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Life-Threatening Anaphylactoid Reaction after Intravenous Gadoteridol Administration in a Patient Who Had Previously Received Gadopentetate Dimeglumine

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Summary: We report a case of a life-threatening anaphylactoid reaction to gadoteridol. The reaction resulted in hospitalization but did respond to medical treatment. Resuscitation equipment and properly trained personnel should be available if these agents are being administered.

Index terms: Contrast media, complications; Contrast media, paramagnetic; Allergy and anaphylaxis; Iatrogenic disease or disorder

The safety of gadoteridol as a magnetic resonance (MR) intravenous contrast agent has been well documented in phase I, II, and III trials (1). As with any drug, serious anaphylactoid reactions can occur after administration. We present a case of severe bronchospasm, dyspnea, facial edema, and diffuse erythema after the intravenous administration of gadoteridol.

Case Report

A 44-year-old 96-kg man was referred for MR because of persistent back and leg pain after two back operations for disk herniation. The patient had previously been evaluated with an MR exam and a computed tomographic myelogram of the lumbar spine before the first surgery. He had a second MR exam with contrast (Magnevist gadopentetate dimeglumine, Berlex, Cedar Knolls, NJ) without incident before his second back surgery. An unenhanced MR exam of the lumbar spine was obtained with a 1.5-T system. Gadoteridol (ProHance, Squibb Diagnostics, Princeton, NJ) 0.10 mmol/kg was then administered intravenously (20 mL) over 2 minutes by a second-year radiology resident. Immediately after injection, the patient felt he had to sneeze and was noted to be erythematous over his torso. At approximately 5 minutes after injection, a staff radiologist arrived in the MR suite, and the patient was transferred to the MR preparation area. The patient complained of respiratory difficulty and chest tightness and had difficulty speaking. Marked periorbital edema, diffuse erythema, and hives were noted over the patient's torso. At this point, his heart rate was elevated with a pulse of 92. The patient was given oxygen at 4 minutes, 0.9% intravenous sodium chloride was started, and 0.5 mL of epinephrine (1:1000) was given subcutaneously at approximately 10 to 15 minutes after contrast injection.

Subsequently, the patient's blood pressure was 190/100, pulse was 130 and regular, and diffuse inspiratory wheezing was noted on chest auscultation. The patient was unable to talk, and a code was called in case intubation was necessary. The patient was then given 50 mg of diphenhydramine hydrochloride intravenously and 125 mg of intravenous Solumedrol. Blood gases were normal on 4 L/min of oxygen per nasal cannula. Chest x-ray and electrocardiogram were normal. The patient's erythema and respiratory status partially improved over the next 15 minutes after drug therapy. However, the patient was still unable to talk, and mild wheezing and periorbital edema persisted. He was transferred to the intensive care unit for observation. Vital signs on transfer were blood pressure 140/80, heart rate 124, and oxygen saturation 98%. The patient's clinical status markedly improved overnight, but because of lingering hoarseness and fatigue, he remained in the hospital a second night in the general medical/surgical ward for continued observation. On the second morning, he was dismissed in good condition.

Discussion

Gadolinium has proved valuable in MR imaging of the central nervous system (2). As the use of contrast agents continues to grow, their clinical safety has become evident (1, 3, 4). Since the introduction of gadopentetate dimeglumine (Magnevist) in 1988 only 10 serious life-threatening anaphylactoid reactions have been reported in

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approximately 4 million doses, resulting in one death (Berlex Laboratories, Safety and Efficacy of Magnevist [gadopentetate dimeglumine] Injection: Four Years Experience, April 1993). However, none of these patients had reportedly received prior doses of gadolinium-containing contrast material. Since its introduction in November 1992, approximately 100 000 doses of gadoteridol have been administered (Rogan RM, Squibb Diagnostics, personal communication). According to the manufacturer, this is the first serious life-threatening event requiring hospitalization immediately after administration of the agent and where prior gadolinium contrast was received. (Rogan RM, Squibb Diagnostics, personal communication). This patient had no history of drug sensitivity or asthma. He responded to supportive therapy as well as epinephrine, diphenhydramine hydrochloride, and steroids, as did a similar patient reported by Tisher and Hoffman (5) after gadopentetate dimeglumine administration. This case again indicates that although the risk of life-threatening reaction is low, gadolinium contrast agents (including gadoteridol) are not innocuous.

The clinical stability of gadolinium complexes has been clearly demonstrated (6). Because the number of anaphylactoid reactions after exposure to MR contrast agents is so low, a mechanism suggesting an immunologically mediated reaction has not been established. However, adverse reactions to iodinated contrast media have been studied for many years; although no definite cause has been established, both allergic and nonallergic mechanisms have been proposed (7). Anaphylactoid reactions mimic immunoglobulin E-mediated hypersensitivity, and there is significant incidence of repeat reactions in patients who previously had adverse reactions to contrast media. A number of investigators have demonstrated that complement activation also may play a role in contrast-mediated adverse reactions (8). Treatment guidelines are the same as those used for reactions to ionic contrast (7, 9). Intravenous access needs to be established. Oxygen, subcutaneous epinephrine (1:1000), and inhaled bronchodilators (eg, albuterol) are used to treat mild to moderate bronchospasm. Severe bronchospasm and/or laryngospasm with profound hypotension (usually associated with tachycardia) need more aggressive therapy, including intravenous epinephrine (1:10 000) and intravenous fluids. Isolated urticaria can be treated with an H_1 antihistamine (eg, diphenhydramine) if producing troublesome symptoms. Vasovagal reactions characterized by bradycardia, hypotension, and diaphoresis are treated with intravenous atropine and intravenous fluids. Care must be taken to ensure that the patient is not taking β-blockers, which also produce bradycardia.

It cannot be inferred that there is additional risk for an anaphylactoid event with prior exposure to the same or similar MR contrast agents. However, resuscitation equipment and properly trained personnel should be available if these agents are being administered.

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