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## RFID Chips Could Help Surgeons Avoid Leaving Sponges In Patients

The same technology that prevents thefts in clothing stores could also help surgeons keep track of instruments and gauze sponges during medical procedures, according to a preliminary study at the Stanford University School of Medicine. In the study, researchers used tiny chips called radio frequency ID tags attached to surgical sponges to locate the sponges in the body before the operation ended.

Alex Macario, MD, MBA, professor of anesthesia and lead author of the study to be published in the July issue of Archives of Surgery, said that although procedures are in place to track objects during surgery, errors do still occur and sponges or instruments are sometimes left in the patient's body. "This risk significantly increases in emergencies, with unplanned changes in procedure and with patients that have a higher body-mass index," Macario said.

According to one previous study in Massachusetts, foreign objects were left in the body in one out of every 10,000 surgeries. In another study, those objects added four days to an average hospital stay and resulted in 57 U.S. deaths in 2000. Two-thirds of all objects left in the body cavity were sponges.

Current procedures for tracking instruments and sponges involve a baseline count before surgery begins, a second count before the surgeon begins sewing the incision and a final count before closing the skin. However, Macario pointed out that hospitals have a variety of supplemental tracking methods. For instance, at Stanford Hospital all high-risk patients, such as emergencies or surgeries lasting more than 10 hours, receive an X-ray before leaving the operating room, he said.

For the study, Macario used sponges developed by ClearCount Medical Solutions Inc. in Pittsburgh that were rigged with a 20mm diameter radio-frequency ID chip. These RFID chips are the same type of devices that are attached to clothes and trip an alarm at retail store doorways.

In eight surgeries at Stanford, involving patients who consented to be part of the trial, a surgeon inserted one or two of the tagged sponges while the patient's incision was still open. Another surgeon then used a prototype 12-inch wand attached to a device about the size of toaster oven to detect the sponge while the other surgeon held the incision closed.

In each case, the surgeon accurately located the inserted sponge or sponges in less than three seconds. The wand never failed to detect a sponge and never indicated a sponge when none was present. In a survey given as part of the study, the surgeons said they liked the speed and accuracy of the technique, though they found the prototype wand to be cumbersome. He said the company is testing a smaller device elsewhere.

Macario said that in the future he thinks RFID tags will track all surgical items and supplies throughout a surgery as they enter and leave a patient's body. "The technology to achieve this is not there yet because tagging a small pair of steel scissors, or even a small sponge, has not been entirely worked out," he said. For instance, the RFID tag used in the study is larger than some surgical instruments used during surgery. The tag might also interfere with the use of some instruments.

Macario said that any future procedure using RFID tags would likely be combined with counting and possibly other approaches for the greatest chance of detecting all retained objects. "We need a system that is really fail-safe; where, regardless, of how people use

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this technology, the patient doesn't leave the operating room with a retained foreign body."

The study was funded by the National Institutes of Health and by a grant from the Small Business Innovation Research Program. Macario has no financial interests in the company. The study's co-authors, Dean Morris and Sharon Morris, own several patents related to RFID-tagged sponges. Dean Morris is a director and Sharon Morris is a nursing consultant for ClearCount Medical Solutions, which produces the sponges and scanning device used in the study.

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