RCR
RADIOLOGY CASE REPORTS

Case Report

Chemoembolization of a hepatocellular carcinoma supplied by a caudate artery forming a common trunk with the supraduodenal artery: A case report'

Taishi Amano, MD[a],, Kensaku Mori, MD[a], Syunsuke Kikuchi, MD[a], Masafumi Sakai, MD[a], Sodai Hoshiai, MD[a], Midori Enokido, MD[b], Ken Koyama, MD[b], Manabu Minami, MD[a]*

[a] Department of Diagnostic and Interventional Radiology, University of Tsukuba Hospital, 2-1-1 Amakubo, Tsukuba, Ibaraki 305-8576, Japan
[b] Department of Diagnostic and Interventional Radiology, Ibaraki Prefectural Central Hospital, Ibaraki Cancer Center, Kasama, Ibaraki, Japan

ARTICLE INFO

ABSTRACT

The supraduodenal artery might arise from the hepatic, gastroduodenal, or right gastric arteries, but only a few studies have addressed the branching pattern of this artery. We herein describe a case of an 80-year-old man with hepatocellular carcinoma located in segment I. Selective arteriography and CT angiography showed that the supraduodenal artery formed a common trunk with the caudate artery to feed the tumor. The patient was successfully treated with superselective transarterial chemoembolization without gastrointestinal complications. To avoid nontargeting chemoembolization of the duodenum, interventional radiologists should be aware of this branching pattern. In suspected cases, selective CT arteriography plays a crucial role.

Introduction

In transarterial chemoembolization (TACE) of hepatocellular carcinoma (HCC), understanding the hepatic arterial branches that perfuse extrahepatic organs is important to avoid nontargeting treatment and subsequent sequelae including iatrogenic gastrointestinal ulceration. The supraduodenal artery (SDA) is reported as one of the arterial branches that can arise from the hepatic arteries [1]. Ou et al. [2] reported cases of duodenal ulcer resulting from the inflow of chemotherapeutic drugs to the SDA. In this case report, we describe a case of an HCC supplied by a caudate artery forming a common trunk with the SDA that was successfully treated with superselective TACE without subsequent development of gastrointestinal complications.
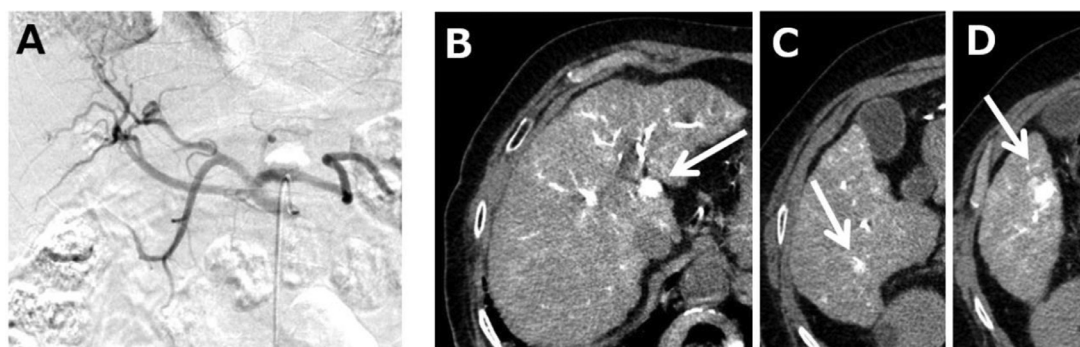
Fig. 1 – (A) Celiac arteriogram showing a replaced right hepatic artery arising from the celiac trunk. (B-D) Axial computed tomographic angiography via the celiac artery showing multiple hepatocellular carcinomas (arrows) in segments I (B), VI (C), and V (D).

Case report

An 80-year-old man with liver cirrhosis of unknown cause was found to have a liver tumor via screening ultrasound. Dynamic enhanced computed tomography (CT) showed 3 HCCs in segments I, V, and VI, with maximal diameters of 1.3, 1.4, and 0.8 cm, respectively. His medical history included hypertension, diabetes, and myocardial infarction. Screening for viral hepatitis showed negative results. Laboratory results were the following: alpha-fetoprotein, 4.7 ng/mL (reference range, 0-7 ng/mL); protein induced by vitamin K absence or antagonist II, 38 mAU/mL (reference range, <40 mAU/mL); serum albumin, 3.5 g/dL (reference range, 3.4-5.4 g/dL). His Child-Pugh score was 6, and his renal function tests and other data were within normal limits. The HCC on the surface of segment I was predicted to be difficult to access via the percutaneous approach; hence, radiofrequency ablation was not selected as the treatment of choice. Instead, TACE was performed.

First, we tried the routine TACE procedure. Via the femoral approach, a hook-shaped 4-Fr catheter was used to identify and enter the celiac artery. The liver was fed by the left hepatic artery arising from the common hepatic artery and the replaced right hepatic artery arising from the celiac artery (Fig. 1A). Axial CT angiography of the celiac artery via a 1.9-Fr microcatheter (Progreat Sigma; Terumo, Tokyo, Japan) showed 3 lesions in segments I, V, and VI (Fig. 1B-D). The left hepatic angiogram showed a diminutive side-branch arising from the left hepatic artery (Fig. 2A). Selective arteriography of this branch showed an ascending caudate artery supplying the HCC in segment I and a descending branch continued to an extrahepatic stain presumed to be the duodenal wall (Fig. 2B). Axial CT angiography of the branch demonstrated a hypervascular tumor in segment I together with enhancement of the proximal duodenal wall and pericholedochal plexus (Fig. 3). Therefore, the HCC was considered to be fed by the caudate artery forming a common trunk with the SDA.

A lipophilic platinum complex, miriplatin (Miripla; Sumitomo Dainippon Pharma, Osaka, Japan), was injected into the ascending caudate artery selectively, and the tumor was suc-
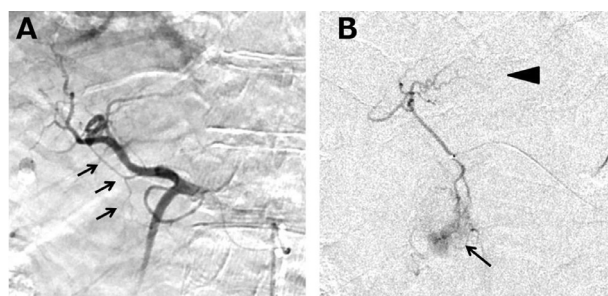

Fig. 2 – (A) Left hepatic arteriogram showing a diminutive side-branch arising from the left hepatic artery (arrows). (B) Angiogram of the side-branch showing the artery supplying the hepatocellular carcinoma in segment I (arrowhead) and some staining of the intestinal tract wall (arrow).

cessfully embolized with a small amount of gelatin particle (1 mm Gelpart; Nippon Kayaku, Tokyo, Japan). We also performed TACE procedures for the HCCs in segments V and VI. Postprocedural CT revealed favorable iodized oil accumulation into the targeted HCCs. Minimal iodized oil accumulation was observed in the nontumorous hepatic parenchyma, duodenal wall, and extrahepatic bile duct wall. There were no complications due to nontargeted chemoembolization of the duodenum or extrahepatic bile duct.

Discussion

According to Kim et al. [3], the technical success rate of superselective TACE is a prognostic factor for survival of the patients with HCCs in segment I. Thus, it is important to select the possible caudate arteries for TACE. A retrospective analysis by Miyayama et al. [4] shows that the proximal hepatic arterial branches frequently contribute to the origins of caudate arteries feeding HCCs in segment I (right hepatic artery, 27.6%; left hepatic artery, 20.7%; anterior segmental artery, 20.7%; posterior segmental artery, 21.6%; middle hepatic artery, 6.0%;
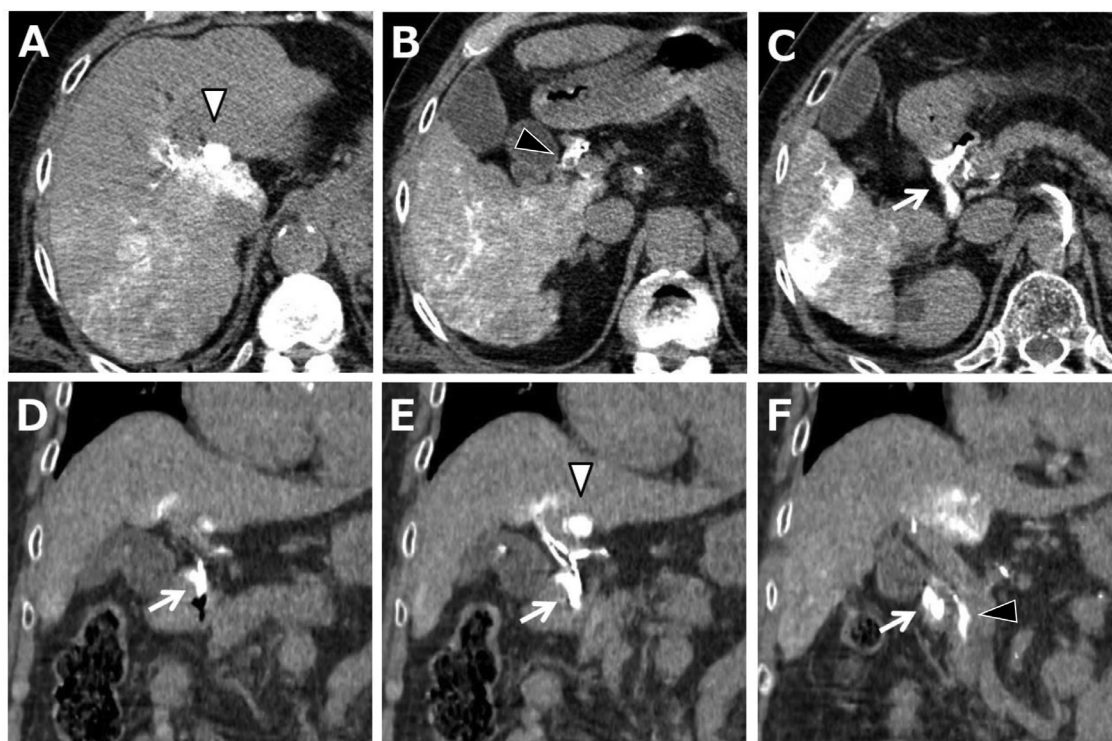
Fig. 3 – Computed tomographic angiography via the branch arising from the left hepatic artery. Axial (A-C) and coronal reformatted (D-F) images showing nodular tumor staining in segment I (white arrowhead) together with staining in the proximal duodenal wall (arrow) and pericholedochal plexus (black arrowhead).

proper hepatic artery, 0.9%; extrahepatic artery, 2.6%). They also warned the risk of extrahepatic bile duct stricture after TACE for HCCs in segment I because the caudate artery can give rise to the pericholedochal plexus [5]. Several investigators also documented that the pericholedochal plexus can be continuous with the caudate arteries through the communicating arteries [6,7].

Meanwhile, various gastrointestinal and pancreatic arteries are known to originate from the hepatic arteries. According to Ozaki et al. [8], the extrahepatic branch prevalence rates are 94.4% for the right gastric artery, 40.9% for the falciform artery, 17.1% for the accessory left gastric artery, 4.6% for the left inferior phrenic artery, 3.5% for the posterior superior pancreaticoduodenal artery, and 2.8% for the dorsal pancreatic artery. The duodenal artery is also reported to arise from the hepatic arteries in 12 (1.3%) of 943 patients. According to the anatomical study by Bianch et al. [1], the SDA arises most frequently from the gastroduodenal artery (26%); however, it is not rare for the hepatic arteries to give rise to the SDA (common/proper hepatic artery, 20%; right hepatic artery, 13%; left hepatic artery, 20%). In addition, the pericholedochal plexus can arise from the SDA.

Therefore, both the caudate artery and SDA can arise from the hepatic arteries and give rise to the pericholedochal plexus. However, to our knowledge, there have been no reports describing that the caudate artery perfused the duodenal wall. In our case, selective CT angiography demonstrated the enhancement of not only the HCC and extrahepatic bile duct wall but also of the duodenal wall. Therefore, we considered

that the SDA formed a common trunk with the caudate artery and arose from the left hepatic artery.

Conclusion

We present an HCC of the caudate lobe fed by the caudate artery forming a common trunk with the SDA. By using selective CT arteriography, we have successfully treated the HCC in segment I without nontargeted treatment. In TACE for HCCs in segment I, interventional radiologists need to know that the caudate artery can form a common trunk with the SDA. To avoid nontargeting chemoembolization of the extrahepatic bile duct and duodenum, selective CT arteriography is recommended in suspected cases.

Statement of Informed Consent

Informed consent was obtained from the patient.

REFERENCES

[1] Bianchi HF, Albanese EF. The supraduodenal artery. Surg Radiol Anat 1989;11:37–40. https://doi.org/10.1007/BF02102244.

[2] Ou TH, Wu DK, Shih PM, Chao MF. Recognition of supraduodenal artery from hepatic artery is essential to avoid untoward complications at HAIC: two cases. BMJ Case Rep 2018;2018. https://doi.org/10.1136/bcr-2017-223627.

[3] Kim HC, Chung JW, Jae HJ, Yoon JH, Lee JH, Kim YJ, et al. Caudate lobe hepatocellular carcinoma treated with selective chemoembolization. Radiology 2010;257:278–87. https://doi.org/10.1148/radiol.10100105.

[4] Miyayama S, Yamashiro M, Hattori Y, Orito N, Matsui K, Tsuji K, et al. Angiographic evaluation of feeding arteries of hepatocellular carcinoma in the caudate lobe of the liver. Cardiovasc Intervent Radiol 2011;34:1244–53. https://doi.org/10.1007/s00270-010-0036-3.

[5] Miyayama S, Yamashiro M, Okuda M, Yoshie Y, Nakashima Y, Ikeno H, et al. Main bile duct stricture occurring after transcatheter arterial chemoembolization for hepatocellular carcinoma. Cardiovasc Intervent Radiol 2010;33:1168–79. https://doi.org/10.1007/s00270-009-9781-6.

[6] Ramesh Babu CS, Sharma M. Biliary tract anatomy and its relationship with venous drainage. J Clin Exp Hepatol 2014;4(Suppl 1):S18–26. https://doi.org/10.1016/j.jceh.2013.05.002.

[7] Tohma T, Cho A, Okazumi S, Makino H, Shuto K, Mochiduki R, et al. Communicating arcade between the right and left hepatic arteries: evaluation with CT and angiography during temporary balloon occlusion of the right or left hepatic artery. Radiology 2005;237:361–5. https://doi.org/10.1148/radiol.2371040919.

[8] Ozaki K, Kobayashi S, Matsui O, Minami T, Koda W, Gabata T. Extrahepatic arteries originating from hepatic arteries: analysis using ct during hepatic arteriography and visualization on digital subtraction angiography. Cardiovasc Intervent Radiol 2017;40:822–30. https://doi.org/10.1007/s00270-017-1568-6.