Cancer Investigation, 25(S 1):55-56,2007
ISSN: 0735-7907 print/ 1532-4192 online

001: 10.1080/07357900701571916

Neuroendocrine Tumors

RADIOEMBOLIZATION FOR NEUROENDOCRINE HEPATIC METASTASES

Andrew S. Kennedy'; Richard Warner", Patrick McNeillie3 , William A. Dezarnl, Doug Coldwell", Charles Nutting" , Dennis Carter-' , Ravi Murthy", Steven Rose7 , David Liu" , Carroll Overton", Riad SalemLO, 1Wake Radiology Oncology, Cary, NC; 2Mt. Sinai Medical Center, New York, NY; 3University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, NC; "University of Texas, Dallas, TX; 5Skyridge Medical Center, Denver, CO; 6The University of Texas MD Anderson Cancer Center, Houston, TX; 7 University of California, San Diego, San Diego, CA; 8St. Vincent's Hospital, Portland , OR; 9Wake Radiology, Raleigh, NC ; LONorthwestern Medical Center, Chicago, lL

Introduction: Hepatic metastases are a major problem for nearly all patients with neuroendocrine malignancies. Tumor-related symptoms range from pain and carcinoid syndrome to liver dysfunction, ascites, and death from liver failure secondary to tumor bulk. Local therapies have consistently shown the ability to decrease symptoms, and some reports show improved survival with liver-directed therapy. Recently the use of radioactive microspheres has gained popularity as an effective treatment for hepatic metastases from colorectal tumors and hepatocellular cancers.

Materials and Methods: Eight institutions collaborated in a retrospective analysis of all patients treated with resin 90Y-microspheres (Yttrium-90), a pure beta-emitting radioisotope with a short effective range (3 mm) in tissue . The microsphere carrier is approximately 32 microns in diameter, and permanently binds the 90Y such that no leaching occurs. Microspheres are released in the hepatic artery close to the hepatic tumors and become permanently implanted in tumor. Data reviewed included demographics, treatment indices, and acute and delayed toxicity according to the Common Toxicity Criteria (CTC) 3.0, imaging and biochemical response and overall survival.

Results: A total of 140 patients were treated, 70 male and 70 female. The median age at treatment was 59 years (26-95 years), and median performance status ECOG 0 (0-3). The primary site was known for 132/140 (94.3%) patients and unknown in 8/140 (5.7%), with small intestine the most common (69%), followed by pancreas (17%); lung (4%); colon (2%); kidney and ovary (I %). Previous non-radioactive therapies had been delivered in 84% of all patients. The most common histology was carcinoid not otherwise specified (NOS) comprising 116/140 (83%) of all cases; islet cell (13%); insulinoma (2%); atypical pulmonary and glucogonoma each (3%); gastrinoma (2%); and VIPoma (I case). All patients received resin 90Y-microspheres, with the activity of radiation to be implanted determined in all cases by the body surface area method. Macroaggregated albumin 99mTc (MAA) scanning confirmed that the potential shunt of microspheres from the liver to the pulmonary circulation was low, medi an 4% (range 0-34.1 %). The intended treatment volume of the liver was known for 174/177 (98.3 %) of treatments. The right lobe was most frequently treated 77/174 (44.2%); followed by whole liver 65/174 (37.3%) and left lobe in 32/174 (18 .3%). The total activity delivered per individual treatment was relatively low, about I GBq (27 mCi) with the median 30.3 mCi (9.0-90.0 mCi) . Toxicity for acute (0-30 days) and delayed (31+days) time periods demonstrated 67% grade 0-2 for GI, constitutional and hepatic systems. Grade 3 toxicities included fatigue (10%), abdominal pain (6%), and nausea (3%), with the remaining cases (14%) a combination of all three. Response data was available for 161/177 (90%) of treatments, with 107 partial, 41 stable, 4 complete and 9 progressive disease. Median survival is 70 months from the day of treatment with 108 patients still alive and 32 dead . No cases of radiation-related liver failure occurred. Retreatment of the liver was completed in 32 patients ; three treatments in four patients, and one patient received four separate treatments.

Conclusions: Internal radiation to the liver for extensive hepatic metastases from neuroendocrine tumors has demonstrated significant activity and efficacy. The low toxicity from treatment , low amount of radiation used, and ability to retreat the liver for new lesions or incompletely destroyed original lesions is a useful feature. Extensive prior systemic and non-radioactive hepatic therapy did not interfere with successful delivery of90Ymicrospheres. Given these data, microsphere therapy should be considered for hepatic metastases for all subtypes of neuroendocrine malignancies.