PHARMACOLOGIC STRESS MYOCARDIAL PERFUSION IMAGING IN
A Man With Renal Insufficiency

CASE DISCUSSION PROVIDED BY

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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.

PLEASE SEE FULL PRESCRIBING INFORMATION AT WWW.LEXISCAN.COM.
PATIENT PRESENTATION
AND HISTORY

A 59-year-old man was admitted to the hospital after experiencing 3 days of chest pain and shortness of breath. His cardiac risk factors included hypertension, hyperlipidemia, and diabetes mellitus. The patient also had stage 3 chronic kidney disease (CKD), with a creatinine level of 2.7 mg/dL and a glomerular filtration rate (GFR) of 31 mL/min/1.73 m². The patient was taking a beta-blocker for his hypertension.

PHYSICAL EXAM

The patient had a baseline blood pressure (BP) of 182/84 mm Hg and heart rate (HR) of 108 beats per minute (bpm). He also had elevated jugular venous pressure, bibasilar raless, a II/VI systolic murmur, and 1+ pitting edema. The patient’s baseline electrocardiogram (ECG) showed T-wave inversions in leads I and aVL, and his cardiac enzymes were negative for acute myocardial infarction (MI).

Because the patient could not exercise and was taking a beta-blocker for hypertension, he was referred for pharmacologic stress single-photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI), and Lexiscan was chosen as the pharmacologic stress agent.

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

The patient underwent a Tc-99m sestamibi stress/Tl-201 rest dual-isotope SPECT MPI study. During the approximate 10-second infusion of Lexiscan and during recovery, there was no chest discomfort and no ischemic ECG changes. The patient complained of shortness of breath (dyspnea), which resolved without treatment approximately 6 minutes after administration of Lexiscan. The patient’s HR increased from 79 bpm to 93 bpm, and his BP changed from 159/81 mm Hg to 148/82 mm Hg during peak stress.

Figure 1. Rotating raw acquisition SPECT images.

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The SPECT myocardial perfusion images showed extensive reversible perfusion defects involving the inferior, apical, lateral, and anterior walls, which was consistent with myocardial ischemia in multiple vascular territories (Figure 2). The heart appeared enlarged in both stress and rest images. On gated SPECT, mild-to-moderate global left ventricular (LV) systolic function was observed, with a calculated LV ejection fraction of 42% (Figure 3). The polar plot display showed a summed stress score (SSS) of 13 and a summed difference score (SDS) of 11 (Figure 4).
NEXT STEPS

The patient was considered to be high risk based on several factors: (1) perfusion defects involving multiple vascular territories, (2) high SSS and SDS indicating ischemia in >10% of the myocardium, (3) depressed LV function, and (4) presence of renal insufficiency. Given the patient’s extensive ischemia and increased risk, cardiac catheterization and, if feasible, coronary revascularization were recommended. However, due to the patient’s renal insufficiency, as well as other medical problems (including anemia), cardiac catheterization was deferred in favor of medical therapy. The patient was discharged home on medical therapy and has been scheduled for regular outpatient follow-up. To date, the patient has not been referred for cardiac catheterization.

DISCUSSION

In the setting of renal insufficiency, cardiac risk factors and age do not account entirely for the higher incidence of cardiovascular disease, and serum and cellular abnormalities directly related to the renal failure likely play a role.1,2

Radionuclide SPECT MPI allows for risk stratification without the potential for exacerbating kidney disease since it does not require the use of a contrast agent associated with toxic reactions in patients with severe kidney disorders. Abnormal SPECT results are a strong predictor of all-cause mortality in renal failure patients, adding independent and incremental information to clinical, stress testing, GFR, and angiographic parameters.3,4 For any given MPI abnormality, the presence of renal failure increases cardiac risk.3,5

Patients with renal insufficiency frequently have decreased exercise tolerance, and pharmacologic stress is often required. This patient tolerated Lexiscan stress SPECT MPI and experienced no ECG changes or symptoms indicative of ischemia during or after Lexiscan administration.

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References