



# A new vision on minimally invasive procedures

Imaging strategies to improve workflow and patient care

## Who/where

University Hospital Aachen  
Location: Aachen, Germany  
Type: Tertiary medical center and research hospital  
Beds: 1,360  
Serves: 500,000 population; admits about 48,000 patients per year  
Minimally invasive interventions: >2,000 per year  
Catheterization labs: 4  
H.P. Kühl, MD, interventional cardiologist

## Challenge

Reducing the amount of X-rays that patients are exposed to when undergoing same-day and minimally invasive procedures.

## Solution

Exploring ways of applying innovative imaging strategies like 3D echo, so that X-ray exposure is minimized without compromising placement accuracy during interventional procedures.



H.P. Kühl, MD, interventional cardiologist

Around the world, hospitals are increasingly focusing on more same-day and minimally invasive procedures because of the many advantages that they offer to patients and healthcare facilities. Today X-ray plays a key role in guiding these lengthy procedures, but it also exposes the patient to a certain amount of radiation. The development of new imaging technologies has opened the way for new imaging strategies that have the potential to provide more imaging information and reduce the amount of radiation required during minimally invasive procedures. The University Hospital in Aachen and Philips are exploring the possibilities.

## New imaging strategies

The University Hospital in Aachen, Germany is a tertiary care center and university research hospital that serves a patient population of about 500,000 people. It performs over 2,000 minimally invasive procedures a year in its four catheterization labs. Cardiologists at this hospital have long experience using the MR, X-ray and echocardiography techniques to support minimally invasive procedures.

“Echo provides a very detailed 3D view of the heart, giving real 3D anatomical information”.

Philips iE33 echocardiography system with a 3D TEE probe, in particular, has changed how they perform minimally invasive procedures. Dr. H.P. Kühl, interventional cardiologist, explains. “For years, we used 2D echo with X-ray for PFO and ASD closure procedures.”

“Echo plays a very important part in mitral valve clipping”.

The X-ray image and the echo image were displayed next to each other on the exam room monitor. “Now that we have the 3D TEE capabilities it is much easier.

# PHILIPS

We can steer device implementation almost exclusively using 3D echo and thereby reduce the amount of X-ray that we used before. That means we can reduce the amount of radiation which is not only helpful for the patient, but also for the physician.”

Why is echo so useful? Kühl says, “Echo provides a very detailed 3D view of the heart in real-time giving real 3D anatomical information. You can be very confident because you get much more information than you had before with 2D echo. This information is not tomographic as with 2D echo, but it is real-time volumetric imaging of the heart, which is very helpful to guide your interventional procedure. I believe that 3D echo can play a major role in these kinds of procedures.”

“This is ongoing research work we are doing with Philips.”

“Think of valve interventions,” continues Kühl. “We are now performing mitral valve clipping and echo plays a very important part there. You cannot do this procedure without using echo to guide your clips to the right position to clip the valve leaflets.”

### The next step

The University Hospital Aachen is already doing minimally invasive procedures now, but the next step for them is to fuse these images and that is where Philips plays a vital role. Philips and the University Hospital Aachen have worked together for many years as clinical partners and are currently carrying out a joint research project to investigate ways to combine images from different modalities to provide even better guidance for minimally invasive procedures.

“I think that combining imaging modalities will give us much more information”.

Kühl describes his vision. “We would like to have different modalities fused with each other. One of the interesting parts will be fusion of MR with X-ray and fusion of 3D echo with X-ray and ultimately also fusion of MR with 3D echo. This is ongoing research work we are doing with Philips.”

“I think that combining imaging modalities will give us much more information – physiological information and pathological information on cardiac disease. I would also say that it will help us improve workflow because you have the combination of imaging modalities that gives you much quicker answers to your clinical questions.”



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