Clinical note

Extrahepatic visualization in the distribution of falciform artery in posttreatment Bremsstrahlung images after radioembolization with $^{90}$Y microspheres

V. Beylergil$^{a, *}$, C.T. Sofocleous$^c$, J.A. Carrasquillo$^{a,b}$

$^a$ Molecular Imaging and Therapy Service, Department of Radiology, Memorial Sloan-Kettering Cancer Center, New York, NY, United States

$^b$ Department of Radiology, Weill Cornell Medical College, New York, NY, United States

$^c$ Interventional Radiology Service, Department of Radiology, Memorial Sloan-Kettering Cancer Center, New York, NY, United States

**A R T I C L E   I N F O**

**Article history:**
Received 9 September 2013
Accepted 14 October 2013
Available online 14 January 2014

**Keywords:**
Yttrium-90
Bremsstrahlung
SPECT/CT
Extrahepatic
Falciform artery
Microspheres

**A B S T R A C T**

We report the case of a 39-year-old female with metastatic colorectal cancer. Pretreatment SPECT/CT imaging revealed extrahepatic tracer accumulation along the falciform artery distribution. Prior to the administration of $^{90}$Y microspheres, hepatic arterial anatomy was evaluated angiographically. It was not possible to identify the hepatic falciform artery so that no coil-embolization was performed. The patient tolerated the treatment well with only mild pain around the umbilicus during the procedure that spontaneously abated. As far as we know, this is the first report of Bremsstrahlung SPECT/CT images that has clearly shown that the microspheres accumulation in the anterior abdominal wall corresponds to hepatic falciform artery distribution on CT.

© 2013 Elsevier España, S.L. and SEMNIM. All rights reserved.

---

**Visualización extra hepática en la distribución de la arteria falciforme en las imágenes de Bremsstrahlung después de radioembolización con $^{90}$Y microsferas**

**R E S U M E N**

Se presenta el caso de una paciente de 39 años con cáncer de colon metastatizado al hígado. La imagen SPECT/TC pretratamiento mostró acumulación extrahepática del radiotrazador a lo largo de la distribución de la arteria falciforme. Previo a la administración de las $^{90}$Y- microsferas, la anatomía arterial hepática fue evaluada angiográficamente, pero la arteria falciforme no fue identificada y, por tanto, no se realizó embolización de la misma. La paciente toleró bien el tratamiento mostrando solamente dolor periumbilical durante la realización de la técnica que cedió espontáneamente. En nuestro conocimiento esta es la primera publicación que muestra la visualización en imágenes de Bremsstrahlung de depósito extrahepático de $^{90}$Y- microsferas en la arteria falciforme.

© 2013 Elsevier España, S.L. y SEMNIM. Todos los derechos reservados.

**Introduction**

Microembolization with yttrium-90 resin microspheres for colon cancer metastatic to the liver was approved by the FDA more than ten years ago. It has been shown that it improves time to progression in this patient group.1 It is increasingly being used in other metastatic tumors including breast, neuroendocrine tumors and hepatocellular carcinoma. Radioembolization with $^{90}$Y microspheres is invariably preceded by an intraarterial $^{99m}$Tc-MAA (macroaggregated albumin) scan to rule out any significant lung shunt and sites of extrahepatic uptake which might complicate the treatment. Based on these findings, vessels that may cause extrahepatic non-target delivery of the microspheres may be embolized prior to the delivery of the $^{90}$Y microspheres. The falciform artery that usually arises from the segment 4 hepatic artery and runs through the falciform ligament has been observed in 2–24.5% of patients on $^{99m}$Tc-MAA scans.2,3

**Clinical case**

We report a 39-year-old female with metastatic colorectal cancer scheduled for $^{90}$Y resin microspheres. Pretreatment SPECT/CT performed after injection of a total of 4.12 mCi $^{99m}$Tc-MAA into the right and left hepatic artery revealed extrahepatic tracer accumulation along the falciform artery distribution (Fig. 1A–C). Pretreatment SPECT/CT was performed using a low energy high resolution collimator, 360° acquisition, 40 s/frame over a total of 25 min with energy window centered at 140 keV. Before the administration of $^{90}$Y microspheres, hepatic arterial anatomy was evaluated angiographically, but the hepatic falciform artery could not be identified; therefore, no coil-embolizations was done. The patient tolerated the treatment well with only mild pain...

* Corresponding author.

E-mail address: beylergil@mskcc.org (V. Beylergil).
Bremsstrahlung was demonstrated of hepatic falciform artery before 90Y microspheres in the falciform artery distribution.

Ahmadzadehfar et al. reported that 56% of the patients who had visualization of the falciform artery distribution on 99mTc MAA scan also were positive on Bremsstrahlung imaging. Non-targeted radioembolization to duodenum has been previously reported by Gupta et al. But we believe this is the first imaging report of visualization of extrahepatic 90Y microspheres in the falciform artery distribution.

While epigastric pain, purpuric rash and skin necrosis have been demonstrated with chemoembolization due to a hepatic falciform artery, the need for prophylactic embolization of falciform artery before 90Y microspheres remains controversial. Liu et al. recommended prophylactic embolization of the patent hepatic falciform artery before treatment. Self limiting radiation dermatitis has been reported after radioembolization in the setting of a patent hepatic falciform artery.

Ahmadzadehfar et al., in their series, reported a 9.3% incidence of 99mTc-MAA uptake in the anterior abdominal wall. Out of 18 such patients, hepatic falciform artery was identified and embolized only in one patient. In other patients, authors proceeded with radioembolization and observed no side effects except mild, self limiting pain in one patient. In another study, 99mTc-MAA uptake was observed in four out of 341 patients, but embolization of the falciform artery was feasible only in one patient.

Although Leong et al. and Ahmadzadehfar et al. have reported 99mTc-microspheres uptake in the falciform artery distribution on Bremsstrahlung images, this is the first report of Bremsstrahlung SPECT/CT images that clearly shows that the microspheres accumulation in the anterior abdominal wall corresponds to hepatic falciform artery distribution on CT. A post contrast CT image obtained two weeks before treatment clearly shows contrast flow- ing in the falciform artery (Fig. 1F).

Our case demonstrated 99mTc-MAA uptake along the patent hepatic falciform artery and although the falciform artery could not be identified similar distribution was noted on the Bremsstrahlung SPECT/CT. Similar to previous series, the patient tolerated the procedure well with only self limiting, short duration pain around the umbilicus.

Discussion

Ahmadzadehfar et al. reported that 56% of the patients who had visualization of the falciform artery distribution on 99mTc MAA scan also were positive on Bremsstrahlung imaging. Non-targeted radioembolization to duodenum has been previously reported by Gupta et al. But we believe this is the first imaging report of visualization of extrahepatic 90Y microspheres in the falciform artery distribution.

While epigastric pain, purpuric rash and skin necrosis have been demonstrated with chemoembolization due to a hepatic falciform artery, the need for prophylactic embolization of falciform artery before 90Y microspheres remains controversial. Liu et al. recommended prophylactic embolization of the patent hepatic falciform artery before treatment. Self limiting radiation dermatitis has been reported after radioembolization in the setting of a patent hepatic falciform artery.

Ahmadzadehfar et al., in their series, reported a 9.3% incidence of 99mTc-MAA uptake in the anterior abdominal wall. Out of 18 such patients, hepatic falciform artery was identified and embolized only in one patient. In other patients, authors proceeded with radioembolization and observed no side effects except mild, self limiting pain in one patient. In another study, 99mTc-MAA uptake was observed in four out of 341 patients, but embolization of the falciform artery was feasible only in one patient.

Although Leong et al. and Ahmadzadehfar et al. have reported 99mTc-microspheres uptake in the falciform artery distribution on Bremsstrahlung images, this is the first report of Bremsstrahlung SPECT/CT images that clearly shows that the microspheres accumulation in the anterior abdominal wall corresponds to hepatic falciform artery distribution on CT. A post contrast CT image obtained two weeks before treatment clearly shows contrast flow- ing in the falciform artery (Fig. 1F).

Our case demonstrated 99mTc-MAA uptake along the patent hepatic falciform artery and although the falciform artery could not be identified similar distribution was noted on the Bremsstrahlung SPECT/CT. Similar to previous series, the patient tolerated the procedure well with only self limiting, short duration pain around the umbilicus.

Conflict of interest

The authors declare no conflict of interest.

References