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News Update

A 1, 2005

Focused ultrasound fries pancreatic cancer

by H. A. Abella

High-intensity focused ultrasound ablation has proven effective for tumors of the breast, uterus, and liver. Researchers in China have successfully added pancreatic cancer to the list of useful applications, according to a study in the September issue of *Radiology*.

Most patients with pancreatic cancer are diagnosed when their disease has reached an advanced stage. Surgical resection generally is not an option, and more than 80% of them will die within months, while less than 5% survive beyond five years. The clinical literature recognizes several minimally invasive ablation techniques as safe and effective palliative alternatives, but all of them face limitations.

High-intensity focused ultrasound ablation could change physicians' pessimistic attitude toward the conventional therapeutic approaches, said principal investigator Dr. Feng Wu, a professor of surgery at Chongqing Medical University as well as a senior research scientist at Oxford University.

"HIFU is a noninvasive therapy. It can ablate a targeted tumor in a 3D fashion, without any limitation in tumor size," Wu said.

Wu and colleagues enrolled eight consecutive patients with unresectable pancreatic disease in their prospective trial ranging from December 2000 until September 2002. All patients underwent ultrasound-guided HIFU under general or epidural anesthesia. The investigators found HIFU could safely and effectively treat patients with unresectable cancer in the body and tail of the pancreas. Four patients remain alive to date.

A medical team comprising three surgeons, an oncologist, and an interventional radiologist with more than 20 years of experience oversaw each procedure. Tumors treated reached 8 x 7.5 cm in diameter (mean, 5.89 x 5.40 cm). The ablation system included a 12-cm-diameter HIFU transducer with an integrated diagnostic probe for real-time guidance and monitoring assembled in a bag filled with degassed water.

Patients remained hospitalized for at least one week after ablation for liver function and other tests. Follow-up imaging included color Doppler ultrasound, conventional and contrast-enhanced single-slice CT, and 1.5T MR scanning.

Minimally invasive ablative techniques applied in pancreatic tumors -- including percutaneous ethanol injection, radiofrequency ablation, laser, and cryoablation -- are prone to setbacks. Some may "seed" malignant cells along the needle track after

ablation, while others can cause hemorrhages from visceral or vascular puncture.

HIFU is neither complication- nor limitation-free. Ultrasound cannot penetrate air-filled viscera, so HIFU may not be suitable for tumors in the lungs or bowel. Acoustic windows or tumor position and location may also present an impasse. HIFU may not be safe to treat tumors that are too close to the heart or gallbladder.

Although HIFU's ultimate goal is cure, most patients who have undergone treatment have had advanced pancreatic cancer. HIFU's therapeutic value has therefore been restricted to securing palliation for pain and other symptoms. Further development and more experience from clinical trials, however, should guide application of the technique for cure intent in early-stage patients, Wu said.

Results from four clinical trials at Oxford in patients with liver and kidney cancer show the procedure is feasible, safe, and effective. The technique has been introduced in clinical practice in Japan, South Korea, and Malaysia, Wu said.

HIFU has a long way to go before achieving full recognition in this setting. In the meantime, researchers are exploring multiple avenues of use. Scientists speculate that HIFU could be used in combination with other therapies or as an aid for targeted gene-therapy delivery. If confirmed, HIFU's application could change the course of disease and prognosis for patients with pancreatic cancer and other malignancies.

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