

## Management of patients at high risk of hypersensitivity reactions to contrast agents undergoing examination with Iodinated Contrast Media (ICM)

Manejo de pacientes com alto risco de reações de hipersensibilidade a agentes de contraste submetidos a exames com Meios de Contraste Iodados (ICM)

Manejo de pacientes con alto riesgo de reacciones de hipersensibilidad a agentes de contraste que se someterán a exámenes con Medios de Contraste Iodados (ICM)

Received: 04/18/2025 | Revised: 07/08/2025 | Accepted: 07/12/2025 | Published: 07/14/2025

**Agung Adi Nugroho<sup>1</sup>**

ORCID: <https://orcid.org/0009-0007-8769-6328>

Faculty of Medicine, Udayana University/Prof. Dr. I.G.N.G. Ngoerah General Hospital, Indonesia

E-mail: [agungadingrh@gmail.com](mailto:agungadingrh@gmail.com)

**Ketut Suardamana<sup>2</sup>**

ORCID: <https://orcid.org/0009-0003-3818-0174>

Faculty of Medicine, Udayana University/Prof. Dr. I.G.N.G. Ngoerah General Hospital, Indonesia

E-mail: [kt.suardamana@unud.ac.id](mailto:kt.suardamana@unud.ac.id)

### Abstract

Premedication in patients at high risk of an immediate hypersensitivity reaction to contrast remains controversial. This article aims to present a case report on a successful case of premedication in a patient with a history of anaphylactic reaction to contrast agents. This article reports a 60-year-old female patient with diagnosis of anterior bladder adenocarcinoma T3N0M0 and a history of anaphylactic reaction to contrast. The patient was planned by the urology department for another abdominal CT scan examination using contrast, and was consulted to allergy and immunology division a day before the abdominal CT scan was performed. The patient was given different contrasts and given a premedication using intraoral methylprednisolone 32 mg at 12-hours, and 2-hour before the procedure and intramuscular diphenhydramine 50 mg at 1-hour before the procedure. Patients' symptoms, vital signs, and allergic reactions were monitored during the procedure, and no adverse reactions occurred. Our finding highlights a successful prevention of hypersensitivity reactions in this case. American College of Radiology recommended strategic prevention for patients with history of hypersensitivity of reactions, but it has not proven effective in reducing moderate to severe hypersensitivity incident. Proper preparation must be done to prevent reactions in patients with a history of hypersensitivity reactions to contrast.

**Keywords:** Premedication, Immediate Hypersensitivity Reaction, Iodinated Contrast Media.

### Resumo

A pré-medicação em pacientes com alto risco de reação de hipersensibilidade imediata a meios de contraste permanece um tema controverso. Este artigo tem como objetivo apresentar um relato de caso sobre o sucesso da pré-medicação em uma paciente com histórico de reação anafilática a agentes de contraste. Trata-se de uma paciente do sexo feminino, de 60 anos, diagnosticada com adenocarcinoma vesical anterior estágio T3N0M0 e com histórico de reação anafilática a contraste iodado. A paciente foi indicada pelo departamento de urologia para realização de uma nova tomografia computadorizada (TC) abdominal com contraste e foi encaminhada à divisão de Alergia e Imunologia um dia antes do exame. Foi utilizado um agente de contraste diferente e instituído protocolo de pré-medicação com metilprednisolona oral, 32 mg, administrada 12 horas e 2 horas antes do procedimento, além de difenidramina intramuscular, 50 mg, aplicada 1 hora antes da TC. Durante o procedimento, monitoraram-se os sinais vitais, sintomas e possíveis reações alérgicas, não sendo observadas reações adversas. Nossos achados evidenciam uma prevenção bem-sucedida de reações de hipersensibilidade neste caso. O Colégio Americano de Radiologia recomenda estratégias preventivas para pacientes com histórico de hipersensibilidade a meios de contraste, embora tais estratégias ainda não tenham demonstrado eficácia comprovada na redução de incidentes de hipersensibilidade moderada a grave. Assim, uma preparação adequada é essencial para a prevenção de reações em pacientes com histórico de hipersensibilidade a contrastes.

**Palavras-chave:** Premedicação; Reação Imediata de Hipersensibilidade; Meios de Contraste Iodados.

---

<sup>1</sup> Internal Medicine Residency Program, Faculty of Medicine, Udayana University/Prof. Dr. I.G.N.G. Ngoerah General Hospital, Indonesia.

<sup>2</sup> Department of Internal Medicine Faculty of Medicine, Udayana University/Prof. Dr. I.G.N.G. Ngoerah General Hospital, Indonesia

## Resumen

La premedicación en pacientes con alto riesgo de reacciones de hipersensibilidad inmediata a medios de contraste sigue siendo un tema controvertido. El presente artículo tiene como objetivo presentar un reporte de caso exitoso de premedicación en una paciente con antecedentes de reacción anafiláctica a agentes de contraste. Se trata de una paciente de sexo femenino, de 60 años de edad, diagnosticada con adenocarcinoma vesical anterior estadio T3N0M0, y con antecedentes de reacción anafiláctica a medios de contraste. La paciente fue programada por el servicio de urología para una nueva tomografía computarizada (TC) abdominal con contraste, y fue evaluada por la división de Alergia e Inmunología un día antes de la realización del examen. Se utilizó un medio de contraste diferente y se administró un protocolo de premedicación que incluyó metilprednisolona oral, 32 mg, administrada 12 horas y 2 horas antes del procedimiento, junto con difenhidramina intramuscular, 50 mg, una hora antes del mismo. Durante el procedimiento, se monitorizaron los signos vitales, los síntomas y posibles reacciones alérgicas, sin que se observaran eventos adversos. Nuestros hallazgos destacan una prevención exitosa de reacciones de hipersensibilidad en este caso. El Colegio Americano de Radiología recomienda estrategias preventivas en pacientes con antecedentes de hipersensibilidad a medios de contraste; sin embargo, estas estrategias aún no han demostrado ser efectivas para reducir la incidencia de reacciones de hipersensibilidad moderadas a graves. Por lo tanto, una preparación adecuada es fundamental para prevenir reacciones en pacientes con antecedentes de hipersensibilidad a los agentes de contraste.

**Palabras clave:** Premedicación; Reacción Inmediata de Hipersensibilidad; Medios de Contraste Yodados.

## 1. Introduction

The use of computed tomography (CT) scans continues to increase, with an estimated total of 300 million CT scan procedures performed annually, 40% of which involve the use of contrast agents. Iodinated contrast media (ICM) is the most commonly used contrast agent for contrast enhancement, aiding in both diagnosis and therapeutic evaluation (Schöckel *et al.*, 2020). ICM is known to have a good safety profile; however, it can cause hypersensitivity reactions ranging from mild to severe. The incidence of hypersensitivity reactions due to contrast agents is approximately 0.97%, with a significantly higher incidence (16.99%) in individuals with a history of contrast agent hypersensitivity compared to those without such a history (0.80%) (Lee *et al.*, 2019).

The use of premedication to prevent hypersensitivity reactions caused by contrast agents remains controversial. The American College of Radiology (ACR) currently recommends premedication for patients with a history of hypersensitivity reactions; however, the ACR also emphasizes that premedication cannot prevent all reactions and that there is a lack of supporting evidence regarding its efficacy in high-risk group (American College of Radiology, 2016). In this report, we present a successful case of premedication in a patient with a history of anaphylactic reaction to contrast agents.

## 2. Methodology

A qualitative, descriptive, clinical case study was carried out (Toassi & Petry, 2021; Pereira *et al.*, 2018; Yin, 2015). This research followed ethical standards with approval by an ethics committee, and the patient signed a free and informed consent form for the disclosure of her information for scientific purposes.

This study is a case report written according to CARE guidelines. We report a 60-year-old female presenting to the hospital with a case of anterior bladder adenocarcinoma T3N0M0 and history of anaphylactic reaction to contrast. We also performed a literature review to help readers to better understand how to manage patients with a history of anaphylactic reaction to contrast. Ethical approval is waived from this study.

## 3. Case Illustration

A 60-year-old female patient was referred from the Urology Department of Ngoerah Hospital with a diagnosis of anterior bladder adenocarcinoma T3N0M0 and a history of an anaphylactic reaction to contrast media during a contrast-

enhanced abdominal CT scan using iopromide six months prior. The patient was currently hospitalized and scheduled by the Urology Department for another contrast-enhanced abdominal CT scan to evaluate therapy.

On history taking, the patient reported no current complaints. Physical examination revealed stable vital signs and no abnormalities. Supporting laboratory tests showed: WBC  $5.75 \times 10^3/\mu\text{L}$ , HGB 11.90 g/dL, HCT 36.70%, PLT  $186.00 \times 10^3/\mu\text{L}$ , BUN 9.80 mg/dL, Creatinine 0.80 mg/dL, and estimated GFR (eGFR) 80.13. The patient was also found to have a total IgE level five times the normal limit, at 441 IU/mL. Chest X-ray results were within normal limits.

To reduce the risk of a hypersensitivity reaction, a different type of contrast media was used—switching from iopromide to iohexol. Premedication was administered with methylprednisolone 32 mg orally at 12 hours and 1 hour before the procedure, and diphenhydramine 50 mg intramuscularly 1 hour before the procedure. The patient was closely monitored for symptoms, vital signs, and allergic reactions during and after the procedure. Monitoring continued until the day after the procedure, during which the patient reported no complaints, vital signs remained stable, physical examination was within normal limits, and the patient was discharged.

#### 4. Discussion

The gold standard for contrast agents is those that are low-iodine and iso-osmolar (Schöckel *et al.*, 2020). Contrast agents generally have a good safety profile but still carry a risk of allergic reactions. The prevalence of hypersensitivity reactions to non-ionic iodinated contrast media (ICM) ranges from 0.73% to 3%, which is lower than that of ionic contrast agents, which can reach 4.17–12.66%. ICM hypersensitivity reactions can range from mild to life-threatening, with the incidence of severe reactions being approximately 0.1% (Cha *et al.*, 2019; Lee *et al.*, 2019). In this case, the patient had a history of a severe anaphylactic reaction—characterized by hypotension, laryngeal edema, and decreased consciousness—after undergoing a CT scan with iopromide, a contrast agent classified as low-iodine and iso-osmolar.

Risk factors for hypersensitivity reactions to iodinated contrast media (ICM) include a history of asthma—especially if uncontrolled, previous severe reactions to contrast agents, repeated exposure, female gender, and a history of drug allergies (Schrijvers, Demoly and Chiriac, 2019; Bilò and Bignardi, 2022). Park *et al.* (2017) also identified additional risk factors, including advanced age, diabetes, chronic urticaria, and allergies to medications other than contrast agents. In this case, several of these risk factors were present, including a history of severe reaction to contrast media, repeated contrast exposure, female gender, and older age. Therefore, the patient can be categorized as high risk for hypersensitivity reactions to contrast media.

The risk of hypersensitivity reactions in patients given contrast agents from the same class ranges from 21–60% (Baldo and Pham, 2013). The use of premedication in patients before administering contrast agents to reduce the risk of hypersensitivity reactions remains controversial. Guidelines from the European Society of Urogenital Radiology (ESUR) do not recommend premedication for at-risk patients but emphasize the importance of allergy evaluation to determine the presence of contrast hypersensitivity and to identify alternative imaging procedures that do not require contrast agents for increased safety (European Society of Urogenital Radiology, 2010). The American College of Radiology (ACR) recommends switching the type of contrast agent and administering premedication in patients with a history of hypersensitivity reactions, as shown in Table 1. Routine premedication or avoiding contrast use for other reasons—such as food allergies, seasonal allergies, or asthma—is not recommended (American College of Radiology, 2016).

**Table** - American College of Radiology Premedication Guidelines (American College of Radiology, 2016).

---

**Elective premedication regimens**

50 mg prednisone by mouth at 13 hours, 7 hours, and 1 hour before contrast medium administration, **PLUS** 50 mg diphenhydramine intravenously, intramuscularly, or by mouth 1 hour before contrast medium administration

**OR**

**32 mg prednisolone by mouth at 12 hours and 2 hours before contrast medium administration, PLUS 50 mg** diphenhydramine intravenously, intramuscularly, or by mouth 1 hour before contrast medium administration

---

**Accelerated intravenous premedication regimens**

Methylprednisolone sodium succinate 40 mg IV or hydrocortisone sodium succinate 200 mg IV immediately, and then every 4 hours until contrast medium administration, **PLUS** diphenhydramine 50 mg IV 1 hour before contrast medium administration. This regimen usually is 4-5 hours in duration.

**OR**

Dexamethasone sodium phosphate 7.5 mg IV immediately, and then every 4 hours until contrast medium administration, **PLUS** diphenhydramine 50 mg IV 1 hour before contrast medium administration. This regimen may be useful in patients with an allergy to methylprednisolone and is also usually 4-5 hours in duration.

---

Source: Authors.

In this case, the radiological examination with contrast media was elective. The contrast agent was substituted from iopromide to iohexol, and premedication was administered with oral methylprednisolone 32 mg at 12 hours and 2 hours prior to the procedure, along with intramuscular diphenhydramine 50 mg given 1 hour before the procedure. As a result of the contrast substitution and premedication, there were no recurrent hypersensitivity reactions and no side effects from the premedication.

## 5. Conclusion

Patients with a history of anaphylaxis to iodinated contrast media (ICM) are at high risk for recurrent hypersensitivity reactions. Premedication may be considered for patients at high risk of contrast media allergy. In this case report, a 60-year-old woman with anterior bladder adenocarcinoma and a history of severe anaphylaxis to contrast media underwent successful contrast substitution and premedication, which effectively prevented a recurrent hypersensitivity reaction.

## References

- American College of Radiology (2016) *ACR manual on contrast media, ACR Manual on Contrast Media – Version 10.2*.
- Baldo, B.A. & Pham, N.H. (2013) 'Drug allergy: Clinical aspects, diagnosis, mechanisms, structure-activity relationships', *Drug Allergy: Clinical Aspects, Diagnosis, Mechanisms, Structure-Activity Relationships*, 9781461472, pp. 1–447. <https://doi.org/10.1007/978-1-4614-7261-2>.
- Bilò, M.B. & Bignardi, D. (2022) 'Iodinated contrast media hypersensitivity reactions: is it time to re-evaluate risk factors?', *European Annals of Allergy and Clinical Immunology*, 54(2), pp. 51–52. <https://doi.org/10.23822/EurAnnACI.1764-1489.245>.
- Cha, M.J. *et al.* (2019) 'Hypersensitivity reactions to iodinated contrast media: A multicenter study of 196 081 patients', *Radiology*, 293(1), pp. 117–124. <https://doi.org/10.1148/radiol.2019190485>.
- European Society of Urogenital Radiology (2010) *ESUR guidelines on contrast media, Rentgenologiya i Radiologiya*. [https://doi.org/10.1007/978-3-540-72784-2\\_29](https://doi.org/10.1007/978-3-540-72784-2_29).
- Lee, S. Y. *et al.* (2019) 'Incidence and risk factors of immediate hypersensitivity reactions associated with low-osmolar iodinated contrast media: A longitudinal study based on a real-time monitoring system', *Journal of Investigational Allergology and Clinical Immunology*, 29(6), pp. 444–450. <https://doi.org/10.18176/jiaci.0374>.
- Park, H. J. *et al.* (2017) 'Re-exposure to low osmolar iodinated contrast media in patients with prior moderate-to-severe hypersensitivity reactions: A multicentre retrospective cohort study', *European Radiology*, 27(7), pp. 2886–2893. Available at: <https://doi.org/10.1007/s00330-016-4682-y>.
- Pereira A. S. *et al.* (2018). Metodologia da pesquisa científica. [free e-book]. Editora UAB/NTE/UFSM.

Schöckel, L. *et al.* (2020) 'Developments in X-Ray Contrast Media and the Potential Impact on Computed Tomography', *Investigative Radiology*, 55(9), pp. 592–597. <https://doi.org/10.1097/RLI.0000000000000696>.

Schrijvers, R., Demoly, P. & Chiriac, A.M. (2019) 'Premedication for Iodinated Contrast Media Induced Immediate Hypersensitivity Reactions', *Current Treatment Options in Allergy*, 6(4), pp. 538–553. <https://doi.org/10.1007/s40521-019-00224-z>.

Toassi, R. F. C. & Petry, P. C. (2021). *Metodologia científica aplicada à área da Saúde*. (2nd ed.). Editora da UFRGS.

Yin, R.K. (2015). *O estudo de caso*. Editora Bookman.