

## CASE REPORT

# Acute allergic reaction upon first exposure to gadolinium-DTPA: a case report

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This is a case report of allergic reaction to Gadolinium-DTPA on first exposure, with a brief review of safety of MR contrast agents.

*Key Words:* MR; Gadolinium; Allergy

## 1. Introduction

Cardiovascular magnetic resonance (CMR) is emerging as a potentially powerful new tool in the non-invasive assessment of cardiac pathology. Significant technical advances over the past decade have extended its original role in the assessment of complex cardiac anatomy to include evaluation of left and right ventricular function, studies of flow in the great vessels and across valves and assessment of cardiomyopathic diseases such as sarcoidosis and iron-deposition disorders. More recently, with the advent of contrast agents, myocardial perfusion, extent of infarction and residual viability may be imaged. CMR compares favorably with other non-invasive imaging techniques in several respects, but one of the most important factors which has contributed to its growing popularity is the relative safety of the technique. However, one procedure where there remains a slight risk to the patient is during the administration of intravenous contrast. We report a case of allergy to gadolinium-DTPA that occurred in our own unit.

## 2. Case

A 51-year-old gentleman had been admitted to a local hospital several months earlier with severe burning central chest pain, and although there were no convincing electrocardiogram (ECG) changes and no rise in cardiac enzymes, his subsequent exercise tolerance test was equivocal. He had no risk

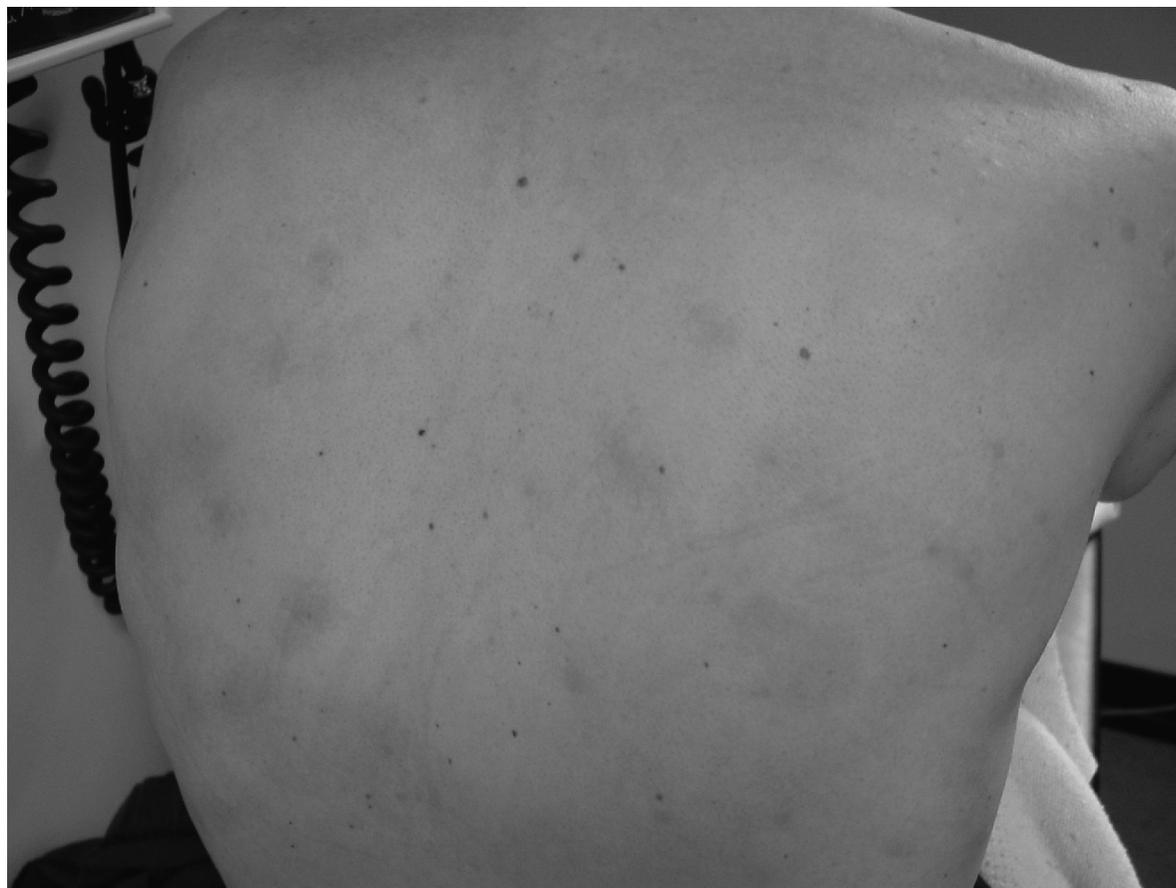
factors for coronary artery disease. There was no past history of any serious medical illness or major surgery. He had no known allergies, and his medication was aspirin 75 mg daily. In particular, there was no family history of atopy. He underwent adenosine stress/rest <sup>201</sup>thallium myocardial perfusion SPECT which showed reverse-redistribution in the inferior wall. As this appearance may be associated with non-transmural myocardial infarction, he consented to undergo contrast-enhanced CMR as part of a research study to evaluate the presence and extent of any myocardial damage.

CMR was performed on a 1.5 T Siemens Sonata scanner (Siemens AG, Erlangen, Germany). Pilot images were acquired to determine the cardiac axes, following which, breath-hold TrueFISP cines were acquired in vertical long axis, horizontal long axis and short axis planes for the evaluation of regional wall motion and thickening. Pharmacological stress was performed with the patient inside the scanner by infusing adenosine intravenously at 140 µg/kg/minute for 4 minutes. First pass myocardial perfusion imaging was then performed using a saturation recovery turbo FLASH (Fast Low Angle Shot) sequence. Gadolinium-DTPA (Magnevist, Schering AG, Berlin, Germany) was administered using a power injector (Medrad Spectris) in an antecubital vein at 0.1 mmol/kg at 3 mL/s. Within 5 minutes of contrast injection, the patient sneezed several times. On being asked whether he was alright, he replied that he was fine, and it was noted that his voice sounded rather hoarse. He was questioned again, but insisted that he felt well and able to continue with the scan. Further images were acquired over approximately 2 minutes, but these were considerably degraded due to patient motion, as it transpired that the patient was shaking uncontrollably. He also continued to sneeze. At this point the scan was terminated and the patient brought out of the scanner. He was noted to be flushed and had bilaterally suffused conjunctivae. He also reported a feeling of mild chest tightness. On

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**Figure 1.** Back urticaria following first exposure to gadolinium.

examination, the pulse rate was 100 bpm, and the blood pressure was 140/80 mmHg. He was found to have developed an urticarial rash over the arms and torso (Fig. 1). There was no expiratory wheeze.

The patient was reassured and treatment was given with 10 mg IV chlorpheniramine and 100 mg IV hydrocortisone. The blood pressure remained stable, and the heart rate gradually declined over 30 minutes to 80 bpm. The patient recovered fully under observation for 2 hours, at which point, the urticaria was noted to have improved considerably. He was discharged home with advice to contact the department immediately in the event of any deterioration. He was reviewed one week later by the cardiologist at his local hospital and was well.

### 3. Discussion

Adverse reactions to contrast media used in imaging techniques are well-known, but are particularly associated with the non-ionic iodinated contrast agents used for angiography and urography (1). Reactions may be acute, occurring within 1 hour, or delayed, occurring more than 1 h but within 7 days of contrast administration. Reactions are

also classified as mild, intermediate and severe, with symptoms and signs ranging from nausea, flushing and mild urticaria to laryngeal oedema, bronchospasm, cardiovascular collapse and cardiac arrest. The reported incidence of such events varies between 3% and 15% depending on the exact nature of the agent used.

Gadopentetate dimeglumine (Gd-DTPA, Magnevist, Schering, Berlin, Germany) is one of four gadolinium chelates used widely for contrast-enhanced CMR. It was approved for clinical use in the late 1980s. In Europe, an intravenous dose of up to 0.3 mmol/kg may be given (0.1 mmol/kg in the USA) (2).

US clinical trials involving 1068 patients given a dose of 0.1 mmol/kg were published in 1990. The three most common reactions noted by the investigators were headache (3.6%), coldness of the injection site (3.6%) and nausea (1.5%). Overall, adverse reactions of *any* kind were reported in 19.9% patients. Laboratory tests showed a mild increase in serum iron and bilirubin levels, probably related to mild transient hemolysis secondary to the presence of small amounts of free gadolinium ion. This was asymptomatic and transient. After several years of clinical use, a larger series was reported in 1995 (3). In this study, the rate of significant adverse reaction was 3.7% in patients with a

history of atopy and 6.3% in patients with a history of prior reaction to iodinated contrast media. The rate of allergic reaction also appeared to be related to injection rate, with a reaction rate of 2.2% for slow administration and 2.9% for rapid administration. Overall, minor adverse reactions such as nausea or urticaria alone are reported in approximately 1% patients. Severe anaphylactoid reactions are reported in 0.0003% (4, 5), but in 1996, a series of cases was reported which suggested a significantly higher rate of 0.01% (6).

Our case illustrates several important points: firstly, the patient had no history of asthma or atopy. As he had not undergone coronary angiography, there was no information regarding his tolerance of iodinated contrast media. Another slightly unusual feature is that he suffered the reaction on first exposure to Gd-DTPA. Thirdly, the features which alerted the medical staff to the problem were sneezing, hoarseness and tremor. The reaction could be graded mild-moderate, as he also suffered from chest tightness, and the development of a hoarse voice may have indicated mild laryngeal oedema. The patient maintained that he was well enough to continue the scan, which could have resulted in a second dose of contrast being administered, had not the staff been alert.

If a reaction to contrast is suspected during scanning, the first step is to stop the scan and take the patient out of the scanner. No further contrast should be given. Depending on the severity of the reaction, treatment may be given as for any anaphylactoid reaction, with chlorpheniramine 10 mg IV and hydrocortisone 100 mg IV. A bronchodilator may be required, and if the patient is distressed and unfamiliar with the use of inhalers, a nebuliser should be available. Adrenaline should be given intravenously *only* in severe cases and to patients who are being monitored (7).

All staff involved in scanning must be trained in basic life support procedures as a minimum and preferably one staff member at least should hold an advanced life support

certificate. Every department should have a well-rehearsed routine for the management of emergencies so that staff are familiar with the whereabouts of emergency drugs and equipment. The patient should be kept under observation during recovery. Even if the patient appears to be stable and to make a fairly rapid recovery, it should not be forgotten that it is possible for symptoms to reappear later at home when the effect of IV drugs has lessened. Therefore the patient must be advised about what to expect in this case and what action to take. Finally, it is vital to mark the patient's notes clearly to ensure that contrast is not given in future, and the GP and referring physician must be informed.

In summary, a high index of suspicion for the occurrence of a reaction to gadolinium, coupled with rigorous management and documentation of any such will ensure that these agents remain as safe to use as they have hitherto shown themselves to be.

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