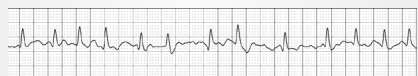


# Stereotaxis Case Study

Courtesy of: Mark E. Krebs, MD, FACC

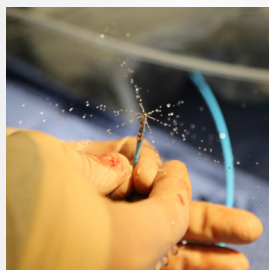
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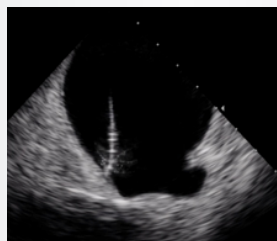
Single lead recording shows atrial fibrillation.



Intracardiac ultrasound shows transseptal needle crossing the intraatrial septum from the right atrium to the left atrium.



Saline was flushed through the irrigated tip catheter to enhance energy delivery during catheter ablation and to lower the risk for thrombus formation.



Intracardiac ultrasound demonstrates ideal ablation catheter contact with the atrial myocardium at the ostium of a pulmonary vein.



Robotic arms connect to the ultrasound catheter (V-Sono system) and the ablation catheter; allows operator to direct remote movement of both catheters.

In addition to its accolades in ablating atrial fibrillation, the Stereotaxis Robotic Magnetic Navigation System offers similar advantages in ablating other complex arrhythmias including ventricular tachycardias, premature ventricular complexes, and atrial arrhythmias associated with structural heart disease.

## Clinical History

A 61 year-old female suffered with intermittent paroxysmal atrial fibrillation for over 10 years, but noted a sharp increase in the frequency and duration of atrial fibrillation during the past year. Atrial fibrillation occurred near daily despite treatment with beta blockers and flecainide. Episodes lasted upwards of five hours in association with palpitations, urinary frequency, fatigue, and activity intolerance. On medications she developed symptomatic sinus bradycardia while still having atrial fibrillation with prominent, symptomatic tachycardia.

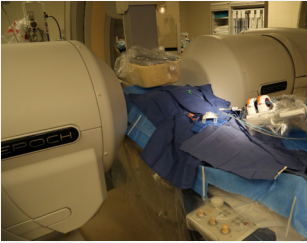
## Data

Laboratories were notable for a euthyroid state. Echocardiography proved fairly unremarkable except for mild left atrial enlargement at 4.6 cm (normal size <4 cm). Images revealed no significant mitral valve insufficiency, diastolic dysfunction, or systolic dysfunction. Ambulatory monitoring confirmed frequent sustained atrial fibrillation with a tachycardic ventricular rate and intervening sinus bradycardia.

## Procedure/Outcome

The patient underwent catheter ablation using the Stereotaxis Robotic Magnetic Navigation System (Niobe® and V-Sono®) that incorporates operator-directed, magnetically and mechanically-driven robotics to integrate catheter movement, ablation, and real-time echocardiographic imaging. Following placement of catheters through a femoral venous approach, transseptal puncture through an intact intraatrial septum allowed access to the left atrium, and passage of the ablation catheter from the right atrium to the left atrium. An ultrasound catheter placed in the mechanical arm aided in visualization during transseptal access, assessed cardiac structures, and tracked the ablation catheter confirming position and tissue contact. Within the left atrium, electroanatomic mapping using robotic-assisted movement of the ablation catheter created an image of the left atrium superimposing color-coded voltage corresponding to the amplitude of the heart's local electrical signal. The movement of the two large magnets located to the right and left of the patient altered the magnetic field around the patient thereby moving the irrigated tip of the ablation catheter. Using the robotic magnetic navigation system, the ablation catheter precisely and safely delivered radiofrequency energy creating lesions encircling and electrically isolating the pulmonary veins. Following her intervention and overnight observation, she returned home, noted occasional self-limiting palpitations in the first two weeks, and subsequently remained free of atrial fibrillation off antiarrhythmic medications.

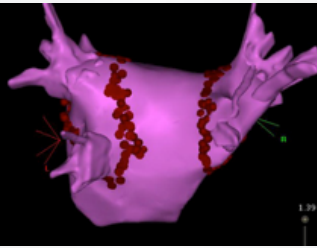
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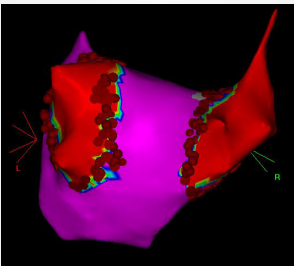
The Stereotaxis Robotic Magnetic Navigation System shows robotic arms and large magnets located to the right and left of the patient. Rotation of the magnets within the shells changes the magnetic field thereby moving the ablation catheter.



Control Room: Computer inputs to Stereotaxis move the ultrasound and ablation catheters during treatment of atrial fibrillation.



Catheter ablation created lines encircling the right and left pulmonary veins. (Dark red dots represent ablation points.)



After catheter ablation, voltage mapping of the left atrium showed electrical isolation of the pulmonary veins. (Purple represents higher voltage and red the absence of voltage.)

## Discussion

Atrial fibrillation remains a difficult arrhythmia to treat and one associated with significant morbidity. In the best candidates catheter ablation offers a 75-80% success of curing atrial fibrillation. Those patients with larger left atria, more persistent atrial fibrillation, and other medical conditions that promote atrial arrhythmias experience lower successes with any treatment strategy. Electrical isolation of the pulmonary veins remains the mainstay of ablative therapy, especially for paroxysmal atrial fibrillation. For persistent atrial fibrillation, ablation often targets additional areas within the left and sometimes right atria. The precision, flexibility, and safety of robotically-assisted catheter ablation with the Stereotaxis technology lends itself well to these complex cases, while reducing fluoroscopy times/radiation exposure by greater than five-fold compared to other ablation methods. Data comparing fluoroscopy times before and after the implementation of the V-Sono system demonstrates our already low total procedure fluoroscopy times dropped by over 12% and fluoroscopy times related specifically to mapping/catheter ablation dropped by 58.9%. All of this translates into even lower radiation exposure for our patients and staff. The additional remote control of the intracardiac echocardiography (ICE) ultrasound catheter by the V-Sono system automates refined movements and furthers the efficacy and safety of this intervention.

## For More Information

If you would like to discuss this case or learn more about other services provided by **Premier Health Heart and Vascular Institute** call **(937) 499-7427**.

## Location

Miami Valley Hospital is the only hospital in the region to offer this robotically assisted magnetic navigation technology, and one of only two centers in Ohio offering Stereotaxis' ultrasound catheter robotics system.



**Mark E. Krebs, MD, FACS**

Mark Krebs, MD, FACC, is a fellowship-trained electrophysiologist and researcher. He completed his residency at Barnes Hospital and fellowships at the Krannert Institute of Cardiology and Indiana University Medical Center. Dr. Krebs earned his medical degree from the University of Cincinnati College of Medicine.



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