Detect more

Philips Allura XperSwing offers a new angle on coronary angiography

Who/where
Dr. Marino Labinaz
Bob Scherer MRT (R)
University of Ottawa Heart Institute
Ottawa, Ontario
Canada

Challenge
To improve the University of Ottawa Heart Institute's ability to diagnose and treat coronary artery disease

Solution
Outfit Philips Allura Xper FD10 interventional X-ray system with new Allura XperSwing technology

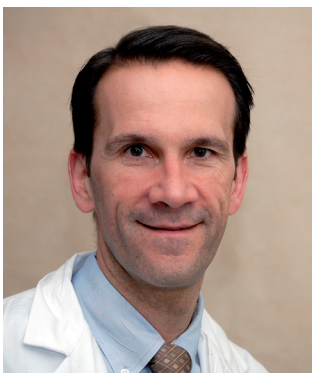
The University of Ottawa Heart Institute uses dual axis rotational angiography to help diagnose coronary artery disease (CAD) and plan for interventions.

How are physicians at The University of Ottawa Heart Institute reducing cine X-ray dose by up to 75% and contrast by as much as 34% while at the same time generating new and useful views of the coronary arteries? They're using Philips XperSwing, a dual axis rotational angiography technique.

According to Dr. Marino Labinaz, Director of Cardiac Catheterization Laboratories and Interventional Cardiology Program at the University of Ottawa Heart Institute, "XperSwing allows me to diagnose patients more accurately and better plan their interventions. It reduces contrast and radiation. And it is easy and simple to use."

UOHI, a center of cardiac excellence

"We have four cardiac cath labs," says Labinaz when describing the interventional program. "On an annual basis, we do approximately 6000 diagnostic angiograms and around 2800 percutaneous coronary interventions based on those diagnostic exams. We also implant percutaneous aortic valves, do septal closures and all the usual interventional cardiac cath lab work."


Marino Labinaz, MD

The University of Ottawa Heart Institute (UOHI) is Canada's largest cardiovascular health center and the only institution of its kind in the region. In addition to extensive catheterization capabilities, UOHI excels in such image-based disciplines as electrophysiology, cardiac CT and general X-ray.

Reflective of its leadership position, UOHI continues to acquire technologies that support its talented staff. In fact UOHI was the first institution in North America to put Philips XperSwing to daily clinical use, outside of Philips development sites in the US.

PHILIPS
sense and simplicity

"We can see anatomy we didn't see before or didn't appreciate before. Now it's quite obvious."

Bob Scherer

"We installed XperSwing in Cath Lab #2 where we have our new Philips Allura Xper FD10 X-ray system," says Charge Technologist, Bob Scherer. "And immediately, it had physicians thinking differently."

Designed to advance current techniques

Coronary angiography is traditionally performed by acquiring multiple stationary views at different angles around the heart. A complete X-ray run is performed at each location. Experience shows these procedures deliver reasonable results, but require a fairly significant amount of contrast and radiation dose. Bob Scherer explains, "On a typical left heart cath for diagnostic purposes, the cardiologist will do anywhere from eight to twelve runs – roughly six to eight on the left and maybe two to four on the right – then possibly a left ventricular injection as well. Every time we move the detector to a new spot, we need to set up the shot. There's fluoro time involved to make sure the catheter tip is properly positioned and a quick puff of contrast to be sure it's still engaged. Then comes the cine run, and we're on to the next position."

"In this way a lot of contrast is used, not necessarily to gain actual coronary data, but simply to make sure the catheter is still in place. A lot of cine fluoro time is racked up as well because we're constantly doing a new setup of the shot." An alternative to stationary imaging is rotational angiography, but as Dr. Labinaz points out, it never really caught on at UOHI. "We simply did not find that a single plane rotational view offered us a big advantage," he says.

Philips researchers imagined another way. They believed that the rotational capabilities of the Allura C-arm could be harnessed to move in a dual axis fashion, passing across a set of traditional stationary angles in a single movement. The expectation was better appreciation of the coronary tree along with a possible reduction in contrast load and X-ray dose. XperSwing was born.

Changing the perspective

"Coronary atherosclerosis is an eccentric process," notes Labinaz. "In our stationary images we pick up a bulk of them. But there's a percentage that we don't. And that's where the XperSwing technology really helps."

During an XperSwing dual axis rotation, the C-arm rotates with a curved trajectory around the patient, thereby imaging in all desired anatomical views in a single run. Clinicians get the stationary views they are familiar with, plus all the iterative views in-between. "When you do stationary angiograms," says Labinaz, "you'll go from say a 30 degree angle to a 45 degree angle. You'll take a picture of one and then the other. But with XperSwing, you actually swing through 30 degrees to 45 degrees and with every frame in between you pick up many different angles."

He adds, "It gives you a sense of getting an infinite number of angles, which helps you detect lesions that you normally would not have detected."

By acquiring images during travel between point A and B, physicians see a multitude of views that previously were not available to them. "Physicians are so used to looking at arteries in one position," says Scherer. "They have always used standard angles. Now with XperSwing it's dynamic. They're looking at a dual axis and all the motion going across it."

> "By doing a swing, we can, with just two injections, interrogate both coronary arteries and get a diagnosis very quickly."
>
> *Dr. Marino Labinaz*

Timing and trajectories

Acquiring the best quality images along a curved trajectory requires close coordination between team members. "What we've discovered with the XperSwing is the critical timing between the start of the injection and the start of the run," says Scherer. To assure a successful run, the interventional team at UOHI has developed a "3-2-1" count down strategy. The goal of the count down is twofold – to ensure patient/staff safety and to optimize the contrast bolus. On the count of "three" the staff is warned to stand back. At "two" the auto-injector begins to deliver contrast. At "one" the C-arm is triggered.

"We want to properly opacify the coronary arteries," Labinaz states. "We don't want to be chasing the dye. As soon as I touch the pedal, I want the coronary arteries to be full of dye so we get the best images. When the dye is delivered evenly over the entire swing, the imagery is beautiful. An auto-injector helps give us a nice neat dose and a smooth injection of contrast," adds Scherer.

XperSwing offers a number of preprogrammed trajectories. Each one has a different time frame that corresponds to the degree of movement of the C-arm. There are three dedicated programs for the left coronary and two for the right.

"The size of the patient really dictates which program we use," Scherer explains. "If we have a barrel-chested patient we can't use the program with extreme angles, so we select the one with shallower angles."

Acceptance of XperSwing technology by the interventional teams at UOHI has been strong. Labinaz acknowledges the interest, "When we installed the XperSwing it became very popular, very quickly. Its advantages were self-evident right from the get-go."

Diagnosis and interventional planning benefits

The additional views provided by XperSwing can boost diagnostic confidence and impact planning for follow-on percutaneous coronary interventions (PCI). According to Bob Scherer, "We're seeing better and different views of bifurcations – many we've never seen before. They are routinely there now so it's helping us to ascertain lesions and determine if they are extending into a bifurcation. In a sense we are getting more information than ever before."

Dr. Labinaz has discovered that new angles can expose areas of disease previously hidden. He says, "We've had many patients where we've actually found stenosis that would not have been evident on our stationary images even though we do multiple orthogonal traditional images. Some of these stenoses are so eccentric or hidden by the side branches, that it's only revealed with the unusual angles of XperSwing. You can actually diagnose lesions that were not visible before."

Analysis of a new angle presents unexpected diagnostic opportunity. "It's logical to think that previous to XperSwing we would not have considered that angle," suggests Scherer. "We would not have searched it out because it was an angle no one was trained to use."

The advantage of XperSwing is apparent in this example shared by Dr. Labinaz. "We had a patient come to us where another angiographer had done an angiogram and thought that there was a lesion in the middle of the left anterior descending artery. He called it about a 50% stenosis. We had been asked to do an intervention of the right coronary artery, but were suspicious about the LAD. We said 'let's do a swing on the left coronary system'. And low and behold, on an angle that neither he nor I would have thought of taking, it showed a 90% stenosis in the LAD. Needless to say, the treatment plan for the patient changed completely."

When an XperSwing assists in a diagnosis of CAD, that same run can later be pulled from PACS and used to help plan the treatment procedure. The angle that best illustrates the stenosis can be quickly recalled. "We are able to select that angle," says Scherer, "use it as a reference, program it in and drive the C-arm to that particular location. It actually saves time with PCIs."

Labinaz concurs, "When we can put the camera back at that specific angle and take a stationary image, it allows us to get more detailed information about the lesion and the side branches to better plan our intervention. This has been a huge advantage of the XperSwing program that we didn't realize in the beginning."

Bob Scherer,
Charge Technologist

Less contrast, less X-ray dose

Unexpected views of the coronary tree are but part of the story. An XperSwing rotation also saves on contrast and X-ray dose over conventional angiography. Scherer observes, "With XperSwing we're down to just two or three contrast injections – one for the left, one for the right and, if necessary, one for a stationary LV."

How does the actual contrast load compare? According to Scherer, "In the left coronary, if we do eight injections and each one uses 8mL of contrast, that's 64mL for the left alone." Add that to four runs on the right, plus an optional LV, and total contrast for a stationary angiogram reaches more than 110mL. Conversely, the UOHI team uses 15 to 17mL of contrast for a single left coronary XperSwing (depending on the selected trajectory). In sum, the typical contrast load for a complete coronary exam using XperSwing averages around 77mL. That's a reduction of about 34%.

Where patients and staff really benefit is in the reduction of X-ray dose. "The thing that surprised us," admits Scherer, "was the cine related X-ray dose reduction. The average study with conventional methods can produce anywhere from 1,000 to 1200 images. What we're finding now with the XperSwing is that we get an average of 242 images. That's to do the left, right and LV. This is a huge drop off in cine dose."

"We're seeing anywhere from 50% to 75% reduction in the fluoro times and X-ray exposure to our patients," agrees Labinaz. "Since radiation is cumulative and coronary disease is a chronic state, patients often come back for repeated interventions or diagnostic procedures. If we can reduce the amount of radiation they are exposed to over a lifetime, that's very crucial."

Patients suffering renal failure are prime candidates for XperSwing technology.

Efficient workflow

Simple to use, UOHI technologists also find XperSwing easy to learn. All have had training on single plane rotational angiography and many of the key principles remain the same:

- Setting the isocenter
- Setting up the runs
- Looking for the heart margins
- Checking the vessel size

There are eight interventional cardiologists, twelve diagnostic cardiologists and four cardiology fellows at UOHI who've had the chance to use XperSwing. "Everybody who's used it likes it," says Labinaz. "Philips taught all of our radiology technicians and cardiologists how to use it. And so we taught our fellows who are training to be interventional cardiologists. They are actually some of its biggest fans."

"Our level of comfort with XperSwing is growing all the time," concludes Scherer.

Part of the cath lab experience

As diagnostic and interventional cardiology matures, catheterization labs must support increasingly complex procedures. Tools that simplify and clarify will become invaluable to clinicians. Philips Allura XperSwing is such a tool. Dr. Labinaz would like to see Allura XperSwing as part of all new interventional X-ray systems at UOHI. The benefits, he believes, support this position. "XperSwing assists in saving radiation, saving contrast, and saving time. But most importantly, I think it improves diagnostic confidence for patients with coronary artery disease and helps us plan their therapy."

He adds, "Sometimes you just don't know what technology does until you start using it yourself."

> "We're seeing anywhere from 50% to 75% reduction in the fluoro times and X-ray exposure to our patients."
>
> *Dr. Marino Labinaz*

PHILIPS

Philips Healthcare is part of Royal Philips Electronics

www.philips.com/healthcare
healthcare@philips.com

Printed in The Netherlands
4522 962 62461 * JUN 2010