

Life-Threatening Allergic-Like Reaction After Intravenous MRI Liver-Specific Contrast Media Gadoxetate Disodium: A Case Report

Fei-Fei Yao, MS,^{1*} and Feng-Hui Liu, MM²

To the Editor:

Gadoxetate disodium is a gadolinium-based, positive-linear-ionic, intravenous, extracellular, and hepatobiliary target(liver)-specific magnetic resonance imaging (MRI) contrast media. In addition to standard dynamic T₁-weighted images, it enables hepatobiliary phase images within ~20 minutes of intravenous (IV) administration.¹ The safety of gadoxetate disodium has been well documented in phase I,^{2,3} phase II,⁴ and phase III⁵ clinical trials. It was approved for use in Sweden, the United States, and China in 2004, 2008, and 2010, respectively. Currently, only nine serious adverse events have been recorded in a multicenter, cross-regional, and large-sample study,⁶ but details of clinical presentation were not provided. We present a case of facial edema with dyspnea, laryngeal edema with stridor and hypoxia, and hypotensive shock after the IV administration of gadoxetate disodium.

A 56-year-old 65-kg female outpatient with a personal history of breast cancer, was referred for liver MRI to rule out metastasis. She had no known drug allergies. Five months prior, the patient had undergone contrast-enhanced computed tomography (CT) with IV iodinated contrast media (CM) and an MRI exam with definite use of an unknown extracellular gadolinium-based CM, without any apparent adverse effects.

Gadoxetate disodium (Bayer Pharma, Berlin, Germany) was injected from a catheter placed within a hand vein at a rate of 1.5 mL/s and at a fixed dose of 10 mL, followed by a 20-mL 0.9% saline flush with a high-pressure injector at the same rate.

Approximately 1 minute after the injection, the radiographer observed a deterioration of the quality of breath-hold hepatic arterial phase images (Fig. 1b). The patient then stated upon questioning that she could not hold her breath. After providing verbal reassurance, the radiographer repeated the hepatic venous phase sequence. However, the image quality remained poor (Fig. 1c). The patient then described swelling of her head and throat and requested discontinuation of the examination. The radiographer expeditiously entered

the scanning room and noted bilateral blepharodema and sweat on the patient's face. The patient was then immediately removed from the magnet and 10 mL of dexamethasone was administered IV timely. However, the patient's condition deteriorated progressively with wheezing, loss of consciousness, and urinary incontinence over the subsequent 5 minutes.

The patient was then transported to the emergency department 100 meters away. After the establishment of the oropharyngeal airway and sputum aspiration, the patient gradually regained consciousness, with a blood pressure of 50/30 mm Hg. Meanwhile, epinephrine was IV administered with 0.2 mg.

At approximately an hour after the injection, the patient was transferred to the respiratory intensive care unit (RICU) for further treatment. The skin flushing and cold extremities were noted. Her blood pressure was 50/30 mm Hg. Combined with the laboratory examinations (blood gas, routine blood test, glucose, myocardial enzymes, and electrolytes) and physiological monitoring (ECG and intra-arterial monitoring of blood pressure and gases), the following treatments were provided: 1) oxygen inhalation through a nasal tube; 2) the establishment of peripherally inserted central venous catheters (PICC) for fluid supplementation and drug therapy; 3) maintaining electrolyte balance and other supportive therapy. The patient's facial edema improved. The blood pressure returned to normal at 4½ hours after injection and remained stable over the next 2 days. The prominent abnormal physiological index fluctuations are shown in Table 1. On the noon of the third day, she was discharged in good condition.

It is challenging to identify severe adverse MRI contrast reactions in a timely fashion for the following reasons. First, gadolinium agents are generally considered very safe.⁷ Thus, there are usually no special procedures undertaken to prepare patients. Second, the magnetic field limits the types and location of resuscitation equipment. Third, gradient noise may limit the observer's ability to hear patient complaints or issues with breathing. Fourth, some studies^{8,9} have shown that acute transient dyspnea after intravenous administration of gadoxetate disodium is not rare. Fifth, acute transient tachypnea following gadoxetate administration in a rhesus macaque has been observed.¹⁰

One thing to note is that the patient was administered an off-label dose of 10 mL, which is ~1.5 times the recommended dose (0.025 mmol/kg body weight, equal to 0.1 mL/kg). This use does

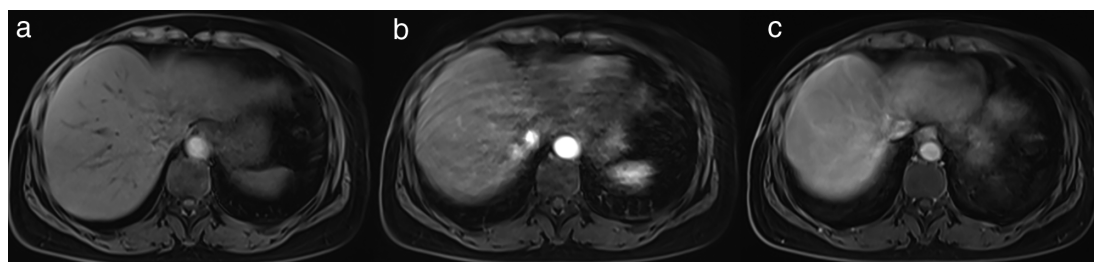


FIGURE 1: Axial 3D T₁-Weighted MRI images of the patient obtained in the precontrast (a), arterial (b), and venous (c) phases. Compared with the precontrast image, note the severe respiratory motion in the arterial phase and poor image quality in the venous phase.

TABLE 1. Prominent Abnormal Physiological Index Fluctuations

Time items (normal reference range)	Day 1	Day 2	Day 3
K (3.4–4.5 mmol/L)	2.8	4.1	3.7
Lac (0.5–1.7 mmol/L)	4.4	1.3	1.1
Glu (3.9–6.1 mmol/L)	10.7	7.3	5.1
WBC (3.5–9.5 10 ⁹ /L)	13.69	/	9.77
LEU (0–12 µL)	/	3	/
CRP (<5 mg/L)	/	69.75	/
CK-MB (0–16 U/L)	45	/	18
PCT (0–0.046 ng/mL)	/	3.68	/
NT-pro BNP (0–198 pg/mL)	/	/	813.32
Cr (58–110 µmol/L)	/	56.6	64.1
SGPT (9–69 U/L)	/	71	66
SGOT (15–46 U/L)	/	82	56

not appear to be uncommon, as it is easy to administer the entire 10 mL vial, and using the full vial might improve image quality.⁸

Although the risk of severe adverse reactions induced by gadoxetate disodium is small, we still should be alert to this kind of emergency.

¹Department of MRI in the First Affiliated Hospital, Zhengzhou University Zhengzhou, China

²Department of Respiratory and Sleep Medicine in the First Affiliated Hospital, Zhengzhou University Zhengzhou, China

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Level of Evidence: 5

Technical Efficacy: Stage 5