CASE REPORT

ECTOPIC BLOOD SUPPLY OF HEPATOCELLULAR CARCINOMA FROM THE MIDDLE COLIC ARTERY

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ABSTRACT

Hepatocellular carcinoma is a common malignancy worldwide. Variant arteries along with each hepatic artery is of functional importance as they provide blood supply to the liver and subsequently the tumor.We report a case of hepatocellular carcinoma (HCC) supplied by branches from the middle colic artery, a branch of the superior mesenteric artery. This arterial vasculature was visualized on computed tomography (CT) and subsequently confirmed with conventional angiography. Ectopic supply is often related to tumor size, superficial anatomic location, integrity of pseudocapsule and multiple chemoenbolizations.

Introduction

Hepatocellular carcinoma (HCC) is one of the most common malignancies worldwide and is responsible for more than 500,000 deaths every year globally.[1] Variant arteries along with each hepatic artery is of functional importance as they provide blood supply to the liver. The accessory right hepatic artery (ARHA) and replaced right hepatic artery (RRHA) are commonly described in the literature as variant arteries.[2]
We report a case of hepatocellular carcinoma (HCC) supplied by branches from the middle colic artery, a branch of the superior mesenteric artery. This arterial vasculature was visualized on computed tomography (CT) and subsequently confirmed with conventional angiography.

Case Report

A 78-year-old female presented to us with primary HCC in the right hepatic lobe for which she had already undergone transhepatic arterial chemoembolization (TACE) at another hospital.

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Her alpha-fetoprotein level was 2.7 IU/mL, and she had a platelet count of 67 x 10^9/L, red blood cell count of 3.12 x 10^{12} cells /L, and hemoglobin level of 9.7 g/L. Evaluation of her liver function revealed Child-Pugh class A chronic liver disease.
A CT scan showed an exophytic lesion measuring approximately 43 X 41 mm with lipiodol deposit in segment VI of the liver with residual viable tumor. She subsequently underwent another session of TACE at our hospital and the preliminary angiogram showed replaced right hepatic artery which was supplying the large tumor blush in the right lobe of the liver which was corresponding with the lesion on recent CT scan.The replaced right hepatic artery was cannulated using microcatheter and chemoembolization was then performed.
On follow up CT examination, the exophytic hepatoma was redemonstrated with lipiodol deposition in the superior part of the lesion.There was no significant lipiodol deposition in the inferior half of the lesion.There was mild arterial enhancement within the inferior portion of lesion, showing washout on portal venous

phase suggestive of residual disease (Fig.1). Therefore, a repeat session of TACE was performed. Her alpha-fetoprotein level had increased from 2.7 to 5.6 IU/mL.However, based on the liver function she still had Child-Pugh class A liver disease.

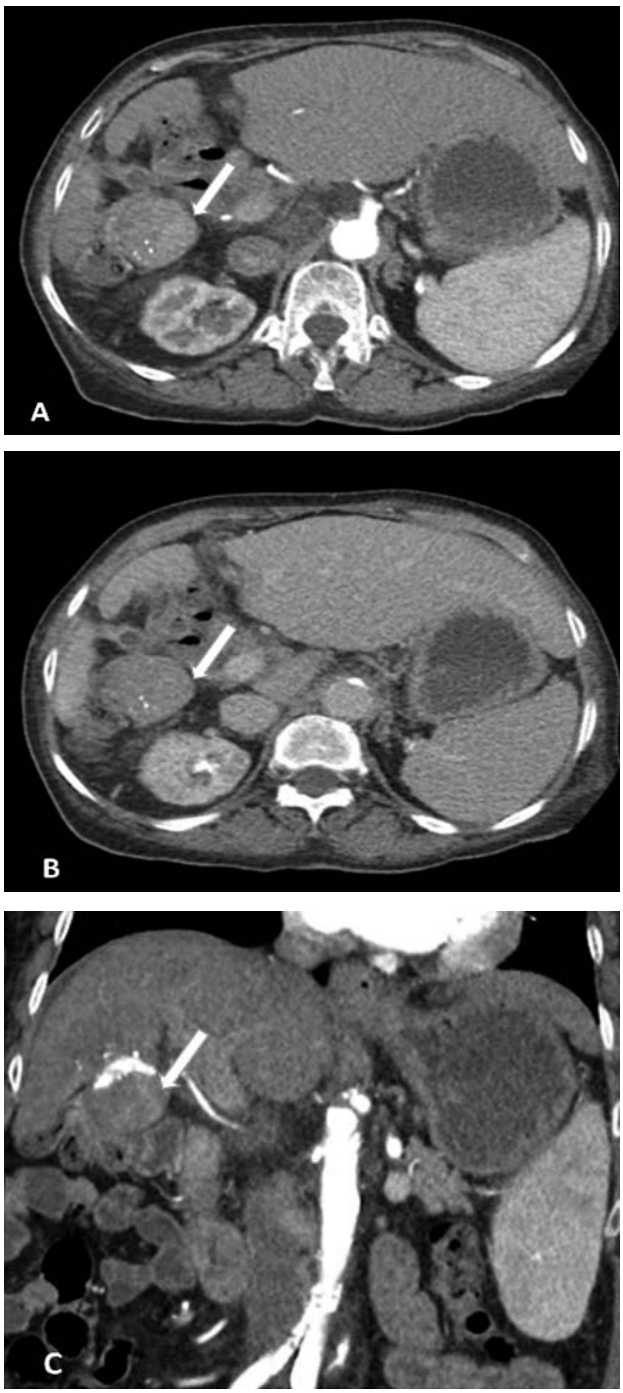
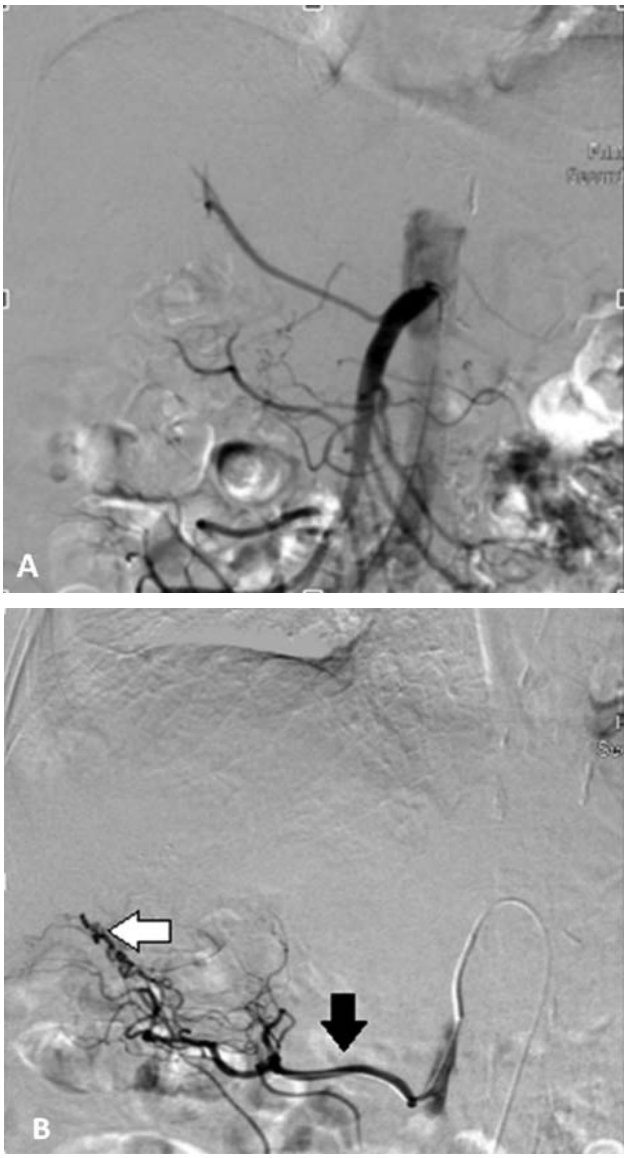


Figure 1: CT abdomen with contrast **(A&C)** arterial and **(B)** venous phases. Status post one session of TACE in our hospital showing residual viable tumor in inferior aspect of the segment VI lesion in the liver evident by arterial enhancement in A.

Digital subtraction angiography (DSA) showed minor supply to the superior part of the tumor form the replaced right hepatic artery. The inferior tumor blush was not identified from the right hepatic artery. Therefore, extensive search was performed after which a tortuous vessel arising from the middle colic artery was identified which was also supplying the tumor.

Chemoembolization was subsequently performed after super-selective cannulation of small branches arising from the middle colic artery and replaced right hepatic artery (Fig.2A,B and C). Post embolization angiogram showed almost complete occlusion of the arterial supply of the lesion. The patient tolerated the procedure well.



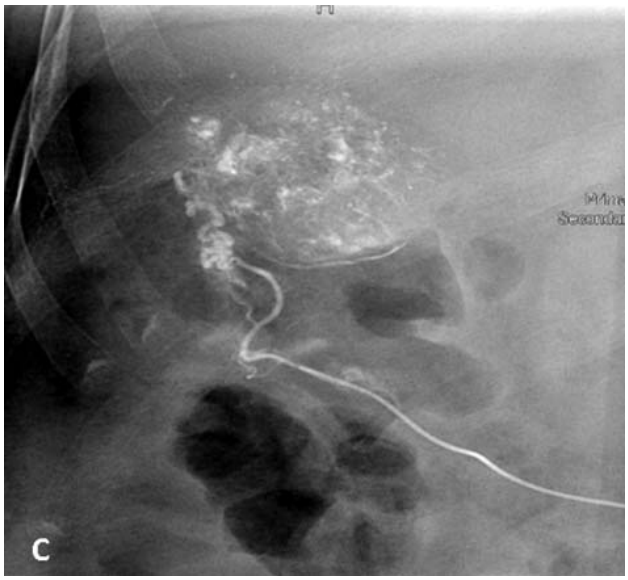


Figure 2 (A,B and C): Images from digital subtraction angiogram showing the middle colic artery (black arrow on image B), arising from the superior mesenteric artery, which is subsequently giving rise to a vessel (white arrow on image B) supplying the hepatocellular carcinoma. Post embolization image showing complete vascular occlusion with lipoidal deposition (C).

Discussion

Treatments for HCC include surgical resection, liver transplantation, or local ablation therapy for early HCC.[3] However, many patients are diagnosed at an intermediate or advanced stage and therefore, are candidates for palliative therapy.[4] An important alternative treatment option for unresectable HCC is transarterial chemoembolization (TACE). It is essential to identify the feeding arteries of HCC including hepatic artery (HA) and ectopic perihepatic arteries prior to a successful TACE.[5]

Studies have found that perihepatic arteries such as the internal mammary artery (IMA), intercostals artery (ICA), inferior phrenic artery (IPA), gastric artery (GA), superior mesenteric artery (SMA), gastro duodenal artery (GDA), cystic artery (CA), renal artery andeven the lumbar artery (LA) can supply HCC lesions.[6]

In a study conducted during over 9 years, authors encountered 61 patients with HCCs fed by a colic branch of the SMA out which 22 patients had blood supply from the middle colic artery. They also found that the 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.[7] Upon literature review we also found a case of a 70-year-old man with a large hepatocellular carcinoma (HCC) containing two pseudoaneurysms measuring up to 2 cm in diameter. The pseudo aneurysms and part of the HCC were supplied by branches from the middle colic artery.[8]

It has been seen that the incidence of HCC supplied by ectopic arteries increases gradually with the increasing size of hepatic mass and when the tumor involved the liver capsule.[9] In another study conducted by Wang et al it was observed that after repeated chemoembolization, most of the ectopic blood supply in HCC formed among the tumors with the sizes ranging from 5 to 10 cm in diameter.[10] The lesion in our case report was also large measuring 4.3 x 4.1 cm.

With the growth of the tumor, it would break through the capsule directly or go through the ligament to invade the adjacent organ. Once HCC invades adjacent organs, the supplying blood of the involved organ may also supply the HCC lesions by giving off branches or anastomose with the feeding arteries of the lesion. Because peripheral lesions are inclined to involve the liver capsule and grow outward, the probability of ectopic blood supply for peripheral lesions was higher than that of lesions located in the central area of the liver.[9]

DSA is used as the gold standard for assessing ectopic blood supply of HCC, its application is limited due to the invasiveness, the cost expense, and the inability to demonstrate all blood vessels in an examination. In recent years, multidetector row computed tomography angiography (MDCTA) has been applied in a wide variety of vascular diseases of the head, thorax, coronary arteries, and abdomen. MDCTA can also be used for displaying hepatic and perihepatic vessels and has been suggested to be conducted for any tumors to delineate the feeding vessel before chemoembolization.[11-14]

Conclusion

In conclusion, ectopic blood supply for HCC isoften related to tumor size, superficial anatomic location of tumors, integrity of pseudocapsule and multiple chemoenbolizations. Assessment of these factors

would be helpful for the pre-TACE evaluation for such patients.

Conflict of Interest: None

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