Hepatocellular Carcinoma Rupture after Transcatheter Arterial Chemoembolization

KUNG-SHIH YING1 SHYUH-HUEI HUANG2 CHE-JEN CHAO3 SHIN-HWA WU1 TAI-YU CHANG1
CHUNG-HSEIN LEE1

Department of Radiology1, Hematology-Oncology2, Gastroenterology3, Cheng Ching Hospital

Transcatheter arterial chemoembolization (TACE) is widely used to treat non-resectable hepatocellular carcinoma (HCC). Several complications of TACE have been reported. HCC rupture after TACE is very rare. Here, we reported a 51 years old male patient had a large HCC (7.2 × 6.5 × 5.7 cm) with tumor abutting the liver capsule and bulging out of the liver contour in the lateral segment of left hepatic lobe. TACE was performed from the left and right hepatic arteries respectively. In order to avoid hepatic failure and tumor rupture, TACE by administering reduced amount of Gelfoam particles (partial embolization) was performed from the left hepatic artery. HCC rupture developed sixteen hours after TACE, when the plain abdomen radiograph showed lipiodol extravasation into the peritoneal cavity. Emergent angiography revealed early recanalization of the embolized peripheral branches of left hepatic artery. This early recanalization may be due to previous partial embolization procedure. In a patient with high risk of spontaneous tumor rupture, rupture of the HCC may occur after TACE even by applying partial embolism or modified TACE techniques.

Key words: Complication; Hepatocellular carcinoma; Transcatheter arterial chemoembolization

Hepatocellular carcinoma (HCC) is a common malignancy in Taiwan. Surgical resection is generally considered as the primary treatment for cure. Transcatheter arterial chemoembolization (TACE) has become an effective method of palliative treatment of the unresectable HCC. Several complications after TACE have been reported [1,2,3]. The mechanism of rupture of HCC is unknown. Spontaneous rupture is the most common cause for rupture of HCC, though it has been reported to occur after abdominal trauma, intra-arterial infusion chemotherapy (IAIC) and after angiography [4,5,6]. HCC rupture after TACE is very rare [7,8,9,10]. We reported here a case of ruptured HCC as a complication of TACE. The predisposing factors and mechanisms of tumor rupture after TACE are discussed.

CASE REPORT

A 51-year-old male was admitted to our hospital for third TACE treatment because of recurrent HCCs. His past major illness included liver cirrhosis and chronic viral hepatitis (type B) diagnosed at the age of 40 and esophageal varices at the age of 46. HCC was diagnosed at 48 years of age. In these 3 years, 2 courses of TACE and 6 sessions of percutaneous ethanol injection therapy (PEIT) were performed. Endoscopic ligation for esophageal variceal bleeding was performed 3 times. Physical examination revealed hepatomegaly and splenomegaly. Tenderness was noted in the right mid-abdomen.

Laboratory examination showed white blood cell count of 3.01 K/μL, hemoglobin of 12.2 g/dL, platelet of 53.6 K/μL, total bilirubin 1.6 mg/dL, aspartate aminotransferase 162 U/L, and alanine aminotransferase 107 U/L. Alpha-fetoprotein level was elevated (364 ng/ml). The endoscopic examination showed esophageal varices and portal hypertensive congestive gastropathy. Hepatic ultrasonography revealed several HCCs in the right hepatic lobe and a large HCC in the lateral segment of left hepatic lobe.
Dual phase spiral computed tomography (CT) showed an expansile, large HCC (7.2 × 6.5 × 5.7 cm) in the lateral segment of left hepatic lobe, with tumor abutting the liver capsule and protruding out of the liver contour (Fig. 1). Several smaller HCCs in both hepatic lobes and atrophy of the right hepatic lobe were noted. The diagnostic angiography revealed that the large HCC in the lateral segment of left hepatic lobe was supplied from the left hepatic artery and an AP shunt in the upper aspect of right hepatic lobe (Fig. 2). The main portal vein and left portal vein were patent, but occlusion of the right inferior portal vein was seen. There was no tumor thrombus in the portal vein.

After transfusion of 14 U platelet, TACE was performed initially from the left hepatic artery by injecting an emulsion of 7 ml of lipiodol and 30 mg of adriamycin followed by using reduced amount of Gelfoam particles (1 × 1 mm & 0.5 × 0.5 mm) for partial embolization. TAE was performed later from the right hepatic artery. We injected several pieces of Gelfoam cubes (1 × 1 mm & 1 × 2 mm) to embolize the AP shunt, then followed by TACE with injection of an emulsion of 3 ml of lipiodol and 10 mg of adriamycin and subsequent by some Gelfoam particles. Post TACE hepatic angiography revealed no AP shunt in the right hepatic lobe and no feeding vessel filling into the lipiodol-retained large HCC in the lateral segment of left hepatic lobe (Fig. 3, 4).

Unfortunately, 16 hours after TACE, abdominal

Figure 1. Enhanced venous phase CT showed a large expansile HCC in the segment 3 of left hepatic lobe, with tumor abutting the liver capsule (arrow) and protruding inferiorly out of the liver contour.

Figure 2. Common hepatic angiogram showed a large HCC in the lateral segment of left hepatic lobe, which was supplied from the left hepatic artery (arrows), and an AP shunt in the upper aspect of right hepatic lobe (long arrow).

Figure 3. Post TACE plain radiograph showed heterogenous lipiodol-retention HCCs in both hepatic lobes and some lipiodol retention in the right portal veins.

Figure 4. Post TACE proper hepatic angiogram revealed no AP shunt in the right hepatic lobe and no feeding vessel filling into the heterogenous lipiodol retention HCC in segment 3 of left hepatic lobe (arrow).
pain, hemodynamic change and decreased hemoglobin level (8.6 g/dL) were noted. HCC rupture after TACE was impressed. The plain abdomen showed lipiodol extravasation from the lipiodol-retained HCC in the lateral segment of left hepatic lobe into the peritoneal cavity (Fig. 5). Emergent angiography of the left hepatic artery revealed early recanalization of the occluded peripheral branches of left hepatic artery (Fig. 6). TAE was performed from the left hepatic artery and the hemodynamic status returned to stable. However, hepatic insufficiency with hyperbilirubinemia lasted for months after TACE and the patient died 6 months later.

**DISCUSSION**

TACE is widely used to treat unresectable HCC. This procedure includes administration of emulsion of lipiodol and cytotoxic agent into the feeding artery with subsequent embolization with Gelfoam particles. The therapeutic efficacy of TACE on HCC is due to ischemic necrosis and chemotherapeutic effects. Several severe complications of TACE have been reported. Rupture of HCC as a complication of TACE is very rare. The overall incidence was 1.5 % per patient and 0.4% per procedure [7]. In another series, the incidence of per procedure was extremely low (1/2300) [8].

Spontaneous rupture is generally regarded as the most common cause for rupture of HCC [11]. Bulky tumor size and extent of extrahepatic protrusion are associated with an increased risk for rupture of HCC [12,13]. Our patient is of high risk for spontaneous rupture of HCC (Fig. 1). Large tumor size and tumor situated very close to the liver surface and protrusion out of the liver contour are the two common predisposing factors for HCC rupture after TACE. Tumor necrosis and necrosis of the liver capsule after TACE may result in HCC rupture [4,6,7,9]. Necrosis of the capsule enables necrotic tumor to spill into the peritoneal cavity. Pijl et al. proposed that immediate contact of large HCC to the liver capsule is a relative contraindication for TACE [9]. Whenever a rim of normal liver parenchyma does not encompass large HCC, one should at least consider withholding additional Gelfoam embolization. In order to preserve the liver reserve and to prevent tumor rupture, TACE with partial embolization method was performed in our patient (Fig. 4).

Coagulopathy such as thrombocytopenia has been considered to be a precipitating factor in tumor rupture [14]. Occlusion of the hepatic veins by a tumor thrombus, obstruction of the main portal vein and portal hypertension are believed to produce a tamponade effect subsequent to tumor rupture [11,15,16]. Occlusion of portal radicles by TACE may also cause increased pressure within the tumor. The massive necrosis of tumor and liver parenchyma after TACE in the circumstance of portal vein thrombosis increase the risk of secondary infection [2,3,9]. Infection of the necrotic tumor may result in liver abscess or sepsis. Liver abscess and tumor rupture after TACE have been reported [5,10]. For patients with portal vein occlusion, modified TACE technique has been suggested [3,5,17]. In 2001, Wu et al reported a case of HCC rupture after using modified TACE technique [5].

The mechanism of rupture of HCC after TACE is

![Figure 5](image_url) Post-rupture plain abdomen showed decreased amount of lipiodol retention in the segment 3 of left hepatic lobe (long arrows) and lipiodol extravasation into the peritoneal cavity (arrows).

![Figure 6](image_url) Left hepatic angiogram in late arterial phase showed recanalization of the occluded peripheral branches of left hepatic artery (arrows).
unclear. It has been postulated to be related to tumor necrosis and increased pressure inside the friable tumor after TACE. It also be related to vascular injury such as necrotizing angiitis and intrahepatic aneurysms after TACE [7,18,19].

Recanalization of an artery occluded with Gelfoam particles is believed to occur over 1-4 weeks [19]. In our patient, recanalization of the occluded left hepatic artery peripheral branches occurred 16 hours after TACE (fig. 6). This early recanalization may be due to incomplete embolization.

HCC rupture after TACE is very rare. The predisposing factors are large tumor size, tumor direct contact with the liver capsule and protruding out of the liver contour, thrombocytopenia and hepatic venous obstruction. Vascular injury, tumor necrosis, capsule necrosis and increased pressure inside the friable tumor due to necrosis, hemorrhage, infection and venous obstruction may be the mechanisms of HCC rupture after TACE. In a patient with high risk for spontaneous rupture of HCC, rupture of HCC may even result from TACE using partial embolization method or modified TACE technique. Radiologists should be aware of this rare complication of TACE.

REFERENCES


肝細胞癌經動脈化學栓塞治療後併發腫瘤破裂：病例報告

英恭史¹ 黃旭輝² 趙哲仁³ 吳新華¹ 張泰裕¹ 李宗憲¹
台中澄清醫院 放射線科¹ 血液腫瘤科² 消化內科³

動脈化學栓塞療法，已被廣泛用在治療無法作開刀手術治療之肝癌病人。經過動脈化學栓塞治療後，發生肝腫瘤破裂之併發症是相當少見的。一個51歲的男性病人，在肝的左葉外節部有一巨大的肝細胞癌（7.2×6.5×5.7公分）；除緊貼在肝包膜外，腫瘤並向外凸出超過肝臟之邊緣表面。而在肝右葉則有一些肝細胞癌，並發現有一大的動脈－門靜脈之不正常交通。另外在血液檢查方面，則發現有血小板過低症。在做左肝動脈化學栓塞治療時，為避免發生肝衰竭及腫瘤破裂，我們只注入了少量的栓塞物（即動脈化學部分栓塞療法）。16小時後，病人發生了肝腫瘤破裂。緊急血管攝影檢查發現，在原本已經栓塞後已發生阻塞之左肝動脈供應支血管，很快的發生了再貫通的情形。此種血管再貫通的情形，可能與我們所使用的部分栓塞技術有關。對於一個易發生肝癌自發性破裂高危險群的病人，即使使用動脈化學部分栓塞療法，亦有可能引起肝腫瘤破裂。臨床及放射科醫師必須知悉此種少見之併發症。

關鍵詞：併發症，已破裂的肝細胞癌，經動脈化學栓塞療法