



Cerebral lipiodol embolism after transarterial chemoembolization for hepatic carcinoma: A case report

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Author contributions: Jiang GM and Tian F performed the operation and analyzed the data and cause of the disease; Jia ZZ and Tian F wrote the paper.

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Abstract

We report a case of cerebral lipiodol embolism (CLE) after transarterial chemoembolization (TACE) for unresectable hepatic carcinoma (HCC). A 54-year-old man with unresectable HCC underwent TACE *via* the right hepatic artery and right inferior phrenic artery using a mixture of 40 mg pirarubicin and 30 mL lipiodol. His level of consciousness deteriorated after TACE, and non-contrast computed tomography revealed a CLE. The cerebral conditions improved after supportive therapy. The complication might have been due to hepatic arterio-pulmonary vein shunt caused by direct invasion of the tumor. Even though CLE is an uncommon complication of TACE, we should be aware of these rare complications in patients with high risk factors.

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Key words: Hepatic carcinoma; Cerebral lipiodol embolism; Chemoembolization

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INTRODUCTION

Hepatic carcinoma (HCC) is one of the leading causes of cancer-related death. It has a tendency to invade the tissue around the tumor, such as diaphragm, portal and hepatic veins, which may result in formation of hepatic arteriopulmonary vein or hepatic arteriovenous shunts. Transarterial chemoembolization (TACE) is one of the most common treatment modalities as a palliative and preoperative method for patients with advanced HCC. Although various complications of TACE have been reported, cerebral lipiodol embolism (CLE) after TACE is rare. In this paper, we report a case of CLE after TACE for advanced HCC.

CASE REPORT

A 54-year-old man was admitted with right upper quadrant pain. He was a hepatitis B virus carrier for 30 years. The α -fetoprotein level was 1200 ng/mL. Enhance computed tomography (CT) revealed a 13-cm mass of the right liver lobe. These clinical signs indicated that the patient had unresectable HCC and Child-Pugh class A. As revealed by angiography, the huge hypervascular tumor located in the right liver was supplied by the right hepatic artery (RHA) and right inferior phrenic artery (RIPA) without arteriovenous shunt. TACE was performed *via* the RHA and RIPA using a mixture of 40 mg pirarubicin and 30 mL lipiodol. Toward the end of the procedure, the lipiodol was deposited in the tumor densely. The embolism process was monitored by fluoroscopy all the way and no abnormal flow of the lipiodol was found. Twenty

minutes after TACE, the patient complained of a serious headache and followed by confusion. Non-contrast enhanced CT scanning showed no hyper-intense lesions in the bilateral lungs, but multiple disseminated hyper-intense lesions in the brain, consistent with the deposition of lipiodol. His neurologic symptoms disappeared completely when discharged 9 d later.

DISCUSSION

TACE can result in various severe complications, including acute hepatic failure, intrahepatic biloma, pseudoaneurysm formation, and ectopic infarction, which occur in less than 1% of the patients. Although CLE is a rare complication of TACE, sporadic cases of CLE after TACE have been reported^[1,2]. We encountered a case of CLE after TACE, which was probably associated with hepatic or right inferior phrenic arteriopulmonary vein shunt. The patient had no specific respiratory symptoms such as cough, dyspnoea, but had neurological symptoms including headache and followed by confusion. CT scanning showed some positive findings, indicating deposition of lipiodol, and the diagnosis of CLE was confirmed clinically.

The underlying mechanisms of CLE after TACE are still obscure. Hepatic arterio-pulmonary vein shunt, which is associated with pulmonary vein invasion of HCC, may be the reasonable explanation for CLE. Vascular abnormalities, referred to as hepatic vein invasion, pulmonary arteriovenous shunt, can be found in patients with advanced HCC^[3]. An intracardiac right-to-left shunt *via* a patent foramen ovale or intrapulmonary arteriovenous shunt can lead to CLE. Patients with advanced HCC are likely to have a pulmonary arteriovenous shunt^[4], and a right-to-left shunt from the RIPA to the pulmonary vasculature is also a possible route^[5]. It has been shown that fat globules < 7 μm in diameter can pass directly through the pulmonary arteriolar network (i.e., transpulmonary shunt) and result in cerebral injury^[6]. Therefore, presence of intracardiac shunt may not be a requisite for CLE as has been demonstrated in mongrel dogs^[7]. But this kind of patients usually had specific respiratory symptoms such as cough, dyspnoea and so on. Wu *et al.*^[1] thought that pulmonary and CLE might be correlated closely with the bypass between tumor feeding artery and pulmonary vessels due to the tumor invading the thoracic cavity. Matsumoto *et al.*^[2] concluded that communication between tumor feeding artery and pulmonary vein might have occurred *via* adhesive pleural or tumor invasion into the diaphragm. Therefore, a small dose of lipiodol could enter into the systemic circulation quickly and caused CLE. Thus, we hypothesize that lipiodol passed through the hepatic or right inferior phrenic arteriopulmonary vein shunt or hepatic arteriovenous shunt, and then traveled to the cerebral artery through intrapulmonary arte-

rio venous shunt.

Although CLE is a rare complication of TACE in patients with HCC, we should keep alert when we observe complications of TACE. When angiogram shows any hepatic arteriovenous or hepatic arteriopulmonary vein shunts, we should decrease the dose of lipiodol during the procedure and pay attention to the respiratory and neurological symptoms after the procedure, which may be caused by ectopic embolism.

In addition to after-embolization syndrome, with its symptoms manifested as fever, pain, nausea and vomiting, there are also some severe complications of TACE, including acute hepatic failure, intrahepatic biloma, pseudoaneurysm formation, ectopic infarction, *etc.* Clinicians should keep in mind that a small number of patients after TACE will suffer from some severe and rare complications. Our patient developed a severe headache and followed by confusion 20 min after the procedure. If some symptoms such as cough, chest pain, chest distress, headache, nausea, and vomiting occur in patients after TACE, physical examinations should be done so as to exclude pulmonary and cerebral complications.

In conclusion, even though CLE is an uncommon complication of TACE, we should be aware of the rare complications in patients with high-risk factors such as a large-size tumor, hepatic vein or diaphragm invasion of tumor and congenital cardiovascular disease, and reduce the dose of lipiodol or stop the procedure accordingly. To reduce the risk of lipiodol embolism, a small lipiodol dose and detection of intracardiac shunt before TACE should be considered in the HCC patients with high risk factors.

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