

MRI-friendly defibrillator implant opens doors for thousands of cardiac patients currently denied MRIs

January 29 2013

Every year an estimated 1.5 million magnetic resonance imaging (MRI) scans are performed in Canada and the number is growing at a rate of about 10 per cent per year. At the same time, a soaring number of Canadians who rely on implanted defibrillators to keep their hearts beating are denied this valuable, life-saving diagnostic test despite a 50 to 75 per cent probability that they will require one over the lifetime of their defibrillator.

It's a win-lose predicament that became very real in December for cardiac patient Justine Bovenkerk, a 35-year-old wife and mother from Newmarket, Ontario, who requires a defibrillator implant to treat a heart condition, yet also needs to undergo regular [MRI scans](#) to monitor a separate health issue. Luckily for Bovenkerk, the Heart Rhythm Program at Southlake Regional Health Centre went the extra mile to solve her case, becoming the first medical team in North America to insert an MRI-friendly [implantable cardioverter](#) defibrillator (ICD) into a patient's heart.

"We were in a bind," said Dr. Atul Verma, Electrophysiologist at Newmarket's Southlake Regional Health Centre, noting that there are no MRI-safe defibrillators currently licensed for use in Canada. The issue is that MRIs can cause disturbances that affect implanted defibrillators, resulting in potential harm to patients.

"One choice would have been to forego the MRI and use CT scans which would have been less effective as a [monitoring tool](#), and the other was to use an MRI-safe pacemaker which would not have provided the full protection against [cardiac arrest](#) that her heart needs," explained Dr. Verma. "We didn't feel good about either option."

After learning about an MRI-safe defibrillator widely used in Europe – the Lumax ProMRI supplied by Biotronik Canada Inc. – Southlake's Heart Rhythm Program applied for and received Health Canada's approval to use the device to treat Bovenkerk. The minimally-[invasive procedure](#) was performed on December 24, allowing the young mother to be home with her family on Christmas Day – the only gift her six-year-old son requested from Santa Claus.

"When they told me they finally made a decision and I would be the first, I was a little bit nervous," said Bovenkerk, referring to Southlake's Heart Rhythm team as her heroes. "But at the same time, I started to cry because I was so happy to learn that I'd be able to spend the holiday with my family."

"It was a true team effort, from the triage co-ordinator who helped to schedule the procedure at the last minute, to the nurses who worked a little later than normal on one of the most popular holidays of the year," noted Dr. Verma.

The MRI-friendly defibrillator is implanted in the same manner as other ICDs, using a small incision near the collar bone. Wires are floated through the veins and attached to the heart while the "brains" of the device, stored on a tiny computer chip, are inserted under the skin near the incision. If the patient's heart starts to beat too rapidly or too slow, the device will readjust the beats to a normal rhythm. If a patient goes into cardiac arrest, it will shock the heart in the same manner as defibrillator panels used outside the body.

"Heart disease is the number one killer of Canadians and defibrillators are increasingly used for anyone who is at risk of cardiac arrest, including people who have had prior heart attacks, people who have advanced degrees of heart failure or people with special inherited conditions as in the case of Justine," Dr. Verma explained. "Meanwhile, MRI is becoming the diagnostic test of choice. Normally, a radiologist will say no to a patient with an ICD, and now we have a solution."

Currently, the only MRI-safe device available in Canada is a pacemaker which differs from a defibrillator because it can only speed up the heart when it beats too slowly. It does not have the capability to slow down the heart when it beats too rapidly and cannot shock the heart in the event of cardiac arrest. Last year, 8,300 defibrillator implants were performed in Canada, a number that is growing at a rate of 10 to 15 per cent annually.

What sets the Biotronik device apart from other defibrillator implants is a special programming feature that provides an MRI mode, allowing patients to safely undergo an MRI scan with the wave of a wand – literally.

"There's a wireless wand we wave over the patient to download information from any implanted defibrillator to a laptop," explained Dr. Verma. "If you need to program the device differently – or in this case, set the MRI mode – you just type in what you need, wave the wand again, and it automatically updates the device inside the patient."

Expected to receive Health Canada approval in the coming months, the MRI-friendly [defibrillator](#) represents a giant step forward, he adds. For example, the MRI-safe mode alerts the device that it is about to detect an abnormal amount of background noise or disturbance due to the magnetic fields used in an MRI so that it can adjust accordingly. This removes the risk of the MRI interfering with normal performance of the device and potentially causing harm to a patient. MRI-friendly

defibrillators also have slight differences in structure and composition that make them safer to operate in magnetic fields.

For Bovenkerk, who lost her younger brother to the same heart condition, the device has relieved the worry and strain of not knowing when cardiac arrest may occur. It also gives her peace of mind to know that she can now undergo routine MRI scans safely.

"They don't know how many MRIs I'm going to need in my lifetime," she said. "I feel amazing and I'm not worried any more about what could happen."

"At Southlake, our culture is one of innovation," says Dr. Dave Williams, Southlake President and CEO. "We relentlessly challenge ourselves to find new ways to achieve more successful outcomes for our patients. The fact that Justine Bovenkerk can now receive the diagnostic testing she needs speaks volumes. As an organization, we could not be more thrilled."

Provided by Southlake Regional Health Centre

Citation: MRI-friendly defibrillator implant opens doors for thousands of cardiac patients currently denied MRIs (2013, January 29) retrieved 24 April 2024 from <https://medicalxpress.com/news/2013-01-mri-friendly-defibrillator-implant-doors-thousands.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.