New system helps steer heart catheters

BY MARK ANDERSEN/Lincoln Journal Star

Monday, Dec 26, 2005 - 05:39:42 pm CST

Dr. Andrew Merliss, Director of the Electrophysiology Service at the Bryan Heart Institute at Bryan LGH East, uses the hospital's recently acquired Niobe machine by Stereotaxis, which uses magnets to guide catheters inside the heart, remotely. The computer allows the doctor to guide catheters from a control box in a room separate from the patient. (Jill Peitzmeier/Lincoln Journal Star)

The invention of manually steered catheters in the early 1980s launched the $10 billion interventional heart procedure market.

Cardiologists could watch X-ray images while manipulating hand controls to push what looks like a wire deep into the body.

The wire or catheter follows veins, typically toward the heart. Once there, they can release dye for X-rays or inflate balloons to open clogged vessels. Some probes even push inside the beating heart to burn areas causing electrical short circuits and dangerously irregular heartbeats. Finally, doctors could fix some heart problems without major surgery.

But there were still risks.

Catheters carry a small danger of puncturing a vessel wall, which can cause internal bleeding.

And human vessels aren't arranged like highways. At times it's more like driving a bus through a cramped parking lot — all narrow spaces and tight corners.

Physicians, meanwhile, must spend hours standing in X-ray fields. The risks of cancer increases only minutely for each patient, but doctors perform hundreds of cases per year, accumulating radiation exposure despite the 30-pound lead aprons they wear.

"There were times in the past when I had to stop work and stay out of the lab for a while," Dr. Andrew Merliss, director of Electrophysiology Service at the BryanLGH Heart Institute.

Worn day in and day out, the lead vests take their toll on backs and knees.

"I walk out of the lab an inch shorter," Merliss said.

The recently acquired Stereotaxis system at BryanLGH Medical Center East promises to overcome these and other issues, Merliss said.

With it, physicians gain precision control over the tip of the wire, moving it millimeter by millimeter and in all 360 degrees of direction.

"Stereotaxis is one of great advances on the electrophysiology side of heart devices in a decade," Merliss said. The device is more commonly found at major medical centers like the Cleveland Clinic and Mayo Clinic, he said.
If you ever pulled a ball bearing around a tabletop by moving a magnet several inches above, you understand the basic concept.

Replace the ball bearing with a tiny magnet probe placed inside the body's vessels. The probe attaches to a limp, noodlelike cord.

A pair of 2,000 pound super-conducting magnets controlled by advanced computers replace the hand magnet, producing a precision application of electromagnetic forces.

The physician directs the probe to this point in three-dimensional space, Merliss said, and $1 million in sophisticated technology works to pull it gently to that point.

Meanwhile, the physician stands away from the X-ray field, manipulating the movements of the catheter with a joystick.

"It's nice to be away from the fluoroscopy tube," Merliss said.

The technology does change the artistry of the physician.

Conventional catheters depend greatly on the tactile senses and dexterity of a physician's hands.

"You have to put your brain into your fingertips," Merliss said. "With this system, it's more like becoming a Nintendo expert."

Eric Hoesing, director of cardiac and vascular services at BryanLGH, said the benefit to the hospital comes in decreased duration of procedures, in less X-ray exposure to physicians and staff, and in better outcomes.

The time savings are tangible, reducing procedures by “about half,” he said.

There are ongoing studies comparing stereotaxis with conventional catheters, Merliss said.

Certain types of catheters to be used in conjunction with the machine still await FDA approval, but Merliss foresees the day when Stereotaxis will be used for every ablation procedure, creating tiny burns to improve a heart’s electrical stability.

Used in combination with three-dimensional imaging of internal heart chambers, he said, the procedures continue to get safer.

“The exactitude and imaging,” he said, “will only get better.”

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