

## Healthcare industry BW

# Cardiac catheter surgery for children and young adults without X-ray radiation

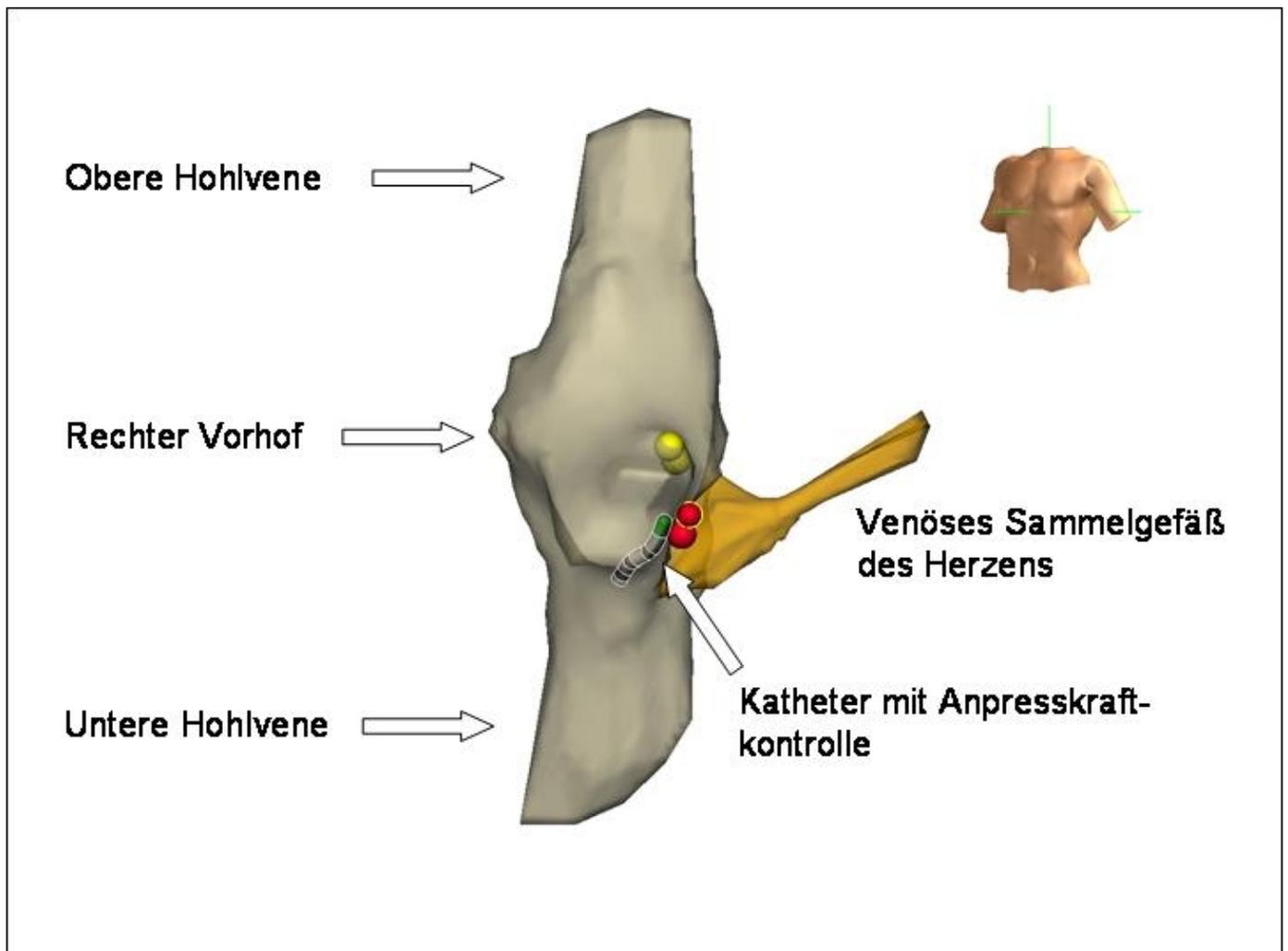
**Heart specialists and electrophysiologists from Tübingen University Hospital have succeeded for the first time in Germany in treating cardiac arrhythmia without the need for X-ray radiation. This was done through the selection of a new method to control the contact force between the catheter and the blood vessel and cardiac walls. The intervention was successfully carried out on a 16-year-old girl and is regarded as a very attractive alternative to X-ray radiation, in particular as far as children are concerned.**

The contact force between the catheter and the heart and blood vessel walls needs to be monitored during surgery in order to prevent damage to the cardiac wall. The system used to control the insertion of a catheter into a chamber or vessel of the heart consists of sensors that measure the contact force of the catheter and produce a three-dimensional representation of the procedure. It is envisaged that the system will also be used for the catheter ablation of cardiac arrhythmia in pregnant women.

## What is cardiac arrhythmia?

Physical activity, stress or anxiety can cause our heart to beat faster than when we are relaxed. Such changes in the heart rhythm are normal, especially in children. However, irregular heartbeat can become a (sometimes life-threatening) condition when it is caused by abnormal electrical activity in the heart; the heartbeat can be too slow, too fast or just irregular. Doctors usually regard such irregularities as a disease when the heart beats irregularly for no apparent reason and when it has a reduced function. In many cases, early symptoms of cardiac arrhythmia can be observed in young children.

The causes of cardiac arrhythmia are mainly seen in the abnormal electrical activity of the heart. On average, the human heart beats between 70 and 80 times per minute. Normal heartbeat results from electrical impulses that start in the sinatrial node from where they travel across specialised fibres to the ventricular muscle cells. Arrhythmias can develop because of abnormalities in how the impulses are conducted.



3D image taken during surgery with no patient exposure to X-rays. View into the heart from the left (see torso in the upper right-hand corner of the figure). The image shows the right vestibule as well as the inferior and superior vena cava (grey sections of the heart) and the cannulae collecting the venous blood (light brown section of the heart). The catheter used is located in the same place as the double signalling system, which is blocked in order to treat palpitation (red spots). The most important part of the signalling system thus remains intact (yellow spots). The image of the right vestibule, the inferior and superior vena cava and the cannulae collecting the venous blood was produced through scanning the structures using a TactiCath™ catheter and not through X-ray radiation. The continuous measurement of the contact force enables the careful and safe scanning of the structures and the destruction of the tissue where abnormal heartbeats may give rise to arrhythmia.

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## Treatment of cardiac arrhythmia

Arrhythmias can occur at any age, including in children and young adults, and can be treated by eliminating the causes using catheter ablation, in which a catheter is used to destroy the tissue where abnormal heartbeat may give rise to arrhythmia. The catheter used to destroy superfluous nerve tracts with high-frequency current is guided to the heart through a blood vessel in the groin. The treating cardiac surgeon must take great care to guide the catheter safely to the heart, which is why the position of the catheter is usually meticulously monitored on X-ray images.

### What is the advantage of the new treatment?

As explained above, the disorder is typically treated by guiding a tube into the heart using X-ray imaging to view the catheter ablation procedure. This exposes the patients to radiation, something that doctors would prefer to avoid, especially in children. To eliminate the potentially harmful radiation, cardiologists are also using an X-ray-free technique in which they rely purely on their

sense of touch to thread the catheter through the patient's groin area to the heart chambers. Care must be taken to prevent too great a contact force to avoid the catheter tip perforating the heart wall. In this approach, the force that the catheter exerts on the blood vessel and cardiac walls depends purely on the surgeon's sense of touch and experience.

Cardiologists at the University Hospital Tübingen have developed another catheter ablation approach that does not require the use of X-rays to view the catheter ablation procedure and is also extremely safe as it measures the contact force between the catheter and the cardiac and vascular walls. The efficiency and safety of this approach has now been shown by the cardiac rhythm experts Dr. Gunter Kerst and Dr. Jürgen Schreieck, head of the Department of Electrophysiology at the University Hospital of Tübingen. The new method was used for the treatment of a 16-year-old patient who presented with a "doubling" in the atrioventricular junction.

## How does the new system work?

The use of the newly developed TactiCath™ catheter (Endosense), which is a force-sensing ablation catheter, provides a real-time, objective measure of the contact force between the catheter and the beating heart wall without the use of X-rays. The treating doctors are able to place the tip of the catheter on the exact area to be treated and monitor the procedure with a 3D localisation system (EnSite NavXTM, St. Jude Medical).

"The few X-ray-free catheter ablations carried out around the world have been carried out without measuring the contact force between the catheter and the beating heart wall. We believe that it is extremely important to monitor this force in order to ensure high levels of patient safety. In addition, the catheter is likely to improve the success of the ablation," said the two doctors, going on to add "the procedure also has the potential to treat cardiac arrhythmias in pregnant women."

### **Further information:**

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