Novel interventional radiology treatment with microspheres shows promise for liver cancer patients

March 17 2010

An interventional radiology treatment—the use of intra-arterial yttrium-90 microspheres for liver cancer (also known as hepatocellular carcinoma)—shows promise in prolonging life for many patients with this devastating condition, according to researchers at the Society of Interventional Radiology's 35th Annual Scientific Meeting in Tampa, Fla.

"This is encouraging news for liver cancer patients, especially those who also have blockage in the portal vein. While patients aren't cured, their lives are being extended and their quality of life is improving with yttrium-90 microsphere treatment," said Riad Salem, M.D., MBA, director of interventional oncology at the Robert H. Lurie Comprehensive Cancer Center at Northwestern Memorial Hospital in Chicago, Ill. "This unique interventional radiology treatment, which combines the radioactive isotope Y-90 into microspheres that deliver radiation directly to a tumor, is a particularly elegant way to give patients a cancer treatment that doesn't harm the healthy cells. Patients don't feel sick or have many of the side effects that happen with standard cancer treatments," added Salem, an interventional radiologist and professor of radiology, medicine and surgery at Northwestern University in Chicago, Ill. In a 291-patient study, patients with Child-Pugh A disease, with or without portal vein thrombosis (blood clot), benefited the most from Y-90 treatment, said Salem, with some patients surviving more than 20 months. Child-Pugh A patients with branch portal vein thrombosis

survived nearly 17 months. "These are early promising results. This information can be used to design future Y-90 trials and to describe Y-90 as a potential treatment option to liver cancer patients," he added.

About 18,500 cases of primary liver cancer are diagnosed each year; the most common form is hepatocellular carcinoma, a tumor that begins in the main cells of the liver (hepatocytes). Primary liver cancer is twice as common in men as in women and occurs most frequently in those who have a form of liver disease called cirrhosis. Cirrhosis occurs when the liver becomes diseased and develops scarring, usually over a period of years. The liver attempts to repair or regenerate itself; this process can lead to the formation of tumors. In the United States, the most common causes of cirrhosis are alcohol abuse and chronic infection with the liver virus hepatitis B or C. Many patients with liver cancer have impaired liver function due to underlying cirrhosis and/or the tumors themselves. They are then at increased risk for liver toxicity from any liver cancer treatment. In the United States, approximately 50□□ percent of patients with primary liver cancer die of tumor progression and 40□□ percent die from advancing cirrhosis and subsequent liver failure.

Liver cancer treatment options are limited, said Salem. Although surgical removal of liver tumors offers the best chance for a cure, it is not possible for more than three-fourths of primary liver cancer patients. Liver tumors are often inoperable because the tumor may be too large or have grown into major blood vessels or other vital structures. Sometimes many small tumors are spread throughout the liver, making surgery too risky or impractical. Historically, chemotherapy drugs and external radiation therapy have been ineffective at curing inoperable liver cancer. Additionally, due to the compromised liver function of liver cancer patients, physicians must be careful that cancer treatments do not cause additional liver damage and toxicity, which could lead to death.

"For these patients, minimally invasive treatments offer them an option

that can give them more time," said Salem. Tumors need a blood supply, which they actively generate, to feed themselves and grow. As vascular experts, interventional radiologists are uniquely skilled in using the vascular system to deliver targeted treatments via catheter throughout the body, he added. In treating cancer patients, interventional radiologists can attack the cancer tumor from inside the body without medicating or affecting other parts of the body. Y-90 treatment adds to interventional radiology's nonsurgical advances for liver cancer, such as delivering chemotherapy directly to the affected organ (chemoembolization), killing the tumor with heat (radiofrequency ablation) or freezing the tumor (cryoablation) to treat cancer locally.

Combining the radioactive isotope Y-90 into microspheres to deliver radiation directly to a tumor allows for a higher, local dose of radiation to be used—without subjecting healthy tissue in the body to the radiation. Each microsphere is about the size of five red blood cells in width. These beads are injected through a catheter from the groin into the liver artery supplying the tumor. The beads become lodged within the tumor vessels where they exert their local radiation that causes cell death. Y-90 radiates from within and, since it is administered via the hepatic artery, it can be viewed as "internal" radiation, said Salem. Y-90 treatment is approved by the Food and Drug Administration for the treatment of unresectable hepatocellular carcinoma.

In the study, 291 patients with hepatocellular carcinoma were treated with intra-arterial yttrium-90 microspheres as part of a single-center prospective study. Researchers administered 526 (average, 1.8) Y-90 treatments. Researchers reviewed 1,250 scans to assess response and time-to-progression (a surrogate marker that might imply—but does not prove—improved survival). Survival by stage was assessed. Overall time-to-progression was 7.9 months, said Salem. In other words, it took a median 7.9 months for the tumors to regrow after treatment. In oncologic standards for this disease, this is a very promising finding, said

Salem. Survival times differed by the cancer staging system used: Child-Pugh A (17.2 months) and Child-Pugh B (7.7 months) and by Barcelona Clinic Liver Cancer staging (A, 26.9 months; B, 17.2 months). Researchers used baseline age; sex; performance status; presence of portal hypertension; tumor distribution; levels of bilirubin, albumin and alpha-fetoprotein; and World Health Organization/European Association for the Study of the Liver response rates to predict survival. Toxicities included fatigue (57 percent), transient pain (23 percent), nausea/vomiting (20 percent) and exhibited grade 3/4 bilirubin toxicity (5 percent).

Provided by Society of Interventional Radiology