Test of implantable cardioverter defibrillator linked to cognitive problems

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A standard test of the implantable cardioverter defibrillator (ICD) is linked to significant thought-processing problems that improve for most patients within a year after the device is inserted, according to research reported in *Circulation: Arrhythmia and Electrophysiology*.

An ICD is a small electronic device that monitors and regulates heartbeat (somewhat similar to a pacemaker). It's inserted into the patient's chest or abdomen and connected to the heart. An ICD can prevent sudden death by detecting irregular and/or rapid heartbeat, then sending an electrical pulse to the heart that shocks it and allows a normal rhythm to resume.

In 2006, an estimated 114,000 ICD procedures were performed, according to the most recent American Heart Association statistics.

After an ICD is inserted, doctors check its performance by medically causing repeated episodes of irregular heartbeat. The procedure, known as ventricular defibrillation testing, temporarily disrupts brain activity by causing a drop in blood pressure and blood flow to the brain, according to previous studies. However, the long-term thought-processing, or cognitive, effects of these disturbances were unclear.

"What's surprising is that this minor procedure, which has very short periods of ventricular defibrillation induction, results in significant decline in multiple areas of cognitive function," said Claire N. Hallas, Ph.D., lead author and assistant professor of psychology at Sultan

Qaboos University's College of Medicine and Health Sciences in Muscat, Oman.

Compared with pre-surgery scores on thought-processing exams, more than one-third of study participants had significant cognitive problems six weeks and six and 12 months after ICD surgery. Attention, short-term memory of visual words and objects, and auditory (spoken) words were most commonly affected. Although most patients regained their normal abilities by 12 months after surgery, onset of cognitive problems varied between patients. A small group -- 10 percent -- first developed difficulties 12 months after ICD surgery.

"We're interested now in the psychological and surgery-related factors that could be related to late-onset cognitive decline," Hallas said. "We need more research to understand what risk factors are involved in mediating this late decline."

For the long-term study, investigators administered a series of cognitive exams to 52 patients in the United Kingdom several days before ICD surgery and again six weeks and six and 12 months afterwards. The exams measured a range of psychological abilities, including attention, visual and auditory memory, mental speed and flexibility, and the ability to manipulate objects. Investigators identified a cognitive problem when 20 percent of post-surgery exam scores showed a 20 percent decrease from pre-surgery scores.

Investigators eliminated the influence of age-related cognitive problems by comparing their results to data on healthy, age-matched individuals.

Patients also completed surveys on anxiety, depression and quality of life, which researchers found to be unrelated to mental ability.

"We tried to determine whether there were other factors, both surgical

and psychological, that could have influenced dysfunction, which proved not to be the case," Hallas said.

The average age of study participants was 61; most were Caucasian and 86 percent were male. Nearly three-quarters had suffered a previous heart attack, and more than half had been diagnosed with an abnormal heart beat.

"Doctors need to be aware of screening patients early on for particular problems and then referring patients for psychological testing if they have concerns about effects that are more consistent over two or three months," Hallas said.

Provided by American Heart Association