

Clinical and Imaging Follow-up Practices after Transarterial Therapy for Primary and Secondary Hepatic Malignancies:

Results of an Online Survey

Ron C. Gaba, MD, Mark O. Baerlocher, MD, Boris Nikolic, MD, Aradhana M. Venkatesan, MD, Robert J. Lewandowski, MD

Abbreviations

IO Interventional Oncology; **IR** Interventional Radiology; **LRT** locoregional therapy; **SIR** Society of Interventional Radiology; **CT** computed tomography; **TACE** transarterial chemoembolization; **c-TACE** conventional transarterial chemoembolization; **DEB-TACE** drug-eluting bead transarterial chemoembolization; **⁹⁰Y RE** yttrium-90 radioembolization; **HCC** hepatocellular carcinoma; **mCRC** metastatic colorectal carcinoma; **mNET** metastatic neuroendocrine tumor; **ICC** intrahepatic cholangiocarcinoma; **MR** magnetic resonance; **PET** positron emission tomography; **mRECIST** modified Response Evaluation Criteria in Solid Tumors; **WHO** World Health Organization; **EASL** European Association for the Study of the Liver

Rationale and Objectives: To characterize practices and quantify variation in longitudinal follow-up approaches among interventional radiologists (IRs) after liver transarterial locoregional therapy (LRT) in contemporary Interventional Oncology practice.

Materials and Methods: In November/December 2014, Society of Interventional Radiology members were invited to participate in a survey regarding clinical and imaging follow-up of liver cancer patients treated with transarterial LRT. On survey closure, responses were compiled and analyzed.

Results: The 30-item survey response rate was 11% (361 of 3290). Respondents were predominantly American IRs (311 of 355, 88%) who perform 1–5 LRTs monthly (196 of 354, 55%). Most (305 of 336, 91%) IRs reported longitudinal follow-up, with patient encounters within 1-month (73%, 211 of 290) postprocedure and every 3 months (68%, 196 of 287) thereafter and involvement in imaging (up to 80%, 235 of 290) ordering and evaluation. Preferred timing of first follow-up imaging (1 month vs. 3 months) and response criteria used (mRECIST favored) varied.

Conclusions: Although IRs are actively involved in clinical and imaging follow-up of patients with liver malignancies treated with transarterial LRTs, there are differences in imaging frequency and response assessment. These data may serve as a starting point for standardization of LRT follow-up.

Key Words: Transarterial therapy; follow-up; hepatic malignancy; survey.

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From the Department of Radiology, Division of Interventional Radiology, University of Illinois Hospital and Health Sciences System, 1740 West Taylor St, MC 931, Chicago, IL 60612 (R.C.G.); Department of Radiology, Royal Victoria Hospital, Barrie, Ontario, Canada (M.O.B.); Department of Radiology, Stratton Medical Center, Albany, New York (B.N.); Department of Radiology, The University of Texas MD Anderson Cancer Center,

Houston, Texas (A.M.V.); Department of Radiology, Section of Interventional Radiology, Northwestern Memorial Hospital, Chicago, Illinois (R.J.L.). Received July 6, 2015; accepted August 15, 2015. Financial support, disclosures, and conflicts of interest: None. **Address correspondence to:** R.C.G. e-mail: rgaba@uic.edu

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Longitudinal care of Interventional Oncology (IO) patients may have an important role for optimizing clinical outcomes and is critical for the acceptance of Interventional Radiologists (IRs) into the cancer care treatment paradigm. Although essential for patient and treatment response assessment, standardization of clinical and imaging follow-up protocols after transarterial locoregional therapy (LRT) of hepatic malignancies is hampered by a lack of supporting evidence in the IR literature to dictate suitable follow-up methods (1) and limited guidance regarding posttreatment surveillance practices in current clinical practice guidelines (2–4). The development of standardized, evidence-based postprocedure surveillance practices after IO procedures is of paramount importance as these procedures have become integral to the care of the oncology patient. Although previous survey data have suggested variation in follow-up practices within the IR community (5), there remains a paucity of formally acquired information on the specific follow-up approaches used by IRs after IO therapies. This exploratory survey study thus aimed to characterize practices and quantify variation in follow-up approaches among IRs after liver transarterial LRTs in contemporary IO clinical practice to better understand currently used surveillance methods as a framework for future standardization of postprocedure care.

MATERIALS AND METHODS

Between November 24 and December 29, 2014, 3290 American and international Physician members of the Society of Interventional Radiology (SIR) (In-Training, Scientist, and Clinical Associate members excluded) were requested to participate in a survey (Appendix) designed by the SIR IO Service Line and disseminated through an online survey company (SurveyMonkey, Palo Alto, CA). Invitations were sent via electronic mail from the SIR on survey commencement and 3 weeks after survey outset as a reminder for participation. The order of survey questions was identical for all respondents. Two variant but structurally and substantively analogous parallel survey pathways were used, with the final five survey questions (21–25 vs. 26–30) differing for participants based on the individual response to question 20. Responses to the password-protected questionnaire were anonymous, and no compensation was provided for participation. Survey settings were structured to allow only one response per invited e-mail address to prevent duplicate responses. On survey closure, responses were compiled and analyzed.

RESULTS

Of 3290 SIR members contacted for survey participation, 361 (11%) partially or fully completed the questionnaire.

Respondent Demographics

Survey participant characteristics are summarized in Table 1. Respondents were predominantly IRs in practice for

≤15 years (233 of 360, 65%)—although IRs in practice for >15 years represented the largest individual response group (127 of 360, 35%)—in medium-sized groups (3–5 IRs; 182 of 358, 51%) at community hospitals (185 of 346, 54%) in the United States (311 of 355, 88%), and who perform 1–5 liver transarterial LRTs monthly (196 of 354, 55%).

Transarterial LRT Procedures

The preferred transarterial LRT for different tumor types is displayed in Figure 1. Although most (183 of 343, 53%) surveyed IRs used C-arm cone beam computed tomography (CT) during transarterial LRT to confirm satisfactory therapeutic agent targeting, a minority (122 of 342, 36%) of respondents used posttreatment imaging within 24 hours after transarterial LRT. Among those respondents who did use posttreatment imaging, preferred modalities included non-contrast CT scan for conventional (c-TACE; 75 of 96, 78%) and drug-eluting bead (DEB-TACE; 45 of 80, 56%) transarterial chemoembolization, as well as for bland particle embolization (32 of 59, 54%), and bremsstrahlung scan (62 of 87, 71%) for yttrium-90 (⁹⁰Y) microsphere radioembolization (RE).

Clinical Follow-up

Frequency and Duration. Most (305 of 336, 91%) IR respondents indicated that they follow patients longitudinally after transarterial LRT. This held true for patients treated for both primary (264 of 298, 89%) and secondary (264 of 288, 92%) liver malignancies. The preferred first IR clinic follow-up time after hospital discharge after transarterial LRT was 1 month posttreatment for both primary (146 of 290, 50%) and secondary (141 of 280, 50%) liver tumors, with about 22% of respondents seeing patients earlier, at 2 weeks posttreatment. The most prevalent IR clinic follow-up interval or frequency was every 3 months for both primary (196 of 287, 68%) and secondary (188 of 278, 68%) liver tumors. The preferred duration of IR clinical follow-up was indefinite for both primary (189 of 290, 65%) and secondary (165 of 278, 59%) liver malignancies.

Laboratory Assessment. In regard to laboratory follow-up, approximately half of respondents reported ordering hepatic function tests at 1 month post-LRT (132 of 289, 46% for primary liver tumors; 126 of 281, 45% for secondary liver tumors). Other common time points for liver function testing included before a subsequent transarterial LRT (104 of 289, 36% for primary liver tumors; 100 of 281, 36% for secondary liver tumors), 1–2 weeks after procedure (89 of 289, 31% for primary liver tumors; 86 of 281, 31% for secondary liver tumors), and on postprocedure day 1 (70 of 289, 24% for primary liver tumors; 57 of 281, 22% for secondary liver tumors). Most respondents reported ordering serum tumor markers after transarterial LRT (226 of 293, 77% either always or order if elevated or abnormal pre-procedure). Serum tumor markers ordered included alpha-fetoprotein for

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