

Can you feel the force?

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Engineering students from the University of Leeds have found a way to let surgeons keep their sense of touch when operating at a distance with ‘keyhole’ techniques.

The system could help cancer surgeons who like to feel the tissue they are cutting out - an important way of double-checking where the tumour is and if it is malignant or benign.

[Keyhole surgery](#), in which surgeons operate through tiny incisions, has many benefits for patients. It reduces the chance of complications, shortens hospital stays and speeds up recovery times.

But at the moment, surgeons who work 'through the keyhole' cannot feel the tissue they are operating on, as they would during open surgery. This means they are unable to tell the character of a suspicious lump- an important way of diagnosing cancer.

The system devised and tested by the University of Leeds students should give surgeons that hands-on feeling back when they use keyhole techniques. The students' solution combines a computer-generated environment for virtual surgery and a hand-held device that applies pressure to the users' hand. What the user feels will depend on how hard they are compressing the virtual tissue.

Team members set up the system to simulate keyhole surgery on the liver. They gathered measurements from a soft block of silicon to simulate what surgeons would 'feel' during keyhole procedures and fed these into their hand-held device. They tested the system by embedding hard ball-bearings in the artificial, silicon liver and checking whether users could find them.

"This system might help surgeons to become more accurate in theatre," said University of Leeds engineering student, Earle Jamieson. "Haptic devices that give users sensory feedback are becoming more common in surgery, but none of them quite match that true hands-on feeling. With our system, users can interact with the tissue they are operating on throughout the surgical procedure."

"Judging from the feedback the students have received from practising surgeons, this system has real, clinical potential," said Dr. Peter Culmer, a Senior Translational Research Fellow in Surgical Technologies, who supervised the work. "In the short-term, it could be used as a training tool to help surgeons get a feel for keyhole surgery - quite literally. Looking further ahead, systems such as this could become used in operating theatres on a daily basis."

"The haptic system that these students have developed goes a long way to solving one of the main disadvantages of keyhole surgery, namely the ability of the surgeon to feel the structure they are operating on," said David Jayne, Professor of Surgery at the University of Leeds and a

consultant surgeon at Leeds Teaching Hospitals NHS Trust, who tested the system in the laboratory. "If this research can be translated into the clinical setting, then it has the potential to offer benefits to [surgeons](#) and patients."

Provided by University of Leeds

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