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RE-EVALUATION OF SUSPECTED IODINATED CONTRAST ALLERGY USING A DRUG CHALLENGE TEST TO FACILITATE LIFE-SAVING BRONCHIAL ARTERY EMBOLIZATION IN TUMOR-RELATED HEMOPTYSIS: A CASE REPORT

Respiratory Medicine

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ABSTRACT

Hemoptysis secondary to malignancy can be life-threatening and often requires urgent intervention. Bronchial artery embolization (BAE) is a well-established lifesaving procedure for controlling massive or recurrent hemoptysis and requires iodinated contrast agents to identify the bleeding vessel. However, patients labelled with a history of "contrast allergy" frequently experience delays or denial of essential interventions due to concerns regarding severe hypersensitivity reactions. This case highlights the importance of re-evaluating suspected contrast allergy through careful history and supervised graded challenge testing, as mislabeling may delay or prevent critical life-saving procedures.

KEYWORDS

Bronchial artery embolization (BAE), Haemoptysis, ,"Contrast allergy", Hemorrhage

INTRODUCTION

Bronchial artery embolization offers a minimally invasive procedure for even the most compromised patient, serving as first-line treatment for hemorrhage as well as providing a bridge to more definitive medical or surgical intervention focused upon the etiology of the hemorrhage(1)

Despite continued technological progress, including advances in medical imaging, hemoptysis remains an important clinical and potentially grave condition (2)

Given its diverse inflammatory, neoplastic, and vascular etiologies, precise anatomic localization of hemorrhage poses a challenge for all clinicians engaged in its evaluation and management (3)

Any hemorrhage resulting in compromise of pulmonary or hemodynamic status should be considered substantial, necessitating therapeutic intervention; however, massive hemoptysis comprises only 1.5% of reported cases (4)

Although useful guidelines are present in the literature for cases absent clinical compromise, no consensus has yet been reached providing a clear delineation between massive and nonmassive hemoptysis (5)

Reported volumes defining massive hemoptysis range from 200 to 1000 mL over a 24-hour interval, but volume documented as > 300 mL appears to be most frequently accepted (6)

Hemoptysis is a potentially life-threatening clinical condition that requires prompt evaluation and management. (7)

Massive or recurrent hemoptysis is associated with significant morbidity and mortality, primarily due to airway obstruction and respiratory compromise rather than blood loss alone [5,6].

Bronchial artery embolization (BAE) has emerged as the preferred minimally invasive intervention for controlling severe hemoptysis and is widely regarded as the first-line therapy in many clinical settings [8]. Successful bronchial artery embolization requires the administration of iodinated contrast media to delineate bronchial arterial anatomy and identify the culprit bleeding vessel. Despite the widespread use of iodinated contrast agents in diagnostic and interventional radiology, concerns about contrast hypersensitivity reactions often lead to unnecessary avoidance of contrast in patients labelled with "contrast allergy" [9].

Immediate hypersensitivity reactions to iodinated contrast media are relatively uncommon, and many reported reactions represent non-allergic physiologic responses such as vasovagal reactions, anxiety-related symptoms, or injection-related discomfort rather than true immune-mediated reactions [10].

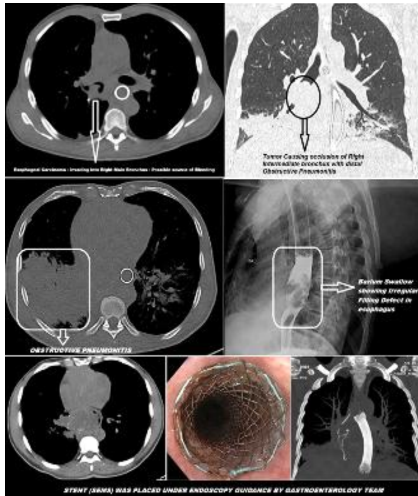
Mislabelled drug allergies may therefore result in avoidance of essential diagnostic procedures or life-saving interventions.(11)

Drug provocation testing or graded challenge protocols performed in controlled medical settings are considered the gold standard for confirming or excluding drug hypersensitivity when clinical history is unclear, and the drug is essential for patient management [12].

Case Presentation

A 53-year-old male,presented with recurrent episodes of hemoptysis. The patient had a history of gastrointestinal malignancy – Ca esophagus with Invasion into Right main bronchus and was undergoing evaluation for airway bleeding. CT Scan and bronchoscopy revealed tumor invading the airway from the gastrointestinal tract with a significant risk of further bleeding.

BRONCHOSCOPY SHOWING - VASCULAR POLYPOIDAL MASS IN THE RIGHT INTERMEDIATE BRONCHUS (MEDIAL ASPECT) - SOURCE OF HEMOPTYSIS



Considering the risk of massive hemoptysis, bronchial artery embolization was recommended as the preferred treatment modality. BAE is widely recognized as an effective therapy for controlling significant hemoptysis with high immediate success rates [16,7].

However, the patient had previously been labelled as having iodinated contrast–induced anaphylaxis following a contrast-enhanced CT scan performed in Zambia in 2018.

Previous Event During Contrast CT (2018)

During the CT scan of the abdomen performed for evaluation of carcinoma stomach, the patient received intravenous iodinated contrast in the form of iopromide (Ultravist).

Shortly after completion of the scan, when the patient stood up, he experienced severe pain at the injection site during contrast administration followed by palpitations, anxiety, dizziness, and a brief fall with transient loss of consciousness. The patient regained consciousness within approximately five minutes.

Importantly, no symptoms suggestive of allergic reaction were reported. There were no episodes of urticaria, itching, angioedema, wheezing, dyspnea, throat tightness, hypotension, or gastrointestinal symptoms. The patient had previously tolerated oral contrast administered the night before the scan without any adverse reaction.

Despite the absence of classical features of anaphylaxis, the patient received epinephrine during the episode and was subsequently labelled as having iodinated contrast–induced anaphylaxis.

Clinical Interpretation

A detailed review of the clinical history suggested that the event was more consistent with vasovagal syncope rather than hypersensitivity to iodinated contrast media.

Vasovagal reactions are common during medical procedures and may be triggered by anxiety, pain during injection, or sudden changes in posture. These reactions can present with dizziness, pallor, hypotension, or transient loss of consciousness, typically followed by rapid recovery [17,18].

In contrast, true anaphylaxis usually involves multisystem manifestations including cutaneous symptoms (urticaria, angioedema), respiratory compromise (bronchospasm or dyspnea), cardiovascular instability, or gastrointestinal symptoms [19].

The absence of such multisystem involvement in this patient strongly suggested a non-allergic reaction

Clinical Decision

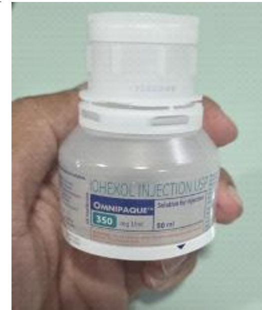
Given the patient's clinical situation, bronchial artery embolization was considered essential to control tumor-related hemoptysis. Avoiding iodinated contrast without proper evaluation could delay or prevent a potentially life-saving intervention.

Alternative therapeutic options such as endobronchial laser debulking or airway stent placement were considered but carried higher procedural risk in the current clinical context.

Therefore, a graded iodinated contrast challenge test was planned to evaluate tolerance and allow safe administration of contrast if no hypersensitivity reaction occurred.

Contrast Challenge Protocol

After detailed counseling, informed consent was obtained from the patient and attendants. The graded contrast challenge was performed in an intensive care unit under the supervision of an intensivist with full anaphylaxis preparedness.



Emergency medications including epinephrine, hydrocortisone, and antihistamines were kept readily available. Oxygen supply, intravenous fluids, airway equipment, and resuscitation facilities were prepared. Continuous monitoring of blood pressure, pulse rate, and oxygen saturation was maintained throughout the procedure.

A stepwise intravenous challenge protocol using non-ionic iodinated contrast (iohexol) was performed. Incremental doses consisting of 0.1 mL, 1 mL, 5 mL, and 15 mL were administered intravenously with observation for 15–20 minutes after each step. This protocol was designed to detect early hypersensitivity reactions while minimizing risk to the patient, consistent with recommended approaches for drug provocation testing [14,15].

RESULTS

The patient tolerated all graded doses of iodinated contrast without any immediate reaction. No symptoms such as urticaria, angioedema, dyspnea, wheezing, hypotension, or syncope were observed during the challenge test. Vital parameters remained stable throughout the procedure.

Following completion of the challenge protocol, the patient was observed for 24 hours to monitor for delayed hypersensitivity reactions. No delayed reactions occurred during this observation period.

Outcome and Follow-Up

The successful completion of the graded contrast challenge confirmed the absence of iodinated contrast hypersensitivity. The patient was therefore cleared to receive iodinated contrast for interventional procedures.

The previous event was reclassified as contrast injection–related pain and anxiety-induced vasovagal syncope rather than anaphylaxis.

The patient was subsequently planned for bronchial artery embolization for control of hemoptysis.

The patient and family were counseled regarding the absence of true contrast allergy and were advised that iohexol, a commonly used non-ionic iodinated contrast agent, could be safely used for future imaging procedures.

DISCUSSION

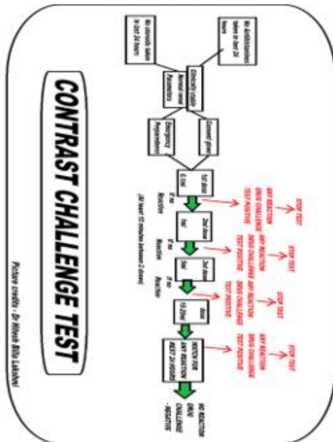
Bronchial artery embolization is widely considered the treatment of choice for controlling massive or recurrent hemoptysis. The procedure is highly effective in achieving immediate bleeding control and plays a crucial role in stabilizing patients with life-threatening airway hemorrhage [16,10].

Iodinated contrast media are essential for angiographic visualization of bronchial arteries and identification of bleeding vessels during embolization procedures. However, concerns regarding contrast hypersensitivity often lead to unnecessary avoidance of contrast administration.

True immediate hypersensitivity reactions to modern low-osmolar iodinated contrast agents are relatively rare. Many reactions attributed to contrast media are non-allergic physiologic reactions related to anxiety, vasovagal responses, or injection-related discomfort [12,20]. Mislabelled drug allergies represent a significant barrier to optimal medical care and may prevent patients from receiving essential diagnostic or therapeutic procedures. Accurate evaluation of prior reactions through detailed history and appropriate testing is therefore critical.

Drug provocation testing remains the gold standard for confirming or excluding drug hypersensitivity when clinically indicated. When performed in controlled settings with proper monitoring and emergency preparedness, graded challenge protocols have been shown to be safe and effective in identifying patients who can tolerate iodinated contrast media [14,15].

This case highlights the importance of systematic reassessment of suspected contrast allergy. Careful clinical evaluation and supervised graded contrast challenge allowed safe administration of iodinated contrast and facilitated a life-saving bronchial artery embolization procedure.



Contrast Given at	Dose of IOHEXOL	SYMPTOMS/ SIGNS/ REACTIONS IF ANY	VITALS	DOSE PASSED OR FAILED	ANY INTERVENTION GIVEN	DRUG CHALLENGE TEST
18:45	0.1ML	NONE	Stable	Passed	None	Negative with given dose
19:00	1ml	NONE	Stable	Passed	None	Negative with given dose
19:15	5ml	NONE	Stable	Passed	None	Negative with given dose
19:30	15ml	NONE	Stable	Passed	None	Negative with given dose Observed till 20:00
21:00		No significant reactions				Negative
22:00		No significant reactions				Negative
23:00		No significant reactions				Negative
00:00		No significant reactions				Negative
1:00		No significant reactions				Negative
2:00		No significant reactions				Negative
3:00		No significant reactions				Negative
4:00		No significant reactions				Negative
5:00		No significant reactions				Negative
6:00		No significant reactions				Negative
7:00		No significant reactions				Negative
8:00		No significant reactions				Negative
9:00		No significant reactions				Negative
10:00		No significant reactions				Negative
11:00		No significant reactions				Negative
12:00		No significant reactions				Negative
13:00		No significant reactions				Negative
14:00		No significant reactions				Negative
15:00		No significant reactions				Negative
16:00		No significant reactions				Negative
17:00		No significant reactions				Negative
18:00		No significant reactions				Negative
19:00		No significant reactions				Negative
20:00		No significant reactions				Negative

REACTION MONITORING CHART – 24 HOURS

TIME	DOSE OF IOHEXOL	RESPIRATORY ASSESSMENT	CVS ASSESSMENT	SKIN	GI	ANXIETY	CNS	ANY MEDICATION GIVEN BETWEEN	ANY MEDICATION GIVEN AS INTERVENTION
18:45	0.1ML	NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
18:50		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
18:55		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:00	1ML	NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:05		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:10		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:15	5ML	NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:20		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:25		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:30	15ML	NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:35		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:40		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:45		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:50		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
19:55		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE
20:00		NSA	NSA	NSA	NSA	NONE	NSA	NONE	NONE

NSA = NO SIGNIFICANT ABNORMALITY

MONITORING DURING -CONTRAST CHALLENGE

CONCLUSION

Mislabelled iodinated contrast allergy can significantly delay or prevent essential diagnostic and therapeutic procedures, including life-saving interventions such as bronchial artery embolization.

Careful clinical evaluation of prior reactions combined with supervised graded contrast challenge testing can safely differentiate true hypersensitivity from non-allergic reactions.

Accurate documentation and reclassification of suspected drug allergies are essential to avoid unnecessary restrictions on future medical care and ensure timely access to critical interventions.

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