

## Clinical Discussion on Contrast-induced Encephalopathy with Clinical Manifestation of Cerebral Hemorrhage

Meng Shuqing, Fu Beibei\*

Department of Neurology, Renmin Hospital, Hubei University of Medicine, Shiyan Renmin Hospital, Shiyan, Hubei Province, China, 442000

Address: Chaoyang District Road No. 39, Shiyan City, Hubei Prov, P.R. China, 442000

\*Corresponding author: Fu Bei-bei, E-mail: hubeiwenbo@163.com

**Keywords:** cerebral hemorrhage; clinical manifestation; contrast-induced encephalopathy; clinical characteristics

**Abstract:** The paper is to summarize and analyze clinical characteristics of contrast-induced encephalopathy (CIE) with clinical manifestation of cerebral hemorrhage, and then provide basis for early intervention of CIE. When the Renmin Hospital implemented coronary arteriography for the patients with coronary heart disease hospitalized from August 2013 to December 2017, CIE happened to 3 cases, and they showed cerebral hemorrhage clinically. The relevant data of the 3 patients were analyzed. According to the results, the 3 patients received comprehensive symptomatic treatment on the basis of identified diagnosis. Finally, 2 of them left hospital successfully, with the proportion of 66.7%. The remaining 1 patient died of brainstem hemorrhage, with the death rate of 33.3%. Conclusions indicate that, contrast agent may lead to CIE with clinical manifestation of cerebral hemorrhage. If CIE patients are not rescued in time, their life may be threatened. Thus, it is required to clinically pay attention to prevention, control and early diagnosis of CIE when contrast agent is used, and improve patients' prognosis to the largest extent.

In clinical disease diagnosis process, contrast agent is usually used as the auxiliary in order to enhance the display effect of different human tissues and organs. The application value of contrast agent in disease diagnosis has been affirmed, and the foundation also has been laid for early intervention of relevant diseases. With the extensive application of contrast agent in clinic, the literatures on adverse effects of contrast agent also increase gradually [1,2]. Based on the reports of numerous scholars, the adverse effects of contrast agent include mild adverse effects such as dizziness, nausea and emesis, and moderate adverse effects such as chest distress, chest pain and dyspnea. Moreover, there are also severe adverse effects such as fall of blood pressure, sudden cardiac arrest, convulsions and coma [3]. When our hospital implemented coronary arteriography for the patients with coronary heart disease, CIE appeared to 3 patients, and the typical manifestation was cerebral hemorrhage. The relevant analyses and reports are as follows:

### 1. CLINICAL DATA AND METHOD

#### 1.1 General data

When our hospital implemented coronary arteriography for the patients with coronary heart disease hospitalized from August 2013 to December 2017, CIE happened to 3 cases, including 2 male patients and 1 female patient, with the age of 58, 63 and 65 respectively. All patients expressed the symptoms of chest distress, chest pain and suffocation, etc. All patients received physical examination and comprehensive diagnosis in time after being hospitalized. 3 of them had complete diagnosis and treatment records.

#### 1.2 Method

Patient A: male, 58 years old. After being hospitalized, the patient received physical examination soon, with the diastolic pressure of 90mmHg and systolic pressure of 150mmHg. His mental state was good. The auscultation examination showed the patient had no dry or moist crackles, and had

clear pulmonary respiration sound, with the heart rate of 69/min. There was no pathologic murmur. The abdomen was soft, and edema did not appear to the lower limbs. The electrocardiographic examination indicated the patient had sinus rhythm, where I wave, avL and V5-6 led, and T wave was inverted. And, III and avF leading showed QS wave. Based on the above comprehensive examination, the patient was diagnosed with hypertension and asymptomatic cerebral infarction. The cardiac function grade was Grade III. Besides, the patient was suspected of unstable angina caused by coronary heart disease or old myocardial infarction. Based on the examination and laboratory examination, comprehensive treatment was conducted for the patient, including blood pressure control, blood lipid level adjustment, coronary expansion, dual anti-platelet therapy, protection and myocardium nutrition, etc. Coronary arteriography was conducted for the patient one week after being hospitalized. The examination result showed the patient was of right coronary superiority type, and stenosis did not exist for the left artery. The degree of coronary artery stenosis near the anterior descending branch was 50.0%-60.0%, and the degree of coronary artery stenosis in the middle segment was 70.0%-80.0%. TIMI blood flow was Grade 3. The middle segment of circumflex artery belonged to complete blockage, and TIMI blood flow of far end of circumflex artery was Grade 2. The degree of coronary artery stenosis of middle coronary bifurcation was 70.0%-80.0%, and the degree of coronary artery stenosis of middle coronary segment was 60.0%-70.0%. The degree of coronary artery stenosis of the segment near PLA was 70.0%-80.0%. TIMI blood flow was Grade 3. There were three lesion areas. The circumflex artery was in the complete blockage state. 6F EBU3.5GC was implemented for the left coronary. 2 Pilot50 guide wires were imported in the circumflex artery, and repeated trials were conducted according to parallel guide wire technology. However, since the guide wire could not reach far-end corresponding blood vessel, PCI operation for the circumflex artery failed. The contrast agent used in coronary arteriography was iohexol, with the dosage of 150ml. On the next day of coronary arteriography examination, the patient suddenly had headache, with blurred vision. Cerebral CT examination showed cerebral hemorrhage. Drug therapy was conducted for the patient quickly, and the patient improved. Meanwhile, the relevant symptoms disappeared [4].

Patient B: male, 65 years old. After being hospitalized, the patient received conventional physical examination, with the diastolic pressure of 90mmHg and systolic pressure of 140mmHg. His mental state was good, with the heart rate of 80/min. Lung examination showed he had no dry or moist crackles, with clear pulmonary respiration sound. His lower limbs had no edema. Electrocardiographic examination showed the patient had ST-T change and sinus rhythm. The comprehensive diagnosis indicated that the patient suffered from diabetes, and his cardiac function was Grade III. Besides, he had acute coronary syndrome. Symptomatic and supportive treatment was adopted, including regulation of blood sugar level, myocardial nutrition, blood lipids regulation, and anti-platelet aggregation, etc. Coronary arteriography examination was conducted for the patient on the next day. The patient belonged to right coronary superiority type, and stenosis did not exist for the left artery. The right coronary was large, without stenosis. The corresponding far-end blood flow was Grade 3. The degree of coronary artery stenosis for near-end of anterior descending branch reached 80-90.0%. Far-end TIMI blood flow was Grade 0. Stenosis did not exist for the circumflex artery. Blood flow signal of far end of circumflex artery was Grade 3. ST was implanted from LAD lesion location for interventional therapy. The contrast agent adopted for the operation was iodixanol, with the dosage of 110ml. On the next day, the patient suddenly raved and had consciousness obstacle. Cerebral CT examination showed cerebral hemorrhage. Despite of timely rescue, the patient still died [5].

Patient C: female, 63 years old. After hospital discharge, the diastolic pressure was 86mmHg, and the systolic pressure was 133mmHg. Her mental state was good. Lung examination showed the patient had clear pulmonary respiration sound and had no dry or moist crackles, with the heart rate of 69/min. There was no pathologic murmur. The lower limbs had no edema. Electrocardiographic examination showed I, V5-6 and avL leading as well as T wave inversion. II, III and avF leading showed QS wave. Comprehensive diagnosis indicated the patient suffered from hypertension and unstable angina caused by coronary heart disease. The basic symptomatic treatment was conducted

for the patient in time, including blood pressure control, myocardium nutrition, anticoagulant therapy anti-platelet aggregation therapy, blood circulation and blood stasis treatment, and so on. Coronary arteriography showed the patient was of right coronary superiority type, and stenosis did not exist for the circumflex artery, left artery, anterior descending branch and right coronary end. Far-end TIMI of the above blood vessels showed Grade 3 blood flow. No abnormal condition existed in the whole examination period. The contrast agent used was iohexol, with the dosage of 40ml. After the examination ended, the patient had nausea, vomiting, dizziness and headache symptoms. Cerebral CT examination showed cerebral hemorrhage. After treatment with neurosurgery, the patient recovered [6].

## 2. RESULTS

Among the 3 CIE patients with clinical manifestation of cerebral hemorrhage, one of them died after treatment, with the death rate of 33.3%, and 2 patients survived, with the rate of 66.7%.

## 3. DISCUSSIONS

Contrast agents as a kind of ancillary drug in clinic include non-ionic contrast agent and ionic contrast agent. Large quantities of reports indicate ionic contrast agent has large toxicity, so the occurrence rate of adverse effects is high. Non-ionic contrast agent is relatively safe, with lower occurrence rate of adverse effects. Thus, non-ionic contrast agent is mainly used in clinic.

Iodixanol and iohexol are often used as the contrast agent. Some scholars indicate the two contrast agents have neurotoxicity in clinic, and will damage endothelial cells of cerebral blood vessels through specific reaction. Thus, different cells are destroyed and red blood cells are exposed. Patients show cerebral hemorrhage in clinic, and the main s include headache, blurred vision, nausea and vomiting. Thus, it is required to focus on prevention of CIE for the above patients [7-9].

Some scholars consider renal failure and hypertension are high risk factors for encephalopathy when the contrast agent is used. Therefore, drug dosage should be controlled well when the patients with renal failure and hypertension are using the non-ionic contrast agent. Meanwhile, it is required to keep an eye on patients' progression of disease after they use the contrast agent. Some scholars think the non-ionic contrast agent will influence blood coagulation and has coagulation effect, while ionic contrast agent has anticoagulation effect. Since relevant reports are few, further study is still required for the mechanism on CIE with cerebral hemorrhage [10].

In conclusion, contrast agent may lead to CIE with clinical manifestation of cerebral hemorrhage. If CIE patients are not rescued in time, their life safety may be endangered. Thus, it is required to clinically pay attention to prevention, control and early diagnosis of CIE when contrast agent is used, and improve patients' prognosis to the largest extent.

## REFERENCES

- [1] Montejo C, Rodríguez A, Transient contrast-induced encephalopathy after internal carotid artery embolisation prior to surgery for nasopharyngeal carcinoma. *Neurologia* (Barcelona, Spain) 2018 Mar.
- [2] Kahyaoğlu M, Ağca M, Çakmak EÖ, Geçmen Ç, Contrast-induced encephalopathy after percutaneous peripheral intervention, *Türk Kardiyoloji Dernegi arsivi : Turk Kardiyoloji Derneginin yayin organidir* 2018 Mar; 46 (2 ):140-142.
- [3] Dattani A, Au L, Tay KH, Davey P, Contrast-Induced Encephalopathy following Coronary Angiography with No Radiological Features: A Case Report and Literature Review. *Cardiology* 2018; 139 (3):197-201.
- [4] Eleftheriou A, Rashid AS, Lundin F. Late Transient Contrast-Induced Encephalopathy after Percutaneous Coronary Intervention. *Journal of stroke and cerebrovascular diseases: the official journal of National Stroke Association* 2018 Jan;

- [5] Matsubara N, Izumi T, Miyachi S, Ota K, Contrast-induced Encephalopathy Following Embolization of Intracranial Aneurysms in Hemodialysis Patients. *Neurologia medico-chirurgica* 2017 Dec; 57 (12):641-648.
- [6] Morales-Casado MI, Iodinated contrast-induced encephalopathy: a pathology that must be borne in mind when carrying out endovascular examinations].*Revista de neurologia* 2017 Dec; 65 (11 ):503-506.
- [7] Shi F, Shen L, Shi Y, Shi L, Yang X, Jin Z, Liu W, Wu D. Posterior reversible encephalopathy syndrome after postpartum hemorrhage and uterine artery embolization: A case report. *Medicine* 2017 Dec; 96 (49 ):e8973.
- [8] Park JC, Ahn JH, Chang IB, Oh JK, Kim JH, Song JH. A Case of Unusual Presentation of Contrast-induced Encephalopathy after Cerebral Angiography Using Iodixanol. *Journal of cerebrovascular and endovascular neurosurgery* 2017 Sep; 19 (3):184-188.
- [9] Yuan JL, Wang SK, Guo XJ, Ding LL, Hu WL. Contrast-induced encephalopathy after coronary angioplasty and stent implantation. *Archives of medical sciences. Atherosclerotic diseases* 2016; 1 (1): e63-e65.
- [10] Nag amine Y, Hayashi T, Kakehi Y, Yamane F, Ishihara S, Uchino A, Tanahashi N. Contrast-induced encephalopathy after coil embolization of an unruptured internal carotid artery aneurysm. *Internal medicine (Tokyo, Japan)* 2014 ; 53 (18 ):2133-8.