

Managing Adverse Reactions to Contrast Agents



Brian Boyd, MD^{a,*}, Carlos A. Zamora, MD, PhD^b,
Mauricio Castillo, MD^c

KEYWORDS

• Adverse • Allergic • Anaphylactoid • Reaction • Iodinated • Gadolinium • Contrast

KEY POINTS

- Iodinated and gadolinium-based contrast agents have low adverse reaction rates with an overall estimated incidence of less than 1%.
- Adverse reactions are subdivided into physiologic and allergiclike (previously anaphylactoid) reactions.
- All members of the imaging staff should be familiar with signs and symptoms of contrast reactions to allow for prompt treatment.
- Treatments for both physiologic and allergiclike reactions are well accepted; radiologists must be knowledgeable of these in order to appropriately manage reactions acutely.

INTRODUCTION

Adverse reactions after the administration of low-osmolarity iodinated or gadolinium-based contrast agents are estimated to have an incidence of less than 1%.^{1–5} Adverse reactions are further subdivided into physiologic and allergiclike (previously anaphylactoid) reactions.⁶ Allergiclike reactions are less common than physiologic reactions and are most often mild. Serious or severe reactions (defined as anaphylaxis grade 3) to current nonionic, low-osmolarity iodinated contrast agents occur at an estimated incidence of 0.04% and have been reported in up to 0.4% of injections with previous ionic compounds.^{7,8} Comparatively, gadolinium-based contrast agents have an adverse reaction rate that is approximately 10-fold lower.^{4,9,10} Physiologic reactions,

such as headache, nausea, vomiting, and vasovagal responses, often require supportive measures at most for treatment. Allergiclike reactions, on the other hand, can range from minor discomfort to life-threatening events and may require medication therapy depending on their level of severity.

Although the incidence of adverse and true allergiclike reactions is low, the number of contrast-enhanced imaging studies performed in a typical imaging practice makes them not an infrequent occurrence; the appropriate precautions and preparations must be in place to provide prompt and appropriate treatment when they occur. The treatment regimen is based on the patients' specific symptoms and level of severity of the reaction. These treatment algorithms are well accepted and are reviewed here.

Disclosure statement: The authors have nothing to disclose.

^a Division of Neuroradiology, Department of Radiology, University of North Carolina School of Medicine, 2107 Old Clinic Building, Campus Box 7510, Chapel Hill, NC 27599-7510, USA; ^b Division of Neuroradiology, Department of Radiology, University of North Carolina School of Medicine, 3320 Old Infirmery, Campus Box 7510, Chapel Hill, NC 27599-7510, USA; ^c Department of Radiology, University of North Carolina School of Medicine, 3326 Old Infirmery, Campus Box 7510, Chapel Hill, NC 27599-7510, USA

* Corresponding author.

E-mail address: bboyd@unch.unc.edu

Magn Reson Imaging Clin N Am 25 (2017) 737–742
<http://dx.doi.org/10.1016/j.mric.2017.06.008>
1064-9689/17/© 2017 Elsevier Inc. All rights reserved.

For patients with a history of a prior contrast reaction who require another contrast-enhanced examination, pretreatment strategies are also well established. Evidence for the effectiveness of these strategies has continued to grow in recent years, including risk stratification to help guide the decision-making process.^{11–14}

PHYSIOLOGIC REACTIONS

The mechanism of physiologic reactions, also known as chemotoxic reactions, is not completely understood. These reactions are thought to be related to certain molecular attributes, such as osmolarity or molecular binding of certain activators.^{5,15,16} Unlike allergiclike reactions, physiologic reactions often demonstrate dose and concentration dependence.

Adverse reactions impacting the cardiovascular system are seen with increased frequency in patients who have underlying cardiac disease.⁶ There are otherwise no specific risk factors identified that have been consistently associated with an increased incidence of physiologic reactions.

General tenets in the treatment of all adverse reactions include preservation of intravenous (IV) access, monitoring of vital signs, and administration of supplemental oxygen preferably with a mask at a rate of 6 to 10 L per minute. Familiarity with the institution-specific emergency response system and with the location of relevant medication and equipment is also paramount.

Vasovagal Reaction

A vasovagal reaction represents a complex neurologic reflex that may be triggered by a variety of stimuli and is characterized by hypotension.¹⁷ It is one of the more common physiologic reactions and can occur at any time point during the study, including before the actual administration of the contrast agent. It is often relieved by recumbence and generally requires only reassurance and elevation of the patients' legs without other intervention. If the induced bradycardia is prolonged, however, or patients become symptomatic, then a slow infusion of 0.6 to 1.0 mg of atropine IV can be administered. Rapid infusion of IV fluid resuscitation (0.9% normal saline or lactated Ringer solution) to a total volume of 500 mL to 1 L is appropriate (Table 1).

Hypertensive Crisis

Defined as systolic blood pressure greater than 200 mm/Hg, diastolic greater than 120 mm/Hg, or evidence of end organ damage, hypertensive crisis warrants consideration for transfer of patients to an

appropriate treatment facility, such as a nearby emergency department (ED), if the contrasted imaging examination was not performed in the hospital setting. Treatment can include use of labetalol or a combination of sublingual nitroglycerin and IV furosemide.

Pulmonary Edema

Noncardiogenic pulmonary edema is very rare and occurs in patients who have a normal cardiac function. It is not known for certain whether it represents an allergiclike or a physiologic reaction.¹⁸ In addition to providing supplemental oxygen and monitoring the patients' pulse oximetry, the head of the bed should be elevated, if possible, and IV furosemide administered. Development of pulmonary edema warrants activation of the emergency response team and consideration of patient transfer to an appropriate treatment facility.

ALLERGICLIKE REACTIONS

The exact mechanism of an allergiclike (also referred to as anaphylactoid or idiosyncratic) contrast media reaction remains unclear; however, they are treated the same as other true allergic drug reactions.⁶ They can occur within 1 hour (acute or immediate) and for up to 1 week after administration (delayed). Despite the timing of the reaction, treatment is based on the severity and types of symptoms exhibited.

Pathophysiology

Drug allergies or hypersensitivity reactions are classically broken down into 4 different categories.¹⁹ Type I reactions are immunoglobulin E (IgE) mediated and often termed immediate because of their rapid occurrence after exposure. Types II and III are IgG mediated and type IV or delayed-type reactions involve T lymphocytes. A recent meta-analysis suggests that up to 17% of iodinated contrast reactions may involve one of the true hypersensitivity pathways.²⁰ Interestingly, in patients with severe reactions, the pooled positive skin testing rate was 52%, which could aid in the selection of alternative contrast agents, should a future contrast-enhanced study be required. The data for positive skin testing and gadolinium-based contrast agents remain limited, likely owing to the overall lower rate of reactions.

Most allergiclike reactions to contrast media, therefore, must occur through a different pathway. Given the manifestations of urticaria and facial edema, histamine release is implicated; however, instead of an IgE-mediated pathway of release, histamine is thought to be triggered

Download English Version:

<https://daneshyari.com/en/article/5727750>

Download Persian Version:

<https://daneshyari.com/article/5727750>

[Daneshyari.com](https://daneshyari.com)