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Radiation Pneumonitis Secondary to Treatment with Y-90 for Hepatocellular Carcinoma

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Hepatocellular carcinoma (HCC) is the fourth leading cause of cancer-related mortality globally. While liver transplantation is the preferred treatment option for HCC within Milan criteria, long waitlist times and limited donor availability necessitates utilizing other treatment modalities as a bridge to or an alternative to transplantation. Transarterial radioembolization (TARE) is among one of the locoregional treatment options, and involves delivery of yttrium-90 (Y-90), a high-energy beta particle emitting radioisotope, directly to the tumor through the hepatic artery. Because HCC is highly vascularized by arterial blood flow, delivery of Y-90 microspheres through the hepatic artery allows lethal doses of radiation to the tumor while minimizing toxicity to surrounding tissue. A rare complication of TARE with Y-90 is radiation pneumonitis, with an incidence of less than 1%. We present the 9th and 10th case of radiation pneumonitis from Y-90 treatment for HCC. Patients mostly present with cough and dyspnea, however they can be asymptomatic. Imaging findings consist of ground glass opacities and ill-defined opacities, which can be difficult to distinguish from infectious sources without context. The mainstay of treatment is steroids, though the dose, duration, and outcome was variable among the patients reported in literature. A major risk factor for radiation pneumonitis is hepatic arterioportal shunting, which is estimated during pre-treatment planning with hepatic angiography and technetium 99 m macroaggregated human albumin (^{99m}Tc-MAA). Although these tests provide a surrogate for amount of shunting from hepatic to lung vasculature, they can overestimate or underestimate the degree of lung shunting, making it difficult to predict the actual dose of radiation the lung will receive. Given the incidence of radiation pneumonitis is less than 1%, it is important to identify this complication as respiratory failure can result and treatment with steroids can be initiated.