CASE REPORT

Hepatic artery pseudoaneurysms arising from within a hepatocellular carcinoma

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ABSTRACT. We report 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 pseudoaneurysms and part of the HCC were supplied by branches from the middle colic artery, which arises from the superior mesenteric artery. This complex arterial vasculature was visualised on CT and confirmed with conventional angiography.

Received 30 September 2009
Accepted 2 November 2009

DOI: 10.1259/bjr/55365425

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Intratumoural arterial pseudoaneurysms within a hepatocellular carcinoma (HCC) usually arise as a post-therapeutic complication. To our knowledge, there have been no previous reports describing pseudoaneurysms arising *de novo* from within a HCC prior to treatment; one such case is reported here. We also show the unique vasculature presented on CT and provide confirmation from conventional coeliac and superior mesenteric angiograms.

Case report

A 70-year-old man presented with right upper quadrant discomfort, increased fatigue, decreased appetite and recent weight loss of 20 lbs. He had a history of hepatitis B, mild diabetes and gout. On physical examination he was found to have a large mass in the right upper quadrant that was smooth, moved with respiration and had no bruits. There were no associated ascites or stigmata of chronic liver disease. The rest of the physical examination was within normal limits. Laboratory investigations showed mildly elevated liver enzymes: aspartate transaminase 117 U l⁻¹, alanine transaminase 66 U l⁻¹, alkaline phosphatase 123 U l⁻¹, γ -glutamyl transpeptidase 51 U l⁻¹ and total bilirubin 30 μ mol l⁻¹. The α -fetoprotein level was elevated at 54 μ g l⁻¹. Sodium was slightly low at 132 mmol l⁻¹. Other laboratory results — electrolytes, glucose, amylase and troponin I levels — were within normal limits.

A CT scan was performed showing a large 18 × 18 × 13 cm hypervascular and heterogeneously enhancing mass that contained two pseudoaneurysms measuring 2 cm and 0.9 cm in diameter (Figure 1). The extent of the mass

was too extensive for surgical treatment and the CT scan also showed very complex arterial anatomy; thus, a conventional mesenteric angiogram (Figure 2) was performed for further evaluation. The coeliac angiogram revealed neovascularity from the right and left hepatic arteries supplying the upper two-thirds to three-quarters of the hepatic mass. The superior mesenteric angiogram revealed innumerable small vascular arcades, arising from the right side of the middle colic artery near the hepatic flexure, leading to tumour neovascularity supplying the inferior portion of the mass and the intratumoural pseudoaneurysms.

Discussion

The diagnosis of HCC was made based on the clinical picture of hepatitis B, elevated liver enzymes, elevated α -fetoprotein and the characterisation of the mass on CT. Unique features in this case include the *de novo* pseudoaneurysms within the HCC shown on CT, the unusual generation of vascular arcades arising from the superior mesenteric artery and the significant size of the liver mass. The combination of these aforementioned features greatly limited treatment to palliative care. Resection was impossible owing to size and extent, whereas chemoembolisation was contraindicated by the extensive complicated vasculature.

HCC is the most common primary malignancy of the liver, resulting in significant morbidity and mortality [1]. Worldwide, HCC is most commonly associated with hepatitis B, whereas in the Western world it primarily affects patients with cirrhosis, secondary to hepatitis C virus infection and alcoholism [2]. If left untreated, the mean survival is only several months; 5 year survival is less than 5% [3]. Traditionally, treatment for HCC has been surgical resection, but radiofrequency ablation (RFA) now offers an alternative in patients who are

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Figure 1. (a) Arterial phase CT and (b) reformatted CT image demonstrating a large heterogeneously enhancing mass containing the pseudoaneurysms (arrows).

contraindicated for surgery [4]. Treatment options for non-resectable HCC include RFA, percutaneous ethanol injection (PEI), transarterial chemoembolisation (TACE) and selective internal radiation therapy (SIRT).

In this patient, the coeliac and superior mesenteric angiograms revealed aneurysms arising from the middle colic artery, such that it would be very difficult to cannulate the artery for chemoembolisation. The upper three-quarters of the mass was supplied by the right and left hepatic arteries arising from the coeliac axis, whereas the lower one-quarter of the tumour was supplied by multiple vessels arising from the middle colic flexure near the hepatic flexure. Attempts at embolisation through the aneurysm would probably result in reconstitution. On the other hand, embolisation of the tumour mass via the coeliac axis or superior mesenteric artery would be likely to result in non-target embolisation and infarction of the

bowel, with little benefit of tumour volume reduction. As a result of these findings, the patient was discharged home to be followed up by a gastrointestinal oncologist for potential medical treatment, together with pain medications for palliative care.

Pseudoaneurysms within HCC have been previously reported in the literature, but predominantly manifest as a result of intervention and/or surgical therapy [5–8]. Chemoembolisation alone has also been associated with hepatic arterial pseudoaneurysm formation [9–11]. In addition, RFA has been shown to engender intrahepatic pseudoaneurysm formation as one of its complications [7]. In this patient, the pseudoaneurysm appeared to occur *de novo*, with no previous treatment for the HCC.

The abnormal vasculature was exemplified on CT as arising from the middle colic artery near the hepatic flexure. The pattern of vascular arcades implies that

Figure 2. (a) Coeliac and (b) superior mesenteric angiograms. The coeliac angiogram demonstrates displacement of the coeliac axis, hepatic artery and gastroduodenal artery to the left. The common and hepatic artery proper, as well as the left and right hepatic arteries, were displaced cranially and demonstrated neovascularity supplying the upper two-thirds to three-quarters of the hepatic mass. The superior mesenteric artery angiogram revealed innumerable small vascular arcades, arising from the right side of the middle colic artery near the hepatic flexure, leading to tumour neovascularity of the mass in segments V and VI and supplying the intratumoural pseudoaneurysms (arrows).

the pseudoaneurysm formed was likely to be directly related to tumour angiogenesis, rather than being an incidental finding. Other pre-therapy aneurysms found in patients diagnosed with HCC include abdominal aortic aneurysms and infrarenal aneurysms; case reports on both types of aneurysm have been published proposing novel surgical management [12, 13]. However, these findings point towards isolated events rather than induction by tumour angiogenesis. In this patient, CT and confirmation with coeliac and superior mesenteric angiograms helped to determine the optimum mode of management.

In conclusion, the findings in this case report appear to be novel in the presentation of pseudoaneurysms arising from within a HCC; the complex arterial vasculature is depicted on CT and mesenteric arteriography. Although proper management and treatment for this patient was limited by the advanced stage of the disease and complex vasculature, the case provides a unique insight into the complexity of HCC and the usefulness of radiographic imaging in determining the most appropriate management plan. Also, it is important to recognise that pseudoaneurysms can arise from HCC pre-treatment, as this can be a cause of catastrophic haemorrhage.

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