Letters to Editor

Adenosine in Cardiac Catheterization Suite: Complication Re-Visited!

The Editor,

Authors present a case of unanticipated bronchospasm following administration of adenosine during fractional flow reserve (FFR) coronary angiography (CAG) in a patient without reactive airway disease. A 71-year-old male was posted for elective coronary FFR testing for assessment of borderline stenosis (~70%) in the left anterior descending coronary artery. Monitored anesthesia care was planned. He presented with Class II dyspnea and angina equivalent. The stress test was inconclusive. He was a chronic smoker and hypertensive. Other medical history was insignificant. Auscultation revealed bilateral equal air entry without any adventitious sounds and clinical features of obstructive airway disease. Routine investigations were normal. Two-dimensional transthoracic echocardiograms showed an ejection fraction of 50% with a Grade 1 diastolic dysfunction and no regional wall motion abnormality.

After regular CAG shoots, FFR testing was commenced using intravenous injection adenosine 140 mcg/kg/min for 3 min. Within few seconds, however, the patient complained of dyspnea and audible wheeze was noted. Recognizing adenosine induced bronchospasm, drug infusion was stopped, and inhaled salbutamol puffs followed by bronchodilator nebulization were administered. The patient responded to the treatment gradually, and sidestream capogram too was normalized later on. There was no episode of desaturation as well. FFR test was switched to intravascular ultrasound and medical management was advised.

FFR estimates the functional impact of coronary artery stenosis; measures pressure difference and flow across it and helps in determining the need for angioplasty. A cut-off point of 0.75–0.80 has been proposed; anything less than it corresponds to inducible ischemia suitable for angioplasty, whereas higher values indicate a non-significant stenosis. This test requires hyperemia in the vessel and intravenous adenosine is most commonly used for this purpose.

The half-life of adenosine is brief (<10 s); hence, its adverse effects are generally short-lived. Absolute contraindications to the use of adenosine infusion are known allergy and severe asthma. It can result in direct stimulation of pulmonary C fibers producing dyspnea. Although life-threatening side effects are rare, it can trigger dyspnea and bronchospasm in patients with preexisting reactive airway disease, obstructive lung disease, even in an awake patient without concurrent respiratory disease. The adenoscan study reports 0.1% incidence of bronchospasm. There is no report of such complication, however, during FFR test. Alternatives to adenosine include nicorandil, papaverine, and newer selective adenosine A2a receptor agonist regadenoson with the similar hyperemic effect but without any additional side effects. Instantaneous wave-free ratio (i-FR) measures the ratio of distal coronary
pressure (Pd) to the pressure observed in the aorta (Pa) over a specific period in diastole (wave-free period) in which competing forces (waves) affecting coronary flow are quiescent; thus pressure and flow are linearly related as compared to the rest of the cardiac cycle. IFR values <0.90 suggest flow limitation. Advantage includes the ability to measure without the need for pharmacological vasodilators or stressors.[6]

This patient did not give a history of asthma or significant respiratory illness in the recent past. Accordingly, pulmonary function test was not deemed necessary before this low-risk procedure. Authors retrospectively speculated that some indolent preexisting respiratory tract infection could have turned airway reactive and resulted in such reaction to adenosine. 

In conclusion, adenosine-induced bronchospasm can occur in any patient irrespective of the airway status and therefore, should escalate peri-procedural vigilance by health-care providers.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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