PREOPERATIVE EVALUATION
WITH STRESS MPI IN
A Morbidly Obese Woman

CASE DISCUSSION PROVIDED BY
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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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In a Morbidly Obese Woman

PATIENT PRESENTATION AND HISTORY

A 48-year-old woman was referred for preoperative cardiac risk assessment prior to bariatric surgery. She had a history of morbid obesity, hypertension, and type 2 diabetes mellitus. She had no history of previous coronary artery disease (CAD). Her functional capacity was poor, mainly limited by exertional dyspnea. She also reported intermittent, non-exertional chest pain. Her current medications were lisinopril, glyburide, metformin, and rosiglitazone.

PHYSICAL EXAM

The patient was 67” tall and weighed 342 pounds, with body mass index (BMI) of 53.6 kg/m². Her blood pressure was 170/95 mm Hg, pulse was 88 beats per minute (bpm), and respiratory rate was 16-18 breaths per minute. The examination was significant for severe central obesity. There were no significant cardiac or pulmonary findings.
The electrocardiogram (ECG) was normal. Laboratory results are shown in Table 1.

<table>
<thead>
<tr>
<th>Electrolytes</th>
<th>Normal</th>
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<tbody>
<tr>
<td>Blood urea nitrogen</td>
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</tr>
<tr>
<td>Creatinine</td>
<td>Normal</td>
</tr>
<tr>
<td>Random glucose</td>
<td>305 mg/dL</td>
</tr>
<tr>
<td>Hemoglobin A1c</td>
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<tr>
<td>Total cholesterol</td>
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<tr>
<td>HDL-C</td>
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<td>LDL-C</td>
<td>92 mg/dL</td>
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<tr>
<td>Triglycerides</td>
<td>56 mg/dL</td>
</tr>
<tr>
<td>C-reactive protein</td>
<td>8.4 mg/L (Normal &lt;8.0)</td>
</tr>
</tbody>
</table>

Table 1. Laboratory results

Based on the patient’s limited functional capacity, symptoms of exertional dyspnea and atypical chest pain, and multiple risk factors for CAD, she was referred for pharmacologic stress myocardial perfusion imaging (MPI) and Lexiscan was chosen.

LEXISCAN SPECT MPI

The patient underwent 2-day stress/rest MPI with Tc-99m sestamibi. In the stress study performed on day 1, Lexiscan was injected as a 10-second bolus, followed within 15 seconds by injection of radiotracer. Baseline heart rate and blood pressure were 84 bpm and 180/90 mm Hg, respectively. Post-stress heart rate and blood pressure were 110 bpm and 170/90 mm Hg, respectively. The patient experienced mild chest discomfort that was felt to be non-anginal. No significant electrocardiographic abnormalities were noted. The rest study was performed on day 2. In both studies, myocardial perfusion images were obtained with and without attenuation correction. Single-photon emission computed tomography (SPECT) myocardial perfusion images were fair in quality.

Both stress and rest images without attenuation correction (Figure 1, page 6) showed significant mild anterior and inferior perfusion defects, consistent with breast and diaphragmatic attenuation artifacts. The summed stress score was 1. Images with attenuation correction (Figure 2, page 6) showed improvement in uptake in the anterior and inferior walls, particularly on the stress images. On gated SPECT, regional wall motion was normal and the calculated left ventricular (LV) ejection fraction was 55%. The LV cavity was mildly enlarged.

Upon interpretation, Lexiscan stress MPI revealed a mildly enlarged left ventricle, normal systolic function, and no evidence of ischemia or infarction.

SAFETY CONSIDERATIONS

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Stress and rest MPI without attenuation correction. Note the relatively reduced uptake in the anterior and inferior walls.

Figure 1. SPECT MPI without attenuation correction

Stress and rest MPI with attenuation correction. Note the improvement in the appearance of the anterior and inferior walls.

Figure 2. SPECT MPI with attenuation correction
PATIENT MANAGEMENT

Based on this preoperative evaluation, it was concluded that the patient was at relatively low risk for cardiac complications during the perioperative period. As a result, no further diagnostic cardiac evaluations were performed. The patient subsequently underwent open Roux-en-Y gastric bypass and cholecystectomy without complication.

DISCUSSION

The need for preoperative cardiac evaluation with stress testing is based on a clinical assessment that includes a detailed history, assessment of cardiac risk, and the type of surgical procedure to be performed. The decision to pursue preoperative stress testing in this patient was based on 3 factors:

- Her limited functional capacity
- Symptoms of exertional dyspnea and atypical chest pain
- Diabetes mellitus, a clinical risk factor for perioperative cardiac complications

Patients with morbid obesity present a challenge to obtaining high quality images. MPI in such patients often is complicated by attenuation artifacts and poor counts. Nonetheless, studies indicate that when techniques are used to minimize the impact of soft tissue attenuation—such as ECG gating, prone imaging, and/or attenuation correction—the diagnostic accuracy of stress MPI is comparable to normal weight patients.

Attenuation correction algorithms, in particular, are helpful in improving the accuracy of stress MPI. Studies indicate that improvements in specificity and normalcy can be achieved without adverse impact on sensitivity by using measured nonuniform attenuation correction methods (Figure 3).

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Figure 3. Specificity for the detection of coronary artery disease and impact of BMI, with and without attenuation correction (AC). Adapted from Thompson, et al.

PLEASE SEE IMPORTANT SAFETY INFORMATION ON PAGE 3.
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References


