Transarterial Chemoembolization of a Colic Branch of the Superior Mesenteric Artery in Patients with Unresectable Hepatocellular Carcinoma

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ABSTRACT

Purpose: To evaluate the technical feasibility, safety, and imaging response of transarterial chemoembolization performed through a colic branch of the superior mesenteric artery (SMA) in patients with hepatocellular carcinoma (HCC).

Materials and Methods: Between July 2000 and June 2009, we observed tumor staining supplied by a colic branch of the SMA in 61 of 5,095 patients (1.2%) with HCC. Computed tomography (CT) scans and digital subtraction angiograms of these patients were retrospectively reviewed by two investigators in consensus to evaluate the tumor location, the technical success of chemoembolization, complications, and imaging response on a follow-up CT scan according to European Association for the Study of the Liver criteria.

Results: Tumors supplied by a colic branch of the SMA were located in segment VI ($n = 58$) or were extrahepatic metastases caused by peritoneal seeding ($n = 3$). Vessels supplying the tumor arose from the right colic artery ($n = 23$), middle colic artery ($n = 22$), or ileocolic artery ($n = 26$). Selective chemoembolization via a colic branch of the SMA was performed in 24 patients (39%). No patient developed symptoms related to colon ischemia. Complete response or partial response of the tumor fed by a colic branch of the SMA as depicted on follow-up CT was achieved in eight patients (33%).

Conclusions: Chemoembolization via a colic branch of the SMA can be safely performed if the microcatheter can be advanced beyond the antimesenteric border of the colon.

ABBREVIATIONS

HCC = hepatocellular carcinoma, SMA = superior mesenteric artery

Transarterial chemoembolization is widely employed as a palliative approach in the management of unresectable hepatocellular carcinoma (HCC) (1,2). However, as noted in previous studies (3–17), HCC tumors often parasitize from extrahepatic collateral vessels such as the inferior phrenic artery, omental branch, adrenal artery, internal mammary artery, intercostal artery, and renal capsular artery.

Although a colic branch of the superior mesenteric artery (SMA) can supply HCC, chemoembolization via a colic branch of the SMA has been infrequently performed because of possible complications such as colon ischemia (6,18). During the past 9 years, we have encountered 61 patients with HCCs fed by a colic branch of the SMA and have attempted to treat these patients by the use of chemoembolization performed via a colic branch of the SMA. The purpose of this study was to evaluate the technical feasibility, safety, and imaging response of chemoembolization

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Table 1. Patient and Tumor Characteristics at Baseline

Characteristic	Value
Sex (M/F)	52/9
Mean age (y)	58 (47–64)
Hepatitis B virus surface antigen	
Positive	46
Negative	15
Hepatitis C virus antibody	
Positive	6
Negative	55
Serum albumin (g/dL)	3.5 (3.1–3.8)
Total bilirubin (mg/dL)	1 (0.8–1.6)
Prothrombin time (%)	75 (65–90)
Ascites	
Present	8
Absent	53
Serum α-fetoprotein (ng/mL)	376 (42–880)
Child-Pugh class	
A	43
B	14
C	4
Tumor size (cm)	6.2 (4.5–10.4)
Tumor location	
Segment VI	58
Peritoneal seeding	3
Previous chemoembolizations	5 (2–7)

Note.—Values in parentheses are interquartile ranges.

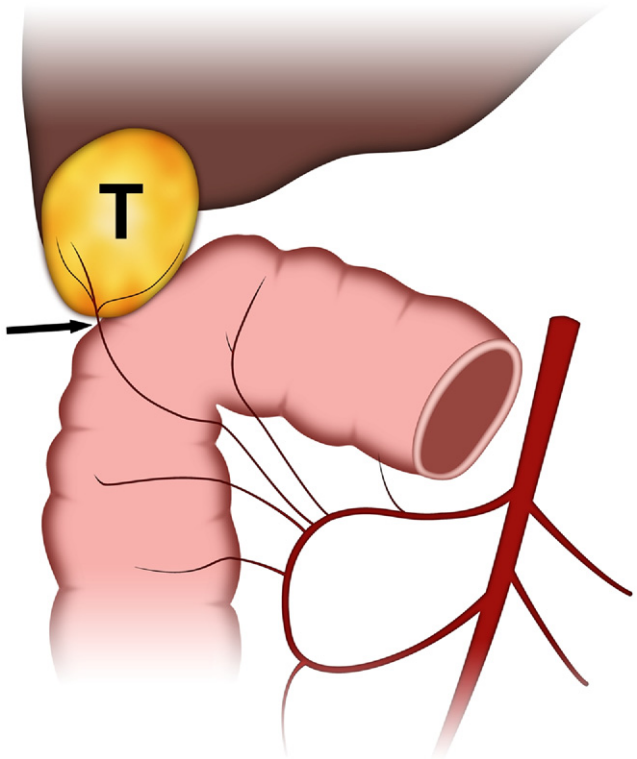

Figure 1. Diagram of a colic branch of the SMA supplying the tumor (*T*). If a microcatheter can be advanced beyond the antimesenteric border (arrow) of the colon, chemoembolization via a colic branch can be attempted. (Available in color online at *www.jvir.org*.)

performed through a colic branch of the SMA in patients with HCC.

MATERIALS AND METHODS

Patients

From July 2000 to June 2009, 19,586 sessions of chemoembolization were performed in 5,095 patients with HCC at our institution. In 61 of the 5,095 patients (1.2%), we observed tumor staining supplied by a colic branch of the SMA. The patients included 52 men and nine women, with a mean age of 56 years (median, 58 y; range, 22–79 y; **Table 1**). Forty-three patients had Child–Pugh class A disease, 14 had Child–Pugh class B disease, and four had Child–Pugh class C disease. Tumor sizes ranged from 2 cm to 20 cm (mean, 8 cm; median, 6.2 cm). Tumors were classified as single nodular ($n = 2$), multinodular ($n = 57$), or infiltrative ($n = 2$). Our institutional review board approved this study, and patient informed consent was waived in view of the retrospective nature of the study.

Methods of Chemoembolization

Angiography of the celiac axis and right/left hepatic artery was initially undertaken, and we correlated vascular tumor blush with tumor demonstrated on computed tomography (CT). If we were dissatisfied with vascular tumor blush, we investigated extrahepatic collateral vessels such as the inferior phrenic, intercostal, and renal capsular artery, as well as the SMA, with consideration of the location of a missing tumor on CT. A 5-F Rösch hepatic catheter (Cook, Bloomington, Indiana) or Cobra catheter (Cook) was used for angiography of the SMA. If tumor staining was present or suspected on angiography of the SMA, selective angiography of a colic branch of the SMA was undertaken with use of a microcatheter with a 2.4-F tip (Microferret; Cook) or 2.0-F tip (Progreat; Terumo, Tokyo, Japan). Whereas an ordinary colic branch of the SMA supplying the colon does not reach the antimesenteric border of the colon, a colic branch of the SMA supplying the tumor generally traverses the antimesenteric border of the colon, according to our experience (**Fig 1**). Therefore, we infused chemotherapeutic agents via a colic branch of the SMA only when we succeeded in advancing the microcatheter beyond the antimesenteric border of the colon and when the subsequent angiography showed vascular tumor blush without obvious colonic perfusion. In contrast, we did not proceed with embolization when we failed to advance the microcatheter beyond the antimesenteric border of the colon.

When selective catheterization had been achieved by placing a microcatheter as close as possible to a specific branch or branches supplying a tumor, iodized oil (Lipiodol;