



High volume cath lab doesn't miss a beat

With new 3D imaging, patients receive less x-ray dose, less contrast

Who/Where

Edward Heart Hospital,
part of Edward Hospital
and Health Services

Naperville, IL

Challenge

Integrate new technology that helps cardiologists in a high volume cath lab acquire more accurate up-to-the-minute information about their patient's condition, without adding to procedure time or complexity.

Solution

Philips Allura FD 10 with rotational acquisition and 3D reconstructed coronary images provides more information, often in less time, while using less radiation and contrast.

Located in Naperville IL, about 30 miles west of Chicago, Edward Heart Hospital, part of Edward Hospital & Health Services, is a full-service, regional healthcare provider, serving a number of Chicago's western suburbs. Edward Hospital has 278 private patient rooms and 4,800 employees, including 1,450 nurses and a medical

staff of more than 800 physicians who consist of independent members of the medical staff, employed physicians, and independent contractors. The Heart Hospital specializes in cardiac care and handles approximately 4,000 cardiac cases each year. Currently four cath labs are in use, with plans to open several cath labs in early 2008.



Dr. Mark Goodwin, Medical Director of the Cardiac Catheterization Lab at Edward Heart Hospital

PHILIPS

To help make the right decisions for his patients, Dr. Mark Goodwin, Medical Director of the Cardiac Catheterization Lab at Edward Heart Hospital, relies on his instincts and training. At the same time he wants as much up-to-the-minute and accurate information about his patient's condition as possible. Like any busy cardiologist in a high volume practice, Dr. Goodwin is constantly moving and carefully manages his time. As a result he looks for cath lab technology that's quick, easy to use, and delivers high quality images and key

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data at bedside. Since January 2007, Dr. Goodwin and his cath lab team have been working with new 3D Coronary Angiography (3D-CA) software from Philips. The Allura 3D-CA software delivers reconstructed 3D images of the relevant vessel structure along with quantitative data that helps Dr. Goodwin reaffirm his judgments.

“I was actually excited about it because it was a way of giving us more information with the images we had already acquired. Obviously the more data we collect, the better decisions we're going to make about how to treat the patient,” says Dr. Goodwin, recounting his initial reaction to the new software.

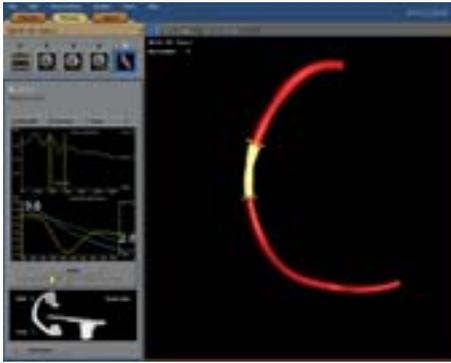
Getting the most information during image acquisition

Dr. Goodwin describes the Allura 3D-CA package as a combination of two processes that he believes greatly enhance cardiologists' ability to collect more image information as quickly as possible. The first component is rotational angiography, which represents a major evolution over the conventional acquisition of coronary images. With rotational angiography, the c-arm makes three separate four-second arcs around the patient, acquiring approximately 150 images, instead of keeping the stand in a fixed position and injecting contrast for each view.

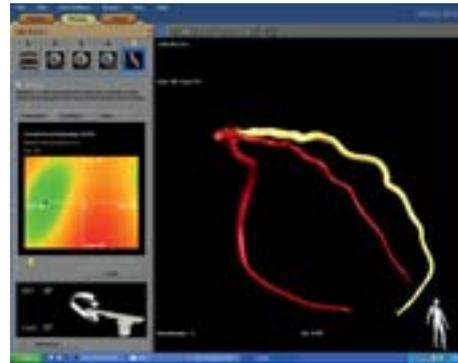
While rotational acquisition is still relatively new in Dr. Goodwin's lab, he has confidence in the value of this tool. “I think as 3D rotational evolves, there are certain lesions that we can see better because we're taking significantly more images from any one plane than the standard six or seven pictures taken with traditional angiography. There are certain lesions, bifurcations, high angle lesions, that your eye recognizes and sees as much more abnormal than you would see in a routine angiogram. So you can get better information, and more information, and that should lead to better outcomes.”

The second component is the 3D reconstruction, which uses selected images from the rotational acquisition to reconstruct a true 3D model of the vessel of interest in a matter of seconds. Two reference images, at least 30 degrees but not more than 90 degrees apart, are chosen for the reconstruction.

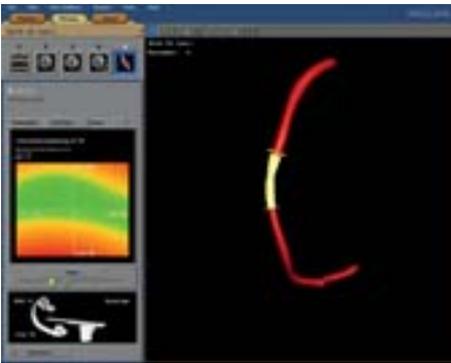




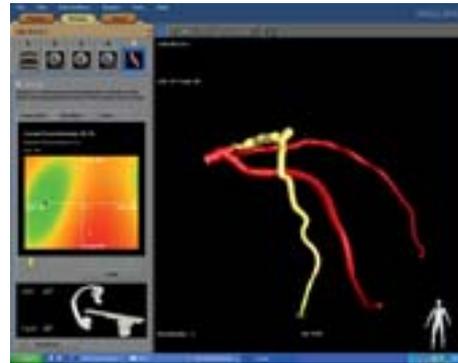
3DCA RCA
RAO-3, CRAN-1



3DCA LCA
RAO-38, CAUD-25



3DCA RCA
RAO-21, CRAN-10



3DCA LCA
LAO-12, CAUD-26

The 3D-CA system automatically selects and displays the best view of the lesion. It is a very intuitive tool that allows the cardiologist or tech to manipulate the 3D view to evaluate the lesion from every possible angle, with the reference point for the best view always visible. The corresponding stand position is also displayed so the cardiologist is aware of the proper orientation for the best view. According to Dr. Goodwin, “The 3D reconstruction allows us to assess the coronary anatomy, particularly for interventions, or possible interventions.”

Dr. Goodwin describes some of the key benefits associated with the 3D-CA tool. “It helps us more accurately understand the length of lesion and the tortuosity of the vessel. While these are things that we inherently ‘know’ because of our experience, now there is help verifying our knowledge, so we pick the correct stent length.”

Selecting the right stent

Dr. Goodwin believes that 3D-CA offers cardiologists some very tangible clinical benefits. “At different times there are ‘bells and whistles’ that come along that really don’t help; they don’t have any clinical application or utility. I think this 3D-CA has true utility, both for experienced and inexperienced interventionalists.”

Dr. Goodwin believes that 3D-CA can help in accurately evaluating the true position and extent of the lesion so the appropriate stent can be selected. With conventional 2D image acquisition, the view of the vessel can often be foreshortened, potentially distorting the perspective cardiologists have as they make critical decisions. This foreshortened view can lead to miscalculations in the correct stent length, and that is a situation that any cardiologist wants to avoid. Dr. Goodwin explains, “You take the picture and you

put in what you think is the right length stent, but you end up being just at the edge of it, so there is little bit of narrowing at the distal end or the proximal edge of the stent and now you say, 'I better cover that other area,' so you end up putting in a second one. The ideal thing is to put in exactly the right length that you need. The more accurate you are the better for the patient. The more metal you put in, the higher the restenosis rate."

"Just using the rotational angiography, we have experienced 35 - 40% less dye use, and almost 40% less fluoro time, which translates into less radiation."

According to Dr. Goodwin, the 3D-CA system automatically identifies the least foreshortened view, allowing the best view for the vessel and lesion of interest, the less foreshortened the vessel, the better the prediction about stent length. "With the 3D reconstructions you can pick the absolute best view to work in, which may not be a view you thought it was going to be." He calls up an earlier case on the monitor and explains, "We don't normally work in a LAO/Caudal view in this particular vessel. But this is a good example of where it's actually a good view to work in for this vessel."

Dr. Goodwin says there have been cases where he's also used the 3D-CA, and the enhanced image display, to help explain his treatment decisions to patients and their families. "I have been able to show them how this gave us different information which allowed us to make a different decision regarding the patient's management."

Acquiring more information with less contrast and less radiation

One of the major advantages of 3D-CA, and one of the reasons Dr. Goodwin is so enthusiastic about it, is that it provides additional information to the cardiologist, without requiring any additional x-ray dose or contrast to the patient. "The patient has already been exposed to the radiation, and now we can see more data and make a more accurate determination of how to treat the patient. What the Philips system does is take that same procedure and allows us to have a 3D display of the heart and provide more data to visualize the arteries. Clearly one of the areas in which I think either 3D reconstruction or rotational will be particularly helpful is for any patient with renal insufficiency. You can get by with significantly less dye by doing rotational angiography. Also 3D reconstruction is very helpful in examining bifurcating lesions and chronic total occlusions."

Dr. Goodwin is achieving major reductions in his use of contrast and x-ray dose as a result of the rotational acquisition. "Just using the rotational angiography, we have experienced 35 - 40% less dye use, and almost 40% less fluoro time, which translates into less radiation." These results are based on comparisons Dr. Goodwin has made between his lab with the 3D-CA tool and the lab without the 3D-CA tool.



Seeing a significant cost savings in stents

Dr. Mark Goodwin, Director of the Cath Lab at Edward Heart Hospital, believes that Philips 3D-CA software can help cardiac cath departments reduce their costs. Specifically he points to 3D-CA's ability to help cardiologists secure the best view of the lesion, and accurately estimate the length of the stent to be used. When cardiologists have a non-foreshortened view of the vessel and the lesion, and avoid misjudging the length of the stent they need to use, Dr. Goodwin calculates the potential savings to be significant.

He describes two scenarios this way. "Depending on how high a volume lab you have, but particularly for drug coated stents, which can cost \$2,400, there are significant potential savings. Let's say a lab does 20 interventions per week – that's 1,000 interventions per year. If in just one case every other week, so out of every 40 if there was just one case where cardiologists didn't have to put in two stents instead of one because they underestimated the length, that would save 25 stents at \$2,400 a piece – approximately \$60,000. And if there was one case each week that didn't use two stents instead of one, the potential savings to the lab – 50 x \$2,400 dollars – would be approximately \$120,000. So at the very the least, you are going to save your lab somewhere between \$60,000 and \$120,000 a year by having more consistently selected the correct length of stent."

Fitting easily into a high-volume environment

Edward Heart Hospital is one of the first mainstream non-academic cardiology centers in the country to use the 3D-CA software from Philips. And Dr. Goodwin, with a keen awareness of how critical time is for his and other high volume cath labs, states he wouldn't use it if he had to compromise on efficiency or patient throughput.

"This is a real-world, busy, relatively high volume place, where we have to turn over a lot of cases. It wouldn't do us any good to have something that was laborious and time consuming, that even added 15 minutes to each case. That just wouldn't work for our throughput. And I think that's one of the things we like about this. It didn't change how efficient or effective we are in taking care of patients.

Once you get used to the flow of doing rotational, the procedure itself ends up being the same or maybe even a bit shorter because you are taking fewer views. I think the advantage of it is, for the same amount of time and effort, you're able to get more information with less dye and less overall radiation."

Lisa Snider, RT(R), one of the lead cath lab techs at Edward Heart, adds that there are some different considerations when setting up the room for rotational procedures. "Everything has to be out of the way for rotational, like the crash cart and IV lines. We just need to make sure nothing interferes, like blankets or gowns. Once you get the set up done, it goes really fast. It's actually a lot quicker, and the radiation and the contrast is lower."



Lisa Snider, RT(R)

Easy to learn, easy to use

When asked about learning to use and operate the 3D-CA tools, Dr. Goodwin is straightforward. “A lot of times software upgrades are so complex that only one person in the lab is the expert. What was so refreshing about 3D-CA from Philips, even though we had some people trained to be the experts, realistically if you just played with it, I think you would inherently figure out how to do it after doing one or two cases. The way they’ve designed it is pretty intuitive.”

The entire staff quickly embraced the inclusion of the rotational angiography and the 3D reconstruction into the cath lab’s routine. As Lisa Snider, one of those trained as an expert, says, “Their (Philips) equipment is super user friendly. Their applications people are really very good. Everyone caught on pretty fast with learning it.”

The 3D-CA can be operated from the tableside, or from the control room. And in Dr. Goodwin’s case, he can operate it himself or have a member of his staff operate it. “I do manipulate the images, sometimes my partners do, and sometimes the techs do. So anyone in the room

can have access to manipulating the image. On anything moderate to difficult, and on any bifurcating lesion or chronic total lesion, I use it all the time.”

After working with this new software for less than a year, Dr. Goodwin believes other cardiologists are going to be very impressed with 3D-CA. “It’s something that, once they’ve seen it, will open their eyes to what it can do for them.” Even for those in his practice who were initially somewhat skeptical, Dr. Goodwin has seen them come around quickly. “What the guys started to realize was, ‘wait a second, this really helped me, this wasn’t taking any time away and was actually making it easier.’”

In fact Dr. Goodwin sees a time when most community based cardiac cath labs will be using 3D-CA. “My own sense is that in two to five years from now, it will probably be a standard package in cath labs. You have a tool that gives you more information, with less dye, and less radiation exposure. That same tool, when you can use it within the same time efficiencies and throughput, as well as, in theory, saving money by selecting the appropriate stent length, all those things make it a logical decision.”



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