

The Use of Intraoperative Ultrasound Guided Radiofrequency Ablation for Cytoreductive Surgery of Liver Metastases from Pancreatic Neuroendocrine Tumors

Jung Sung Choi MD, Pamela J. Hodul MD, Larry K. Kvols MD, Jonathan Strosberg MD, Mokenge P. Malafa, MD

Department of Oncologic Sciences, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL USA

Background: Surgical cytoreduction is an important option for management of hepatic metastases from pancreatic neuroendocrine tumors (PNET). However, optimal cytoreduction by resection alone is often limited by the extent of tumor volume or tumor distribution within the liver. The purpose of this study was to assess the utilization of intraoperative ultrasound guided radiofrequency ablation (RFA) to achieve optimal cytoreduction in patients with PNET and to assess for disease progression following treatment.

Methods: A prospective database of 84 consecutive metastatic neuroendocrine carcinoma patients undergoing surgical treatment at our institution from 1999 to 2010 was retrospectively queried for radiofrequency ablation of liver metastases for cytoreduction from PNET. Patients were evaluated for the use of radiofrequency ablation alone or in combination with resection to achieve optimal (greater than 80% to 90%) cytoreduction. Progression of disease following surgery was evaluated by cross-sectional imaging studies.

Results: 23 patients were identified with a diagnosis of pancreatic neuroendocrine carcinoma with biopsy proven or suspected liver metastases. Of those patients IOUS demonstrated no liver lesion in one patient. Biopsy of liver lesions in two patients demonstrated hemangiomas and bile duct hamartoma in a third patient. IOUS guided RFA was performed in 20 patients. The median age at diagnosis was 48.7 years and at the time of cytoreductive

surgery was 50.6 years. The average time of follow up was 6.7 years from diagnosis (range 2.3 to 15 years). Of the 20 patients undergoing cytoreduction with RFA a total of 73 ablations were performed (range 1 to 9 ablations). 16 of these patients also had one or more segmental or wedge resections with RFA and 9 patients having distal pancreatectomy and splenectomy. Optimal cytoreduction was achieved as assessed by IOUS in 16 of 20 patients.

On follow up imaging 5 patients remained without disease progression and one patient had no evidence of disease in the liver. 14 patients demonstrated disease progression (enlarging residual tumors or new liver metastases) at 0.3 to 4.5 years (average 1.9 years). 2 of these patients had repeat cytoreductive surgery. Multiple additional treatment options were provided for disease progression including chemotherapy, embolization, radioembolization, external beam radiation, and lutetium.

Conclusions: The use of intraoperative ultrasound guided radiofrequency ablation is a reasonable option to increase the likelihood of achieving optimal cytoreduction of liver metastases in PNET. Additional treatment options become necessary for the management of disease recurrence or progression in the majority of these patients.