CEDARS-SINAI MEDICAL CENTER NEWS

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HIGHLIGHTS:
Surgery to remove herniated discs in the thoracic spine (the 12 vertebrae in the chest area of the spine) is potentially dangerous because the spinal cord is often compressed by the herniated discs. Neurosurgeons and orthopedic surgeons at the Cedars-Sinai Institute for Spinal Disorders have pioneered combining 3-D computer-guided imaging technology with endoscopic techniques to improve the surgeon's depth of field and spatial orientation, thus potentially improving the safety, accuracy and efficiency of this complex procedure.

COMBINING ENDOSCOPIC AND COMPUTER TECHNOLOGIES MAY IMPROVE SAFETY, ACCURACY AND EFFICIENCY OF COMPLEX SPINAL SURGERY

LOS ANGELES (April 27, 2006) – The next generation of thoracic disc surgery is being pioneered at Cedars-Sinai Medical Center with the introduction of three dimensional (3-D) computer-guided imaging to the operating room.

"There are only a small number of centers in the United States who have surgeons routinely doing endoscopic thoracic disc surgery," says J. Patrick Johnson, M.D., director of the Cedars-Sinai Institute for Spinal Disorders. "But we are one of only two centers in the world (the other is in France) combining endoscopic and computer-guided surgery. Combining these technologies has the potential to improve the safety, accuracy and efficiency of the procedure."

Thoracic disc surgery is done to remove one or more of the small discs located between each of the vertebrae in the thoracic (mid-section) of the spine. When these discs become damaged − either by injury, disease or normal wear and tear − they may bulge or rupture. Most herniated discs heal on their own over time; some cause continual pain or numbness when pressure from the disc is put on the nerve roots or spinal cord.

This surgery, Johnson says, is "quite unusual and statistically accounts for somewhere between one and four percent of disc herniation surgeries. If you're a surgeon in the community you might see one patient each year (with a herniated thoracic disc) or one every other year." Patients are referred to Johnson and his colleagues who have performed a total of 40 of these procedures over the last two years.

Thoracic herniated discs in front of the spinal cord require that the surgery is done through the chest with the patient lying on his back. "It's a potentially dangerous operation because the spinal cord is often compressed by the herniated discs."

Before a thoracoscopic discectomy is performed, computerized tomography (CT) images of the patient's spine are taken. These images are then transferred to a computer and reformatted into 3-D views which the surgeon uses to plan the procedure.

In the operating room, the patient's position in the surgical field is aligned with the 3-D views to ensure the proper placement of the surgical instruments. An endoscope (a thin, telescope-like instrument connected to a tiny video camera) is inserted through small incisions in the patient's chest. Images produced by the

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endoscope's camera combine with the computer-guided images to provide views of the spinal anatomy that were previously hidden from the surgeon's sight.

"The true advantages of combining image guidance with thoracic endoscopic spinal procedure are that the surgeon now has depth of field and spatial orientation which allows him to track his surgical instruments more accurately throughout the procedure. Without computer-guidance imaging, the surgeon needs to cognitively convert 2-D images from a monitor into a 3-D surgical field which is very difficult to do, even for an experienced endoscopic spinal surgeon," explained Johnson.

In a clinical study reported in the October, 2005 issue of *Spine*, Johnson (the study's first author) reported on 16 patients between the ages of 38 and 78 years who underwent computer-guided thoracoscopic discectomies rather than the traditional open thoracotomy (disc surgery which requires a large incision in the chest). The operating time for these surgeries was approximately 30 percent less than previously published data for thoracoscopic discectomy (using an endoscope alone) and there were no major complications from the discectomy procedures nor from the image-guided procedures.

"Our initial experience with image-guided thoracoscopic discectomy has revealed that this technique is extremely useful and could potentially be applied to a variety of other minimally invasive spinal procedures including lumbar and cervical disc operations," said Johnson.

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