

Novel catheter technique successfully patches holes in the heart

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A novel catheter technique for patching holes in the heart may make it possible for many patients to avoid surgery altogether and others to regain enough strength to safely undergo surgical repair at a later date, according to a study reported at the 30th Annual Scientific Sessions of the Society for Cardiovascular Angiography and Interventions, May 9–12, 2007, in Orlando, FL.

The patch successfully closed ventricular septal defects (VSDs)—or ruptures in the wall between the right and left ventricles—in nearly all patients, allowing blood to circulate normally again and relieving fluid back-up in the lungs. After recovery, patients were able to return to active lives.

"Patients with acute VSDs may be critically ill with heart failure and perhaps be in cardiogenic shock," said Matthew W. Martinez, M.D., a cardiology fellow at the Mayo Clinic in Rochester, MN. "This procedure offers an alternative for patients who are too sick to undergo emergency heart surgery or simply don't want surgery."

To track the long-term effectiveness of the catheter procedure, Dr. Martinez and his colleagues reviewed the medical records of 10 patients treated with the VSD patch between 1995 and 2005. Of these, 5 patients experienced rupture of the ventricular wall, or septum, as a result of a heart attack. In the other 5 patients, the VSD was an unintended consequence of a previous heart surgery.



In all cases, the VSD allowed a portion of the blood in the left ventricle to shoot backward into the right ventricle with each heart beat, rather than being circulated to the rest of the body. As a result, patients were experiencing such severe heart failure they were short of breath at rest or with minimal activity, and were judged to have New York Heart Association class 3 and 4 heart failure.

A variety of patches were used in the study, but all were some form of AMPLATZER Occluder (AGA Medical Corp., Plymouth, MN). The VSD patch is composed of two discs connected by a thick shaft. The discs are made of flexible nitinol metal and covered in polyester fabric that encourages heart tissue to grow over the discs, completely covering them during healing.

Before implantation, the flexible double-disc patch is pulled into a catheter, collapsing and compressing it lengthwise. It is then threaded through a vein into the right ventricle and across the rupture into the left ventricle. The patch is pushed partially out of its catheter sheath until the first disc pops open. The catheter is then withdrawn back into the right ventricle, with the first disc positioned against the left ventricular wall and the connecting shaft filling the hole created by the rupture. From inside the right ventricle, the patch is pushed forward again, releasing the second disc, which covers the rupture on the right side of the heart.

Implantation of the VSD occluder was performed by Donald J. Hagler, M.D., FSCAI, a professor of pediatrics in the Divisions of Pediatric Cardiology and Cardiovascular Diseases at the Mayo Clinic. The procedure was successful in all patients, without complications. One patient died 5 days later of illness unrelated to the VSD patch. In 2 patients, the rupture didn't fully heal, causing damage to blood cells as they jetted through the narrow opening. A third patient developed a bacterial infection that started several months after device implantation. The patch was removed and all 3 patients had successful surgery to



repair the rupture.

Even in such cases, the VSD patch serves its purpose by allowing patients to regain enough strength to withstand surgery, Dr. Martinez said. "Surgery is the long-term answer for some patients," he said. "In such cases, the VSD occluder successfully bridges the patients to surgery."

After a follow-up that averaged more than 1 year, patients were feeling markedly better and were much more active, even able to climb a flight of stairs before becoming short of breath. All patients were ranked in New York Heart Association class 2 or better.

Source: Society for Cardiovascular Angiography and Interventions

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