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Case Report

Rupture of hepatocellular carcinoma after transcatheter arterial chemoembolization: A case report

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ABSTRACT

Transcatheter arterial chemoembolization (TACE) is one of the most common treatment options for patients with unresectable hepatocellular carcinoma (HCC). HCC rupture following TACE is a rare but potentially life-threatening complication. This report described a patient who experienced HCC rupture after TACE. The patient was successfully managed by transarterial embolization and staged liver resection. Large tumor size, superficial tumor location, exophytic growth of the tumor, and vascular lakes during TACE may be predisposing risk factors for HCC rupture after TACE.

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Keywords: Carcinoma, hepatocellular; Hemoperitoneum; Rupture; Therapeutic chemoembolization

Introduction

Transcatheter arterial chemoembolization (TACE) is one of the most common treatment options, being a palliative and pre-operative method for patients with hepatocellular carcinoma (HCC) who are not eligible for surgery.¹ Although TACE has survival benefits, it is also associated with adverse events causing significant morbidity and mortality. Complications of TACE include postembolization syndrome (fever, abdominal pain, nausea, and vomiting), ileus, neutropenic sepsis, hepatic decompensation, and liver abscess.² Although rupture of HCC following TACE has been rarely reported, it will be a potentially life-threatening complication if immediate and proper management is not taken.

This report describes a patient who experienced ruptured HCC after TACE. The patient was successfully treated with additional transarterial embolization using iodized oil and gelatin sponge, followed by liver resection.

Case Report

A 77-year-old male with a medical history of hypertension was incidentally diagnosed with HCC. Computed tomography (CT) showed a superficially located heterogeneously arterial enhanced

mass about 10 cm in diameter with early wash-out in the right posterior section, compatible with HCC (Fig. 1). On laboratory investigation, liver enzymes and serum alpha-fetoprotein (AFP) were within the normal range (aspartate aminotransferase, alanine aminotransferase, AFP levels were 23 IU/L, 19 IU/L, and 2.1 ng/mL, respectively), except for a marked elevation in serum PIVKA II concentration (1,976 mAU/mL; normal, < 40 mAU/mL). His Child-Pugh score was 5. TACE was planned prior to liver resection due to large tumor size.

TACE via the right common femoral artery was performed under local anesthesia using a 5-French sheath (Terumo, Tokyo, Japan). Superior mesenteric artery angiography was performed using a 5-French angiographic catheter (Rosch Hepatic; Cook, Bloomington, IN, USA). Indirect portography showed that the portal vein was patent. Angiography of the common hepatic artery using a 5-French angiographic catheter (Rosch Hepatic; Cook) and a 1.9-French microcatheter (PROGREAT; Terumo) with high-pressure contrast injection demonstrated a large hypervascular mass with multiple feeding vessels (Fig. 2A). Angiography of the right inferior phrenic artery also showed some tumor staining in the inferior portion of the tumor (Fig. 2B). Cisplatin was infused through the right posterior hepatic artery, followed by embolization with a mixture of iodized oil (Lipiodol; Guerbet, Paris,

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Fig. 1. Initial computed tomography (CT) of a 77-year-old male who was incidentally diagnosed with hepatocellular carcinoma (HCC). (A) Arterial phase axial CT scan showing an about 10 cm heterogeneously arterial enhanced mass (arrow), located superficially and with exophytic growth in the right posterior section of the liver. (B) Venous phase coronal CT scan showing early wash-out of the mass (arrow).

Fig. 2. Transarterial chemoembolization. Angiography of the common hepatic artery (A) and right inferior phrenic artery (B) before chemoembolization showing a hypervascular hepatic mass (arrows) with multiple feeding vessels in the right hemiliver. (C) Angiography of the common hepatic artery after chemoembolization showing compact lipiodol uptake by the mass (arrow) with several vascular lakes (arrowheads).

Fig. 3. Follow-up computed tomography (CT) 2 days after transarterial chemoembolization. Axial (A) and coronal (B) CT scans showing a capsular rupture (arrows) at the inferior portion of the treated hepatocellular carcinoma and hemoperitoneum with several foci of lipiodol (arrowheads) in the right subhepatic space.

France) and cisplatin. Subsequently, embolization with a 150 to 350 μ m gelatin sponge (Cali-Gel; Alicon Pharm SCI&TEC Co., Ltd., Hangzhou, China) was performed via the tumor feeders from the right inferior phrenic artery and the right posterior hepatic artery. Postembolization angiography showed compact lipiodol uptake by the mass with some vascular lakes (Fig. 2C). There were no major intraprocedural complications.

One day after TACE, the patient complained of abdominal pain and dizziness. His hemoglobin level had decreased from 13.3 to 8.8 g/dL. CT scan 2 days after TACE showed hemoperitoneum with several foci of lipiodol in the right subhepatic space. These

findings suggested capsular rupture at the inferior portion of the treated HCC (Fig. 3). There was no evidence of active contrast extravasation from the tumor.

The patient was returned to the interventional radiology department for angiography and possible embolization. The right posterior hepatic artery was accessed using a 5-French angiographic catheter (Rosch Hepatic; Cook) and a 1.9-French microcatheter (PROGREAT; Terumo) via the right common femoral artery. Selective angiography of the right hepatic artery showed some vascular lakes at the peripheral area of treated HCC without active contrast extravasation from the tumor (Fig. 4A). The patient

Fig. 4. Repeat transarterial embolization. (A) Selective angiography of the right hepatic artery showing several vascular lakes (arrowheads) at the peripheral area of the treated hepatocellular carcinoma without active contrast extravasation from the tumor. (B) Angiography of the common hepatic artery after embolization showing complete disappearance of the vascular lakes.

Fig. 5. Gross specimen of the resected hepatocellular carcinoma showing a brownish black mass with necrosis, hemorrhage, and rupture of Glisson's capsule (arrows).

underwent additional embolization using mixture of iodized oil (Lipiodol; Guerbet) and a 150 to 350 μ m gelatin sponge (Cali-Gel; Alicon Pharm SCI&TEC Co., Ltd.) via the right posterior hepatic artery. Postembolization angiography revealed complete disappearance of the vascular lakes (Fig. 4B).

After the procedure, there was no clinical evidence of further bleeding. The patient underwent staged right posterior sectionectomy 2 days after the second embolization. Gross specimen of resected HCC appeared as a brownish black mass with necrosis, hemorrhage, and rupture of Glisson's capsule (Fig. 5). Final pathologic diagnosis confirmed a totally necrotic mass with vascular rupture. After a period of recovery, the patient was successfully discharged from the hospital.

Discussion

Although the effect of preoperative TACE of HCC is controversial, preoperative TACE is performed for several reasons: to improve detection of intrahepatic metastatic foci, to increase the resectability of HCCs by down-staging tumors, to provide sufficient time of therapy in cases of damaged liver function, and to improve overall survival and disease-free survival after resection.³

In our patient, TACE was planned prior to liver resection due to large tumor size (10 cm).

Rupture of HCC is associated with an overall high mortality rate of 50% and poor long-term survival rates.⁴ HCC rupture may cause severe intraperitoneal bleeding and hypovolemic shock, especially in patients with poor liver function and coagulation deficiencies.⁵ The incidence of HCC rupture after TACE is very low, ranging from 0.15% to 0.68%.⁶

The mechanism underlying HCC rupture after TACE is not fully understood. Rupture may be associated with acute ischemic necrosis of the tumor and surrounding liver capsule, increased intratumoral pressure, vascular injury during TACE, and/or inflammation secondary to administration of chemotherapeutic agents.⁷ Large tumor size, superficial tumor location, exophytic growth of the tumor, and portal vein thrombosis appeared to be predisposing risk factors associated with rupture of HCC after TACE.⁸ In addition, vascular lakes may predispose to tumor rupture.⁹ Vascular lakes have been defined as localized pooling of contrast media, which persist in the venous phase of angiography and resemble extravasation.¹⁰ Vascular lakes emerging during TACE may be caused by rupture of some of the fragile tumor microvasculature, which may trigger partial disruption of the tumor architecture and result in a new blood space.¹¹ Although vascular lakes have been associated with good tumor response, they may also cause tumor rupture and require additional embolization.¹¹ The patient described in this report had a large sized, superficially located tumor, with exophytic growth, and vascular lakes during TACE, which are consistent with previous research.

Ruptured HCC following TACE should be suspected in patients presenting with severe abdominal pain, abdominal distension, or hypovolemic shock. Diagnosis of HCC rupture and presence of hemoperitoneum could be confirmed by ultrasonography or CT scanning.

The primary goal in the management of these patients is to achieve hemostasis by embolization, surgery, or conservative methods. Transarterial embolization is less invasive method to effectively induce hemostasis in the acute stage, as well as having a high success rate of 53% to 100%.¹² Although no consensus has been reached on the material to be use for embolization, current options include microcoils, particles, gelatin sponge or foam, liquid embolics, and repeat chemoembolization.¹³ We used mixture of lipiodol and gelatin sponge instead of gelatin sponge alone for embolization in anticipation of the additional anti-cancer effect of lipiodol. Our experience suggests that repeat transarterial embolization can be performed for immediate hemostasis and tumor stabilization, followed by staged liver resection.

In conclusion, ruptured HCC following TACE is a rare but potentially life-threatening complication. Large tumor size, superficial tumor location, exophytic growth of the tumor, and vascular lakes during TACE may predispose to rupture of HCC after TACE. Repeat transarterial embolization can be effective in patients with ruptured HCC after TACE.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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