Magnetic system could be key to surgery without scars

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Physicians at UT Southwestern Medical Center and engineers at UT Arlington have collaborated to invent a groundbreaking system that could be key to delivering on the promise of surgery without scars.

The new technique, which is still in the developmental stage, allows for magnetically maneuvering laparoscopic surgical tools inserted into the abdominal cavity through the bellybutton or throat. The challenge remains, however, to design the new instruments and determine just how to move them once they're inside the human body.

"A fixed hole has a limited working envelope that is conical in shape," said Dr. Jeffrey Cadeddu, associate professor of urology and radiology and director of the Clinical Center for Minimally Invasive Treatment of Urologic Cancer. He and his colleagues describe the new surgical concept, called the Magnetic Anchoring and Guidance System, in the March edition of *Annals of Surgery*.

The idea of using magnets to manipulate the instruments in the abdominal cavity was formulated after Dr. Cadeddu watched a television show featuring teens who used magnets to hold studs on their lips to avoid getting their lips pierced.

"Once you think about, it's an obvious thing," said Dr. Cadeddu, whose team of urologists and surgeons worked with engineers from UTA's Automation and Robotics Research Institute and the Texas Manufacturing Assistance Center to build the prototype.

The system uses a stack of magnets outside the abdomen to attract other magnets attached to laparoscopic instruments inside the abdomen. Surgeons can then move the outside magnets to position an internal camera at the best spot for seeing or to move a retractor or other surgical instrument. Once optimally positioned, the instruments can be locked in place. That allows a much greater range of maneuverability and the surgical team can more easily reposition the camera or instrument, said Dr. Cadeddu.

In animal studies, surgeons have been able to successfully remove a kidney using the Magnetic Anchoring and Guidance System.

While working on the system, Dr. Daniel Scott, assistant professor of surgery, joined UT Southwestern as director of the Southwestern Center for Minimally Invasive Surgery. He said the technology may solve the fundamental problem of guiding instruments through the abdomen for natural orifice surgery, which now inserts the instruments through the throat, colon or vagina.

“The current state of the art for laparoscopic surgery requires four or five holes. The question behind this is, can we do the surgery through only one hole and can we hide the hole in a cosmetically advantageous or less painful location,” Dr. Cadeddu said.

Study researchers concluded that “the ability to reduce the number of trocars (holes) necessary for laparoscopic surgery has the potential to revolutionize surgical practice,” but noted that there will be a learning curve for the new system and that because of the expanded maneuverability, surgeons will likely need to develop new techniques.

Also, until the system is fully tested in humans, surgeons won’t know whether fewer entry points will result in fewer complications or faster healing, advantages usually seen in moving from conventional surgery to

laparoscopic surgery.

Source: UT Southwestern Medical Center