PREOPERATIVE PHARMACOLOGIC STRESS MYOCARDIAL PERFUSION IMAGING IN A Patient With Severe COPD

Note: Photo does not depict patient in this case study.
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INDICATION

Lexiscan® (regadenoson) injection is a pharmacologic stress agent indicated for radionuclide myocardial perfusion imaging (MPI) in patients unable to undergo adequate exercise stress.

IMPORTANT SAFETY INFORMATION

CONTRAINDICATIONS

Do not administer Lexiscan to patients with second- or third-degree AV block or sinus node dysfunction unless these patients have a functioning artificial pacemaker.

WARNINGS AND PRECAUTIONS

Myocardial Ischemia

Fatal and nonfatal myocardial infarction, ventricular arrhythmias, and cardiac arrest have occurred following Lexiscan injection. Avoid use in patients with symptoms or signs of acute myocardial ischemia, for example unstable angina or cardiovascular instability; these patients may be at greater risk of serious cardiovascular reactions to Lexiscan. Cardiac resuscitation equipment and trained staff should be available before administering Lexiscan. If serious reactions to Lexiscan occur, consider the use of aminophylline, an adenosine antagonist, to shorten the duration of increased coronary blood flow induced by Lexiscan.

Sinoatrial and Atrioventricular Nodal Block

Adenosine receptor agonists, including Lexiscan, can depress the SA and AV nodes and may cause first-, second-, or third-degree AV block, or sinus bradycardia requiring intervention. In postmarketing experience, heart block (including third degree), and asystole within minutes of Lexiscan administration have occurred.

Hypersensitivity, Including Anaphylaxis

Anaphylaxis, angioedema, cardiac or respiratory arrest, respiratory distress, decreased oxygen saturation, hypotension, throat tightness, urticaria and rashes have occurred. In clinical trials, hypersensitivity reactions were reported in fewer than 1 percent of patients.

Hypotension

Adenosine receptor agonists, including Lexiscan, induce arterial vasodilation and hypotension. The risk of serious hypotension may be higher in patients with autonomic dysfunction, hypovolemia, left main coronary artery stenosis, stenotic valvular heart disease, pericarditis or pericardial effusions, or stenotic carotid artery disease with cerebrovascular insufficiency. In postmarketing experience, transient ischemic attacks, seizures and syncope have been observed.

Hypertension

Adenosine receptor agonists, including Lexiscan, may result in clinically significant increases in blood pressure in some patients. In postmarketing experience, cases of potentially clinically significant hypertension have been reported, particularly in patients with underlying hypertension and when low-level exercise was included in the MPI.

Bronchoconstriction

Adenosine receptor agonists, including Lexiscan, may cause dyspnea, bronchoconstriction and respiratory compromise. Appropriate bronchodilator therapy and resuscitative measures should be available prior to Lexiscan administration.

ADVERSE REACTIONS

The most common adverse reactions (≥5%) to Lexiscan are dyspnea, headache, flushing, chest discomfort, angina pectoris or ST-segment depression, dizziness, chest pain, nausea, abdominal discomfort, dysgeusia, and feeling hot. Most adverse reactions began soon after dosing, and generally resolved within approximately 15 minutes, except for headache, which resolved in most patients within 30 minutes. Aminophylline was used as a reversal agent in 3% of patients.

In postmarketing experience, the following adverse reactions have occurred: myocardial infarction, cardiac arrest, ventricular arrhythmias, supraventricular tachyarrhythmias including atrial fibrillation or flutter, heart block, asystole, marked hypertension, hypotension, seizure, syncope, QTc prolongation, tremor, abdominal pain in association with nausea, vomiting, or myalgias, diarrhea, fecal incontinence, wheezing and musculoskeletal pain.

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PREOPERATIVE PHARMACOLOGIC STRESS MYOCARDIAL PERFUSION IMAGING IN A PATIENT WITH SEVERE COPD

CASE DISCUSSION
Manuel D. Cerqueira, MD, and Ronald Young, CNMT

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PREOPERATIVE PHARMACOLOGIC STRESS MYOCARDIAL PERFUSION IMAGING (MPI) IN A PATIENT WITH SEVERE COPD

A 65-year-old man was referred for cardiac evaluation prior to scheduled left nephrectomy due to a renal mass. The patient’s weight was 160 lb, his height was 72”, and his body mass index (BMI) was 21.7 kg/m².

The patient had severe chronic obstructive pulmonary disease (COPD) and was on 4 L of home oxygen. He was a smoker—3 packs per day for more than 25 years (ie, 75 pack years). He had been hospitalized 4 days earlier for respiratory distress and had spontaneous left pneumothorax with chest tube insertion 2 days before evaluation. His current medications included albuterol sulfate, fluticasone propionate nasal spray, furosemide, ipratropium bromide, formoterol fumarate inhalation powder, mometasone furoate, and tiotropium bromide inhalation powder.

His history also included percutaneous coronary intervention (PCI) 13 years earlier (1996), with placement of a bare metal stent (he had experienced no recent chest pain). In 2006, he had urethelial carcinoma and underwent partial ureterectomy.

The patient’s lab results (Table 1) revealed CK-MB elevation with normal troponins—a marker of cardiac risk. His resting electrocardiogram (ECG) showed normal sinus rhythm.

<table>
<thead>
<tr>
<th>Arterial Blood Gases</th>
<th>Lab Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH 7.37</td>
<td>CK 114 U/L</td>
</tr>
<tr>
<td>pO₂ 73 mm Hg</td>
<td>CK-MB 5.9 ng/mL</td>
</tr>
<tr>
<td>Bicarbonate 29 mmol/L</td>
<td>CK-MB% 5.2 (normal &lt;4.0)</td>
</tr>
<tr>
<td>Glucose 116 mg/dL</td>
<td>Creatinine 0.64 mg/dL</td>
</tr>
<tr>
<td>Troponin T &lt;0.01 ng/mL</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Patient’s lab results.

SAFETY CONSIDERATIONS

Do not administer Lexiscan to patients with second- or third-degree AV block or sinus node dysfunction unless these patients have a functioning artificial pacemaker.

Myocardial Ischemia: Fatal and nonfatal myocardial infarction, ventricular arrhythmias, and cardiac arrest have occurred following Lexiscan injection. Avoid use in patients with symptoms or signs of acute myocardial ischemia, for example unstable angina or cardiovascular instability; these patients may be at greater risk of serious cardiovascular reactions to Lexiscan. Cardiac resuscitation equipment and trained staff should be available before administering Lexiscan. If serious reactions to Lexiscan occur, consider the use of aminophylline, an adenosine antagonist, to shorten the duration of increased coronary blood flow induced by Lexiscan.
LEXISCAN SPECT MPI

The patient was unable to perform exercise due to COPD and recent chest tube insertion (Figure 1), so he was referred for pharmacologic stress single-photon emission computed tomography (SPECT) MPI, and Lexiscan was chosen as the pharmacologic stress agent.

The patient’s pulmonary medications were continued up to the time of testing. He also underwent pre-MPI preparatory assessment, including questioning about airway symptoms and heart and lung examinations. No wheezing was present.

The patient had a resting heart rate of 77 bpm, which increased to 95 bpm after Lexiscan administration. His blood pressure was 128/74 mm Hg at rest and remained almost unchanged (126/76 mm Hg) after Lexiscan. The patient was monitored for 6 minutes after Lexiscan injection, and he developed no symptoms or ECG changes indicative of ischemia. The patient developed premature atrial contractions during the test. He remained stable throughout the imaging procedure and returned to his hospital room in stable condition.

SAFETY CONSIDERATIONS

Bronchoconstriction: Adenosine receptor agonists, including Lexiscan, may cause dyspnea, bronchoconstriction and respiratory compromise. Appropriate bronchodilator therapy and resuscitative measures should be available prior to Lexiscan administration.

PLEASE SEE IMPORTANT SAFETY INFORMATION ON PAGE 3.
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The rotating projection images showed no motion or attenuation, and there was good liver clearance, no interfering gastrointestinal activity, and a paucity of lung activity. The left ventricle (LV) size was normal, but the right ventricle (RV) was enlarged with thick walls (Figure 2).

Figure 2. Reading left to right, rotating projection images at rest (bottom) and with Lexiscan stress (top). Visit the resources section of www.lexiscan.com to see a video of these images.
The perfusion and gated images revealed no evidence of infarction or ischemia, while the enlarged RV is evident (Figure 3). Midcavity septal thinning is also seen in both the rest and stress images. The ejection fraction was 75%, and wall motion was normal.

![Gated SPECT perfusion images at rest and with Lexiscan stress](image)

Figure 3. Gated SPECT perfusion images at rest and with Lexiscan stress. Visit the resources section of www.lexiscan.com to see video of these images.

**NEXT STEPS**

Because there was no evidence of ischemia in this patient, no further diagnostic cardiac testing was necessary. The patient was stabilized in anticipation of the scheduled left nephrectomy procedure.

**DISCUSSION**

This preoperative patient had known coronary artery disease and recent borderline cardiac enzyme elevation. He also had severe COPD and recent chest tube insertion for spontaneous pneumothorax, and he was on multiple medications.

**SAFETY CONSIDERATIONS**

**Sinoatrial and Atrioventricular Nodal Block:** Adenosine receptor agonists, including Lexiscan, can depress the SA and AV nodes and may cause first-, second-, or third-degree AV block, or sinus bradycardia requiring intervention. In postmarketing experience, heart block (including third degree), and asystole within minutes of Lexiscan administration have occurred.