the early days of drug-eluting stents up through more modern, second-generation stents. There has been a great deal of discussion about different mortality outcomes in these trials and how to interpret that, differences in choice of composite primary endpoints, and differences in definitions for some events, including procedural myocardial infarction (MI), all of which have led to a fair amount of disagreement about how to make these decisions.

We recently took part in an individual patient data meta-analysis, working together with a group of independent investigators and the trial principal investigators. The top-line result is that among these 4,394 patients, there was no significant mortality difference at five years between PCI and CABG. With CABG, there is a lower risk of spontaneous MI and a lower risk of repeat revascularization, and with PCI, there is a lower risk of early stroke. The real challenge is taking the small number of hard endpoints for which we have data and then integrating these data into determining the overall right path for the patient, which also needs to take into account their comorbidities, local expertise in terms of who is doing what procedure for the patient, other non-coronary anatomical issues, and patient preferences and values.

What recommendations can you make as a result of the meta-analysis?

The meta-analysis informs the conversations with patients, because for many of these people for whom you do have equipoise, it means a trade-off. PCI is easier to get through upfront. You often go home the same day, but you are more likely to be back in the cath lab more in the future. Bypass surgery is more to go through upfront, but you will get a more durable and sometimes more complete result. That is what much of the discussion hinges on for these patients who are represented by the trials and it is a conversation with the patient to understand their values, where they are coming from, and to think about what is best for them at this point in their life. Separate from the meta-analysis, for those patients who do undergo PCI, it is absolutely critical to perform a good PCI, meaning the use of intracoronary imaging, physiology as needed, and calcium modification by whatever means necessary to optimize the stent and obtain a good long-term result.

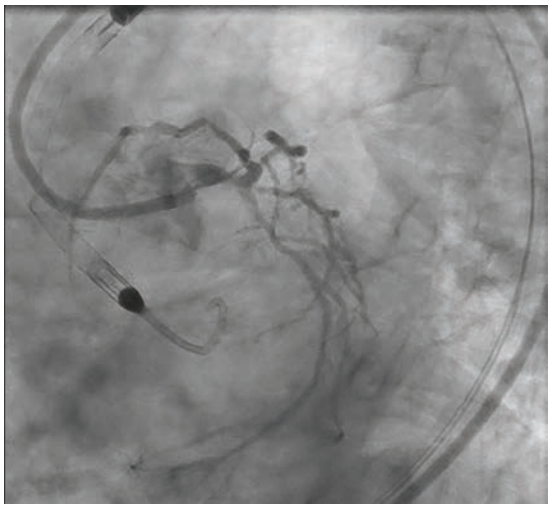

Figure 1. Pre procedure.

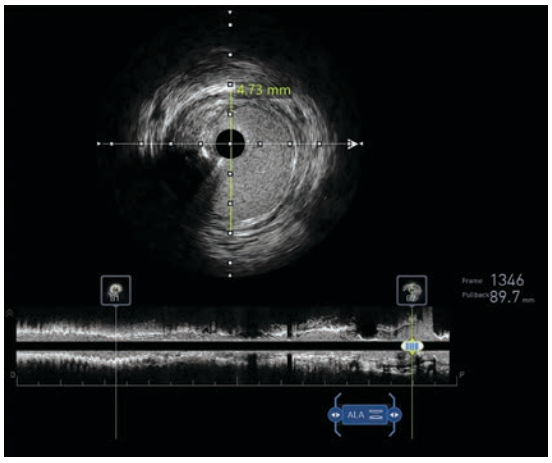

Figure 2. Intravascular ultrasound.

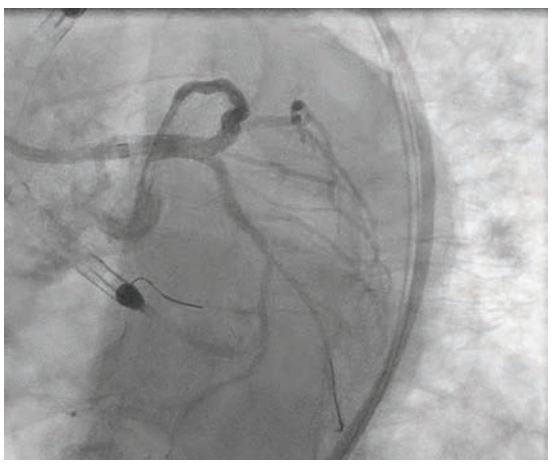

Figure 3. Final result.

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Are there concerns that are unique to left main PCI?

Yes, there are various axes of considerations. One that is commonly discussed is whether mechanical support is needed. Here we are really lacking in data and it comes down to judgment on the part of the operator. We have to take into account the ejection fraction, as well as hemodynamics and filling pressures regardless of the ejection fraction. Is there severe left main bifurcation disease that

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requires rotational atherectomy or is this just a simple ostial left main lesion? All of that goes into the hemodynamic concerns. For bifurcation technique, is it reasonable to use a provisional technique or do you need a two-stent technique? If so, what should that be? The best data we have support DK crush as the typical routine approach to the bifurcation. And then, of course, intracoronary imaging. We don't have a lot of data specifically for the left main, but we know from many randomized trials with complex coronary disease, broadly defined, that people do better after PCI using intracoronary imaging. The data are overwhelming at this point. Technique is important, however, with optical coherence tomography (OCT) or intravascular ultrasound (IVUS). What exactly did you do with the data? My own practice has evolved significantly. We took part in a project called LightLab where a clinical field engineer was present in the cath lab with us. During angiography, not just for a left main, but for any PCI we were doing, we would estimate, based on the angiogram, the reference vessel diameter distally and proximally, the lesion morphology, and the lesion length, among other variables. Then we would do OCT and repeat the same evaluation. It was humbling to realize how difficult it is to be accurate with an angiogram alone. Today, that pre-PCI OCT or IVUS is hugely important. You can plan the entire procedure. You know how big the vessel is supposed to be, you know what the 1-to-1 balloon is and can see if the balloon is expanding appropriately. The historical view of imaging is that it is something done at the end of the procedure to check your work. The modern view is very different. You do intravascular imaging up front, plan your procedure and execute it, and then, on the back end, use it to make sure you have obtained the expected result.

What is the pathway that a typical left main disease patient might follow pre procedure?

It varies, depending on the clinical circumstances, the institution, and the data available ahead of time. The classic routine is where a patient comes in having an abnormal stress test as an outpatient, we cath them, find left main disease, and then, for a stable patient, typically stop to have a conversation. It is essential to have a multidisciplinary discussion, and various institutions involve various people. What's important is to have input from the interventional cardiologist, the surgeon, the patient and their family, and if there is a general cardiologist taking care of the patient, to get their assessment as well. Other places might involve pulmonary and anesthesia, geriatrics, etc.

Many patients come to the cath lab now with a computed tomography (CT) scan, which also provides more of an opportunity to have a conversation ahead of time. Still, for the most part, you need to know the exact coronary anatomy from the angiogram in order to have an informed discussion, unless it is a scenario forcing you to proceed, such as when the patient is in shock with an MI. But most of the time, you would like to have a conversation.

What do we know about how left main PCI patients do post procedure?

Looking at the trial data, the mortality rate out to 5 years is about 10%-11%, with no meaningful difference between PCI and CABG, but there are subgroups that are at heightened risk. Patients with acute coronary syndrome are at higher risk. Their rates of early cardiovascular death are, not surprisingly, higher, but there was no significant interaction in the trials with the treatment modality, so we didn't conclude that either PCI or CABG was specifically better in that scenario. Similarly, diabetic patients remain an area of high interest and, also not surprisingly, these patients also do worse collectively in the long run. For those patients who were enrolled in the trials, which did not by and large include all-comers but selected patients the multidisciplinary team was willing to randomize, there was no interaction with diabetes status. Meaning, diabetes specifically didn't identify people who would do better with one modality or the other.

Should left main PCI remain a 'specialty' intervention?

I learned during the ACC session that only a very small number of interventional cardiologists in the United States do even one left main PCI a year. It is a scenario with some distinct considerations regarding things like hemodynamic support. Additionally, the consequences of doing the PCI well (or poorly) are magnified compared to perhaps just treating a PDA, for example. I do think left main disease is a situation where it makes sense to have the PCI done by operators who are doing left main PCI frequently and are familiar with the technique to do it well.

Any devices on the horizon?

In terms of mechanical support, there are multiple devices in development that offer at least the possibility of being lower profile and therefore potentially lower risk for vascular injury. In terms of intracoronary imaging, there is a huge amount of development right now in terms of other ways of approaching the catheters, trying to make them better, higher resolution, easier to deliver, and incorporating artificial intelligence to aid with the interpretation of the data. There is a lot coming that will continue to evolve the practice of left main PCI. ■

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2. Gaba P, Christiansen EH, Nielsen PH, Murphy SA, O'Gara PT, Smith PK, Serruys PW, Kappetein AP, Park SJ, Park DW, Stone GW, Sabik JF, Sabatine MS, Holm NR, Bergmark BA. Percutaneous coronary intervention vs coronary artery bypass graft surgery for left main disease in patients with and without acute coronary syndromes: a pooled analysis of 4 randomized clinical trials. *JAMA Cardiol*. 2023 Jul 1; 8(7): 631-639. doi:10.1001/jamacardio.2023.1177

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