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Radioactive beads can help treat liver cancer - In this treatment, millions of the glass or polymer beads are injected into the liver's main artery to help destroy the tumors.

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Author: *Miami Herald, By Rebecca Burton*

Patients with liver cancer typically have few choices of treatment: chemotherapy directly to the liver (chemoembolization), removal of part of the liver, or a liver transplant.

Now, millions of tiny radioactive beads can be injected directly into the liver's main artery to help destroy the tumors in a process called radioembolization. The treatment is used primarily for treating patients with unresectable hepatocellular carcinoma (HCC), the most common form of primary liver cancer.

The beads — about one-third the width of a human hair strand — are inserted by a catheter into the hepatic artery, one of two arteries that supply blood to the liver.

The beads become lodged in the tumor, emitting radiation over the course of several weeks. Patients receive treatments every four weeks, usually as an outpatient procedure.

Studies show that the general survival rate grows from a minimum of three months to three years with the treatment, according to research by Radiology Today.

Two companies manufacture the beads. One, the Canadian-based Nordium, calls its treatment Therasphere and uses glass beads. The other, the Australian-based Sirtex, uses polymer beads in a treatment called SIR-sphere. Both treatments use yttrium-90, a radioisotope that emits pure beta radiation.

Dr. Shaun Samuels, interventional radiologist with Baptist Cardiac and Vascular Institute, said both treatments work the same way. He said the only difference is that the SIR-sphere beads have less radioactivity per particle, meaning more have to be used per treatment.

Arterial roadmap

The treatment is a two-step process. The first step, an arteriogram, involves dye injected into the liver's blood vessels to determine how the blood flows to the liver. Samuels described it as a roadmap of the arteries; without the map, the beads run the risk of flowing to somewhere other than the tumors.

The next step is called an MAA profusion scan. In this, a radioactive isotope, technetium, is injected through the upper leg via a catheter, through the femoral artery and into the hepatic artery. The technetium acts as a dye and shows how much blood flows from the patient's liver to their lungs. If the blood flowing is greater than 20 percent, too much radiation would

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get into the lungs. The dose may need to be lowered or the patient may need to undergo a different treatment.

After the two steps are cleared and the dose is calculated, the patient is ready to have the beads inserted into the hepatic artery. A radiation oncologist is the only one who can handle the radioactive material.

“You really have to plan this out like a chess game,” Samuels said. “It requires a fair amount of diligence with everyone involved.”

Question of timing

He also said that since radioactive particles have a short shelf life — approximately three days — the timing has to be perfect. If the patient is sick or has a family emergency, the dose, which costs about \$14,000, is wasted. The procedure is approved for Medicare reimbursement, though some insurance companies decline based on the cost.

To be a candidate for the procedure, the tumor cannot occupy more than 70 percent of the liver’s volume, said Dr. Allie Garcia-Serra, radiation oncologist at Baptist Cardiac and Vascular Institute. The liver also has to be functioning adequately.

The University of Miami’s Miller School of Medicine also performs radioembolization.

Samuels said when it comes to choosing between chemoembolization or radioembolization, there are key differences. In general, chemoembolization introduces less toxins in the body, but patients take longer to recover from the side effects. Side effects include fatigue, chills, fever, nausea, vomiting and headaches. Radioembolization has the same flu-like side effects, just less severe and only lasting about a week after each treatment.

Since the radioactivity decays quickly, Samuels said the beads have not been known to cause any adverse problems, especially with the primer steps to make sure the toxic material doesn’t get into other organs.

For three days, while the beads are still active, patients should avoid contact with pregnant women, sleep alone and not have physical contact with anyone for more than two hours, doctors say. This is a precaution to avoid spreading the radiation to others.

“With chemoembolization, patients will feel like they got hit by a truck,” Samuels said. “But with radioembolization, they barely complain at all. Both treatments are equally effective.”

Samuels also said he encourages patients with larger tumors to go the radioactive route because of the less severe side effects.

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