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(not for publication)

Catheter Techniques Offer Long-Term Advantages Over Surgery for ASD Closure

The Amplatzer Septal Occluder Significantly Reduced Atrial Arrhythmias and Improved Cardiac Pump Function When Compared to Surgery

(Las Vegas – May X, 2009) Using minimally invasive techniques to repair a hole in the heart not only avoids the pain and trauma of open heart surgery, it appears to reduce the likelihood that an abnormal heart rhythm will develop and keeps the heart pumping more efficiently.

According to a study presented at the SCAI 32nd Annual Scientific Sessions, May 6-9, doctors successfully closed a hole between the two upper chambers of the heart—or an atrial septal defect (ASD)—with either open heart surgery or by threading a patch into the heart through the blood vessels, using a slender tube called a catheter. However, patients who had open heart surgery not only faced a more difficult recovery, they experienced a significantly higher rate of atrial arrhythmias after the procedure and a significantly lower left ventricular ejection fraction (LVEF), a measure of the heart's pumping ability.

“There is a huge population of adult patients who have not had surgery for ASD closure,” said Teiji Akagi, MD, PhD, a professor in the cardiac intensive care unit at Okayama University, Okayama, Japan. “Now, they can be treated with device closure, rather than surgery. Even if they are 70 or 80 years old, the catheter procedure can be performed safely and with a high success rate.”

Atrial septal defects are among the most common types of congenital heart defects. In this condition, a hole in the wall that normally separates the right and left atrium allows oxygen-rich blood to flow from the left atrium to the right atrium, rather than being circulated to the body. The patient may experience few symptoms for several decades, but over time, the right side of the heart may become enlarged from having to pump so much extra blood, and the blood vessels in the lungs may become damaged. Patients experience shortness of breath and fatigue, and may develop disturbances in the heart's rhythm.

Surgery involves opening the chest, stopping the heart from beating, cutting into the right atrium, and either stitching the hole closed or, if it is too large, placing a tissue patch over the hole. The minimally invasive approach involves use of the Amplatzer Septal Occluder, a device that consists of two discs of flexible nitinol mesh, each filled with a polyester fabric insert. The discs are joined to one another by a narrow waist and look like a pair of tiny umbrellas when opened. For easy passage through the body, the discs are collapsed and loaded inside a catheter. The interventional cardiologist punctures a vein in the groin, threads the catheter through the vein, into the right atrium, and through the atrial septal defect into the left atrium. The first disc is released and positioned over the hole, then the catheter is pulled back into the right atrium and the second disc is released and positioned snugly over the hole on the other side of the dividing wall.

For the new study, Dr. Akagi and his colleagues set to compare how well adult patients fared with surgical or catheter-based ASD closure. The researchers analyzed data from 21 patients who had surgery to

close the ASD and 74 patients who were treated with Amplatzer ASD closure device between March 1999 and February 2008. All of the patients were at least 40 years old. The surgery group tended to be younger (53 vs. 59 years old, on average) and to have larger ASDs. In other ways, however, the two groups were similar, including in the rates of atrial arrhythmias before the procedure and in the average LVEF.

Both types of procedures were highly successful, with no deaths in either group. However, there were clear differences in outcomes during a follow-up period that averaged more than 4 years for surgery patients and about 1½ years for patients treated with the Amplatzer device. Patients who had an atrial arrhythmia before the procedure were significantly more likely to continue having the arrhythmia if they were treated with surgery rather than catheter-based techniques (38% vs. 16%, $p<0.05$). Similarly, new atrial arrhythmias developed in 10% of patients who had surgery but in none of the patients treated with the Amplatzer device ($p<0.001$).

The heart's pumping ability was also worse after surgery, when compared to catheter-based treatment (LVEF 65.8% vs. 73.9%, $p=0.003$). One reason may be that, after surgery, the heart's lower chambers moved less efficiently with each beat. In fact, it was far more common for patients who had surgery to develop an unusual pattern of motion in the wall between the ventricles (78% vs. 9%, $p>0.002$), a finding Dr. Akagi attributed to the cardiac arrest and cardiopulmonary bypass patients undergo as part of open heart surgery.

"The most important message of this study is the clinical benefit of catheter closure for the adult patients with atrial septal defect," Dr. Akagi said. "Previous studies in children could not demonstrate the benefit of the Amplatzer Septal Occluder procedure compared with the surgical procedure. We focused on the adult patients, and the advantages of catheter intervention were confirmed."

The research team is continuing long-term patient follow-up, in order to evaluate whether the rates of atrial arrhythmias remain lower with the Amplatzer procedure over 5 or 10 years.

Dr. Akagi reports no conflicts of interest related to this study.

About SCAI

Headquartered in Washington, D.C., the Society for Cardiovascular Angiography and Interventions is a 4,000-member professional organization representing invasive and interventional cardiologists in more than 60 nations. SCAI's mission is to promote excellence in invasive and interventional cardiovascular medicine through physician education and representation, and advancement of quality standards to enhance patient care. SCAI's annual meeting has become the leading venue for education, discussion, and debate about the latest developments in this dynamic medical specialty. SCAI's patient and physician education program, Seconds Count, offers comprehensive information about cardiovascular disease. For more information about SCAI and Seconds Count, visit www.scai.org or www.seconds-count.org.

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