VALLEYCARE
OLIVE VIEW-UCLA MEDICAL CENTER
CARDIOLOGY DIVISION/NON-INVASIVE PROCEDURE
POLICY & PROCEDURE

NUMBER: 5866
VERSION: 1

SUBJECT/TITLE: INTRAVENOUS ADENOSINE AND REGADENOSON (LEXISCAN) STRESS PROTOCOL

POLICY:

I. Definition of Service
   a. Exercise-nuclear imaging (using technetium-99m tetrofosmin otherwise known as Myoview and produced by GE Healthcare) is a noninvasive physiologic method for assessing myocardial perfusion and the presence and extent of coronary artery disease. Intravenous adenosine (Adenocard) and regadenoson (Lexiscan) are used in conjunction with Myoview nuclear imaging in patients who cannot adequately exercise. Adenosine and regadenoson increase myocardial blood flow by decreasing arteriolar resistance. Normally, coronary flow and perfusion increases 2-5 times; however, the flow increase is less when stenoses are present. The disparity in perfusion is imaged using Myoview nuclear imaging.

   b. Adenosine and regadenoson are commonly used vasodilators and both approved by the FDA for vasodilator stress testing. Adenosine stimulates four main receptor subtypes (A_1, A_{2A}, A_{2B}, and A_3) while reagadenoson is more selective for the A_{2A} adenosine receptor and less prone to the side effects associated with adenosine. The bronchospasm that can occur with adenosine (A_{2B} and A_3) in COPD patients is not a factor with regadenoson (selective A_{2A} adenosine receptor agonist). Also, regadenoson has a two- to three-minute biological half-life, as compared to adenosine's 30-second half-life. The longer half-life of regadenoson has allowed for the development of single bolus stress protocols obviating the need for an intravenous line.

II. Patient Selection
   a. Indications
      i. Patents unable to achieve an adequate degree of exercise secondary to physical, medical, or

pharmacologic limitations. Examples included disabling arthritis, peripheral vascular disease, neurologic impairment, obstructive pulmonary disease.

ii. Patients with known coronary anatomy and borderline coronary stenosis.
iii. Risk stratification
    1. Preoperative evaluation
    2. Post-myocardial infarction
iv. Evaluation of therapeutic interventions
    1. Revascularization
    2. Medical therapy
v. Assess functional capacity
vi. Assess significance of stenosis found on coronary angiography

b. Relative Contraindications
    i. Patients with unstable angina, resting ischemia.
    ii. Patients with acute myocardial infarction.
    iii. Left-main disease
    iv. Patients with systolic blood pressures less than 90mmHg or greater than 220mmHg
    v. Severe asthma or active bronchospastic disease, severe chronic obstructive lung disease (especially in the presence of audible wheezes).
    vi. Second- or third-degree AV block, or sinus node dysfunction (without pacemaker backup).
    vii. LBBB or paced rhythms are generally not walked during adenosine or regadenoson given the potential for false positive perfusion scans.

III. Risk of Procedure
    a. Symptoms may occur in 30-40% of patients.
    b. Rare instance of respiratory arrest, myocardial infarction, and death have been reported.
    c. Common adverse effects include: headache, nausea, vomiting, facial flush, dizziness, hypotension, chest pain, ECG abnormalities.

IV. Definition of Procedure
    a. Level of Personnel
        i. Attending cardiologist or cardiology fellow, registered nurse, electro-diagnostic technician, nuclear medicine technologist, nuclear medicine physician.
    b. Equipment
        i. Crash cart

ii. Stress test equipment with continuous ECG monitor, automatic BP equipment and automated computer programming.
iii. Portable ECG monitor
iv. Adenosine 140mcg/kg/min infusion dose (5 minute protocol) per patient or regadenoson 0.4mg/5mL dose per patient.
v. Aminophylline 100mg per patient for reversal of symptoms
vi. Angiocath system with needless tubing.
vii. NS in 40cc and 250cc bags.
viii. Automated I.V. infusion device.

c. General Considerations
   i. Adenosine and regadenoson myoview nuclear perfusion imaging can be performed on an inpatient or outpatient basis.
   ii. Prior to testing, patients should be screened by cardiology personnel for appropriateness.

d. Pre-Procedure
   i. Pre-procedure patient instructions (to be given by physician, nurse, or treadmill technologist).
      1. NPO 4-6 hours prior to study
      2. No caffeine at least 12 hours prior to study. Decaffeinated coffee is also not allowed (has 3% caffeine)
      3. Aminophylline/theophylline medications should be withheld 48 hours prior to the study.
      4. Aggrenox (aspirin and dipyridamole combination) should be withheld 48 hours prior to the study.
      5. Insulin dependent diabetics should take ½ usual dose and bring recent blood sugar results with them.
      6. Patients using inhalers should be encouraged to bring them for use prior to the test (regadenoson protocol).
      7. Patients weighing greater than 220lbs are usually scheduled for a two-day protocol.
      8. Provide patients with instruction sheet and explain procedure and schedule of the day.

   ii. Pre-procedure nursing/technologist/physician

instructions.

1. Verification of signed consent for adenosine or regadenoson nuclear myocardial perfusion study
2. Verification of NPO status and withholding of medications as appropriate.
3. Assessment of allergy history, especially to xanthines
4. Assessment of current medication list.
5. Assessment of bronchospasm, asthma, unstable angina, hypotension, or CVA.
6. Verification of resuscitation equipment/supplies.
7. Verification of NPO status and withholding of medications as appropriate.
8. Obtain baseline vital signs as well as height and weight.
9. Nuclear medicine technologist or registered nurse will start IV 22-18 gauge.

e. Procedure
   i. Attending cardiologist or cardiology fellow or cardiology resident must be present throughout infusion/injection and post-infusion/injection period.
   ii. Adenosine/regadenson resting and walking protocols follow (four separate protocols in total):
      1. Adenosine IV infusion five minute <u>resting</u> stress infusion protocol.
         a. Electro-diagnostic technician to enter information into ECG machine and obtain baseline ECG.
         b. Patient in sitting position. Monitor ECG continuously and obtain blood pressure and 12-lead ECG every one-minute.
         c. Adenosine IV infusion at dose of 140mcg/kg/min to be administered into peripheral vein using a 22-18 gauge catheter and infused for five minutes.
         d. Nuclear technologist to administer radionuclide myocardial perfusion imaging agent (Myoview) 2 minutes after adenosine IV infusion started. Followed immediately with 5mL saline flush.
         e. Continue to obtain blood pressure, 12-lead ECG every one-minute for remainder of five-minute protocol.

f. Observe continuously for dyspnea, headache, flushing, chest discomfort, angina pectoris, ST segment depression, dizziness, nausea, abdominal discomfort, flushing, or wheezing. Use pharmacologic stress test form to record all data.
g. If post-stress symptoms continue, observe until symptoms resolve or negligible or at MD/RN discretion.
h. At nuclear medicine technologist discretion, patient may be moved to scan room for imaging.

2. Adenosine IV five minute walking stress infusion protocol.
    a. Electrodiagnostic technician to enter information into ECG machine and obtain baseline ECG.
    b. Start treadmill at 0% grade and 1mph and hold at this level.
    c. Monitor ECG continuously and obtain blood pressure and 12-lead ECG every one-minute.
    d. Adenosine IV infusion at dose of 140mcg/kg/min to be administered into peripheral vein using a 22-18 gauge catheter and infused for five minutes.
    e. Nuclear technologist to administer radionuclide myocardial perfusion imaging agent (Myoview) 2 minutes after adenosine IV infusion started. Followed immediately with 5mL saline flush.
    f. Continue to obtain blood pressure, 12-lead ECG every one-minute for remainder of five-minute protocol.
    g. Observe continuously for dyspnea, headache, flushing, chest discomfort, angina pectoris, ST segment depression, dizziness, nausea, abdominal discomfort, flushing, or wheezing. Use pharmacologic stress test form to record all data.
    h. If post-stress symptoms continue, observe until symptoms resolve or negligible or at MD/RN discretion.

i. At nuclear medicine technologist discretion, patient may be moved to scan room for imaging.

3. Regadenoson IV rapid injection five minute resting stress protocol.
    a. Electrodiagnostic technician to enter information into ECG machine and obtain baseline ECG.
    b. Patient in sitting position. Monitor ECG continuously and obtain blood pressure and 12-lead ECG every one-minute.
    c. Regadenoson IV rapid injection (approximately 10 seconds) at dose of 0.4mg/5mL into a peripheral vein using a 22-18 gauge catheter. Administer a 5mL saline flush immediately after injection of regadenoson.
    d. Nuclear technologist to administer radionuclide myocardial perfusion imaging agent (Myoview) 20 seconds after regadenoson IV injection. Followed immediately with 5mL saline flush.
    e. Continue to obtain blood pressure, 12-lead ECG every one-minute for remainder of five-minute protocol.
    f. Observe continuously for dyspnea, headache, flushing, chest discomfort, angina pectoris, ST segment depression, dizziness, nausea, abdominal discomfort, flushing, or wheezing. Use pharmacologic stress test form to record all data.
    g. If post-stress symptoms continue, observe until symptoms resolve or negligible or at MD/RN discretion.
    h. At nuclear medicine technologist discretion, patient may be moved to scan room for imaging.

4. Regadenoson IV rapid injection five minute walking stress protocol.
    a. Electrodiagnostic technician to enter information into ECG machine and obtain baseline ECG.

b. Start treadmill at 0% grade and 1mph and hold at this level.
c. Monitor ECG continuously and obtain blood pressure and 12-lead ECG every one-minute.
d. After 30 seconds of walking, administer Regadenoson IV rapid injection (approximately 10 seconds) at dose of 0.4mg/5mL into a peripheral vein using a 22-18 gauge catheter. Administer a 5mL saline flush immediately after injection of regadenoson.
e. Nuclear technologist to administer radionuclide myocardial perfusion imaging agent (Myoview) 20 seconds after regadenoson IV injection. Followed immediately with 5mL saline flush.
f. Continue to obtain blood pressure, 12-lead ECG every one-minute for remainder of five-minute protocol.
g. Observe continuously for dyspnea, headache, flushing, chest discomfort, angina pectoris, ST segment depression, dizziness, nausea, abdominal discomfort, flushing, or wheezing. Use pharmacologic stress test form to record all data.
h. If post-stress symptoms continue, observe until symptoms resolve or negligible or at MD/RN discretion.
i. At nuclear medicine technologist discretion, patient may be moved to scan room for imaging.

iii. Indications for termination include:
1. ECG changes: ST depression>3mm or any significant ST elevation.
2. Arrhythmias: onset of second- or third-degree sustained AV block.
3. Blood pressure: decrease in systolic blood pressure greater than 20mmHg or increase to greater than 250/110mmHg.

iv. Quality Assessment
1. Infection control: universal infection precautions

to be observed.
2. Radiation safety: monitoring procedures for nuclear medicine technologist.
3. Procedure complication: data log book is maintained for periodic review.

PURPOSE: To define policy and procedure for the use of intravenous adenosine and regadenoson (Lexiscan) for stress testing.

DEPARTMENTS: Cardiology, Cardiology/Cath Lab, Nursing

DEFINITIONS:

PROCEDURE:

References:

V. References

a. Iskandrian AE et al. Adenosine versus regadenoson comparative evaluation in myocardial perfusion imaging: results of the ADVANCE phase 3 multicenter international trial. J Nuclear Card 2008; 14:645-58.
b. Thomas GC et al. Safety of regadenoson during submaximal exercise testing: a randomized, double-blind, placebo-, and active-controlled trial (the RegEx trial). Abstract: J Nuclear Card 2007; 14:S109-10.
c. Iskandrian AE et al. Integrated ADVANCE-MPI trial results of selective A_{2A} agonist regadenoson versus adenosine in myocardial perfusion imaging. J Am Coll Cardiol 2008; 1:307-16.
d. Thomas GC et al. Safety of regadenoson in patients with chronic obstructive pulmonary disease (RegCOPD trial). J Nuclear Card 2008; 15:319-28.

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