

HEART BEAT | FEBRUARY 9, 2010

# Hearts Actually Can Break

By RON WINSLOW

Dorothy Lee and her husband of 40 years were driving home from a Bible study group one wintry night when their car suddenly hit the curb. Mrs. Lee looked at her husband, who was driving, and saw his head bob a couple of times and fall on his chest.

In the ensuing minutes, Mrs. Lee recalls, she managed to avoid a crash while stopping the car, called 911 on her cellphone and tried to revive her husband before an ambulance arrived. But at the hospital, soon after learning her husband had died of a heart attack, Mrs. Lee's heart appeared to give out as well. She experienced sudden sharp pains in her chest, felt faint and went unconscious.

When doctors performed an X-ray angiogram expecting to find and treat a blood clot that had caused Mrs. Lee's symptoms, they were surprised: There wasn't any evidence of a heart attack. Her coronary arteries were completely clear.

Doctors eventually determined that Mrs. Lee had suffered from broken-heart syndrome, a name given by doctors who observed that it seemed to especially affect patients who had recently lost a spouse or other family member. The mysterious malady mimics heart attacks, but appears to have little connection with coronary artery disease. Instead, it is typically triggered by acute emotion or physical trauma that releases a surge of adrenaline that overwhelms the heart. The effect is to freeze much of the left ventricle, the heart's main pumping chamber, disrupting its ability to contract and effectively pump blood.

The phenomenon is a "concussion" of the heart, says Scott Sharkey, a cardiologist at Minneapolis Heart Institute. "It's really a heart attack which is triggered by stress rather than by a blocked artery," he says.

For reasons that aren't fully understood, the problem, formally known as stress-induced cardiomyopathy, afflicts mostly women after menopause. The syndrome is relatively uncommon, accounting for an estimated 1% to 2% of people—and about 6% of women—who are diagnosed with a heart attack. In addition to such common emotions as grief and anger, doctors say broken-heart syndrome has been triggered by a person's anxiety over making a speech, a migraine headache or the emotional response to a surprise party. It can be fatal on occasion, but for the most part patients recover quickly, with no lasting damage to their hearts.

In a conventional heart attack, an obstructed artery starves the heart muscle of oxygenated blood, quickly resulting in the death of tissue and potentially permanently compromising heart function. In contrast, the heart muscle in broken-heart-syndrome patients is stunned in the adrenaline surge and appears to go into hibernation. Little tissue is lost. "The cells are alive, but mechanically or electrically disabled," Dr. Sharkey says.

Mrs. Lee's heart was so weakened by her episode in 2005 that she nearly died. The 63-year-old required a special balloon pump to support her left ventricle during the first couple of days in the hospital. But Mrs. Lee, who runs her own clothing repair business in a Minneapolis suburb, was discharged within five days. Despite cautions by her doctors, she attended her husband's funeral a few days later. "I was able to work through my grief both positively and spiritually," she says. "I have no effects of [the heart episode] today."

### *Weak Pumping*

When patients are hospitalized with broken-heart syndrome, their hearts might be pumping at as little as 20% efficiency, a mark of serious heart failure, says Chet Rihal, a cardiologist and director of the catheterization clinic at Mayo Clinic, Rochester, Minn. But within 48 to 72 hours, many recover to the 60% level that is considered healthy. "It's remarkable how quickly this will occur and how quickly they will recover," he says.

The phenomenon was first identified in the early 1990s by Japanese researchers, who named the condition "tako-tsubo" cardiomyopathy, because in X-ray images, the left ventricle affected by broken-heart syndrome takes the shape of a vase-like pot used in Japan to trap octopuses.

The first major studies in the U.S.—one from Dr. Sharkey and his colleagues and another by Ilan S. Wittstein and other researchers at Johns Hopkins University in Baltimore—appeared within 10 days of each other in 2005.

The researchers say that more than 90% of those affected by broken-heart syndrome are post-menopausal women—possibly because lower levels of the hormone estrogen make heart cells in some women more vulnerable to an adrenaline rush. But some men and younger women have also been diagnosed with the syndrome, complicating the estrogen argument. And just last month German researchers reported an episode in a 2-year-old girl who was undergoing surgery. (Her heart recovered fully.)

In any event, experience at the medical centers in Minnesota and Baltimore suggests that the problem afflicts a small portion of the people who arrive at the emergency room with heart-attack symptoms.

"It's a small number, but it's really important to learn how to recognize them," says Dr. Rihal. "The treatment for these patients is really different" than that prescribed for patients with a conventional heart attack. For one thing, it's risky to give a clot-buster drug to a patient without an arterial blockage, due to the potential to cause a stroke.

Doctors don't yet understand the mechanism that causes broken-heart syndrome. Nor are there any established ways to identify people who might be susceptible to the condition or known strategies patients might adopt to reduce their risk.

While doctors use blood-pressure pills such as beta-blockers and ACE-inhibitors to help treat the condition, Dr. Sharkey says that about 20% of patients who suffer an attack of broken-heart syndrome are already on such medications.

"This is so powerful that with currently used doses, we haven't found a way to block it," he says. The problem recurs in about 10% of cases.

Triggers for broken-heart syndrome seem as varied as the number of people affected. While death of

a spouse or other close family member or friend is a common cause, breakups such as a divorce or separation have also sparked the event, according to a study of 136 patients by Dr. Sharkey and his colleagues published Jan. 26 in the Journal of the American College of Cardiology.

For others, being overwhelmed by new software at work, seeing a poultry barn burn down, or losing money at a casino all have brought the condition on, doctors say.

### *Nonemotional Triggers*

But physical stress can cause a broken heart as well. "The emotional aspects get all the press," says Dr. Wittstein of Johns Hopkins. "But nonemotional triggers" are at least as common. A sudden drop in blood pressure, an asthma attack, a surgical procedure, an adverse drug reaction and withdrawal from alcohol are among such causes.

Pat Dorn's trigger, like that of Mrs. Lee, was the health of her husband. She went to awaken him one morning in 2006 and found him in bed lying on his back with his hands crossed over his chest. "I kept slapping his face and calling to him and he didn't respond," she recalls. When an ambulance crew arrived, her husband regained consciousness but seemed disoriented; she worried he was having a stroke.

At Mayo Clinic's St. Mary's Hospital two hours later, she began suffering chest pains. But she was reluctant to tell anyone because she felt her husband still needed her to help describe his condition to doctors. In addition, the retired college English teacher exercised regularly and doubted she was having a heart attack.

### *Wrong Diagnosis*

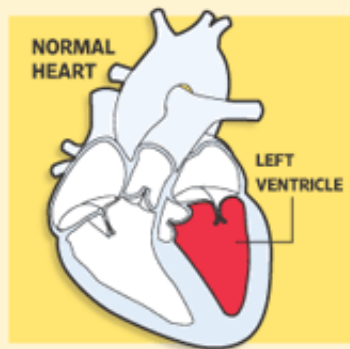
When she finally sought help, nurses at the hospital just looked at her and told her she was having a heart attack. An electrocardiogram supported the assessment. But an angiogram didn't find any blockage and Mayo doctors quickly recognized the tell-tale shape of tako-tsubo shape of her left ventricle that was characteristic of broken-heart syndrome. She spent three days in the hospital and went home the same day as her husband, who recovered from an unusual episode of brain inflammation.

One explanation for broken-heart syndrome may lie in the interaction between adrenaline and heart-muscle cells. Adrenaline causes calcium to rush into heart cells, which is how they contract, Dr. Wittstein explains. Some abnormality in the relationship may result in a calcium overload that stuns the heart.

Researchers are also identifying gene variants that may predispose some people to suffering from the condition, he says.

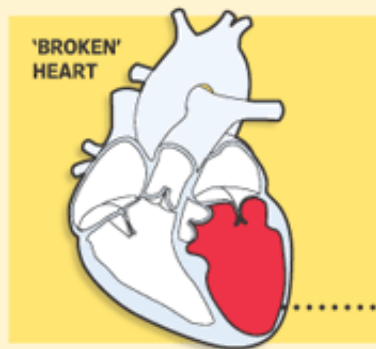
Another question is why some events with strong emotion affect people while others don't. One patient in Dr. Wittstein's research suffered an episode after she entered a dark room and people jumped out to wish her a happy birthday. A year later, her brother died. "You'd think that would be much more stressful, but she didn't get the syndrome."

### Emotional Malady | Intense feelings can cause the heart to change shape



The shape of a normal left ventricle after it contracts to pump blood into the aorta

Source: WSJ research



In a person with broken-heart syndrome, the left ventricle takes on a different shape.



The disorder was first identified in Japan and named after a tako-tsubo octopus trap because of its similar shape.