Left Heart Catheterization - Single Service

Clinical Guidelines for Medical Necessity Review

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Important Notices

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Guideline Information:

Specialty Area: Cardiovascular Disease
Guideline Name: Left Heart Catheterization (Single Service)

Literature review current through: 3/22/2024
Document last updated: 3/22/2024
Type: [**X**] Adult (18+ yo) | [**X**] Pediatric (0-17yo)

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Care Path Services & Medical Necessity Criteria

Service: Left Heart Catheterization

General Guidelines

- **Units, Frequency, & Duration:** None.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** A left heart catheterization is invasive, with more risks than other tests (e.g., cardiac computed tomography angiogram [CCTA], stress echo). It is appropriate when there is a high likelihood of coronary artery disease (CAD). Unless the clinical situation is emergent or progressive, non-invasive testing (e.g., CCTA, stress testing with or without accompanying echo or isotope imagery) should precede a direct catheterization.[1-2]
- **Exclusions:** Non-emergent cardiac catheterization should be performed at a facility that offers coronary intervention and has the staffing and lab availability for a PCI if indicated. Unless there are objective findings at the time of catheterization that make intervention uncertain, intervention should occur at the time of the catheterization.[3]

Medical Necessity Criteria

Indications

➔ **Left cardiac catheterization** is considered appropriate if **ANY** of the following is **TRUE**[1-11]:

- ◆ The patient has worsening Canadian Cardiovascular Society class II or higher angina and **ANY** one of the following:
  - The patient is on two or more antianginal medications; **OR**
  - The physician can provide documentation on why the patient is not on two or more antianginal medications (e.g., contraindications or adverse effects); **OR**
- ◆ The patient has **ALL** of the following[4]:
  - Intermediate- or high-risk non-invasive findings, including **ANY** of the following:
    - High-risk findings, including **ANY** of the following:
      - ◆ Severe resting LV dysfunction (LVEF less than 35%) not readily explained by noncoronary causes; **OR**

        - Resting perfusion abnormalities greater than or equal to 10% of the myocardium in patients without prior history or evidence of MI; **OR**
        - Stress ECG findings including greater than or equal to 2 mm of ST-segment depression at low workload or persisting into recovery, exercise-induced ST-segment elevation, or exercise-induced VT/VF; **OR**
        - Severe stress-induced LV dysfunction (peak exercise LVEF less than 45% or drop in LVEF with stress greater than or equal to10%); **OR**
        - Stress-induced perfusion abnormalities encumbering greater than or equal to 10% myocardium or stress segmental scores indicating multiple vascular territories with abnormalities; **OR**
        - Stress-induced LV dilation; **OR**
        - Inducible wall motion abnormality (involving greater than 2 segments or 2 coronary beds); **OR**
        - Wall motion abnormality developing at low dose of dobutamine (less than or equal to 10 mg/kg/min) or at a low heart rate (less than 120 beats/min); **OR**
        - CAC score greater than 400 Agatston units; **OR**
        - Multivessel obstructive CAD (greater than or equal to70% stenosis) or left main stenosis (greater than or equal to 50% stenosis) on CCTA; **OR**
    - Intermediate-risk findings, including **ANY** of the following:
        - Mild/moderate resting LV dysfunction (LVEF 35% to 49%) not readily explained by noncoronary causes; **OR**
        - Resting perfusion abnormalities in 5% to 9.9% of the myocardium in patients without a history or prior evidence of MI; **OR**
        - Greater than or equal to 1 mm of ST-segment depression occurring with exertional symptoms; **OR**
        - Stress-induced perfusion abnormalities encumbering 5% to 9.9% of the myocardium or stress segmental scores (in multiple segments) indicating 1 vascular territory with abnormalities but without LV dilation; **OR**

- Small wall motion abnormality involving 1 to 2 segments and only 1 coronary bed; **OR**
- CAC score 100 to 399 Agatston units; **OR**
- One vessel CAD with greater than or equal to 70% stenosis or moderate CAD stenosis (50% to 69% stenosis) in greater than or equal to 2 arteries on CCTA; **AND**

- **ANY** of the following:
  - Worsening or limiting ischemic symptoms (e.g., chest pain, chest tightness, chest burning, shoulder pain, left arm pain, jaw pain, shortness of breath); **OR**
  - Stable chest pain despite guideline-directed medical treatment (GDMT)[2]; **OR**

- Stable chest pain after a negative stress test AND with a high clinical suspicion of coronary artery disease (CAD); **OR**
- Previous CABG surgery and **ALL** of the following:
  - Stable chest pain; **AND**
  - Suspicion of myocardial ischemia; **AND**
  - Indeterminate or nondiagnostic stress test; **OR**
- Stable chest pain and obstructive CAD and **ANY** of the following:
  - Greater than or equal to 50% stenosis in the left main coronary artery, defined by angiography or CCTA; **OR**
  - Obstructive CAD in all 3 major vessels with fractional flow reserve (FFR) by angiography or CCTA less than or equal to 0.80 or iFR by angiography less than or equal to 0.89; **OR**
  - Severe stenosis (greater than or equal to 70%) in all 3 major vessels; **OR**
- Chest pain (or ischemic equivalent) and high pretest probability of CAD; **OR**
- High-risk ECG stress test, stress echo, or MPI SPECT results with or without symptoms; **OR**
- Suspected acute coronary syndrome (ACS) and **ANY** of the following:
  - Newly diagnosed left ventricular (LV) wall motion abnormality; **OR**
  - Newly diagnosed resting myocardial perfusion defect; **OR**
- Ventricular fibrillation or sustained ventricular tachycardia with or without symptoms; **OR**
- Survived sudden cardiac death or potentially life-threatening ventricular arrhythmia; **OR**
- Preoperative assessment before valvular surgery; **OR**
- Suspected cardiomyopathy (LV ejection fraction (LVEF) less than 40%) of unknown etiology with symptoms; **OR**
- The patient is being considered for or has received a heart transplant; **OR**

- Patients with stable ischemic heart disease who develop symptoms and signs of heart failure; **OR**
- Depressed LV function (ejection fraction less than 40%) and moderate risk criteria on non-invasive testing with demonstrable ischemia; **OR**
- Non-invasive evaluation suggests catheterization is needed for preoperative assessment before a planned high-risk surgery; **OR**
- Before valve surgery (e.g., TAVR), if the patient has **ANY** of the following[9]:
  - Symptoms of angina; **OR**
  - Objective evidence of ischemia; **OR**
  - Decreased ventricular systolic function; **OR**
  - Coronary artery disease (CAD); **OR**
  - Coronary risk factors (including men greater than 40 years of age and postmenopausal women).

Non-indications

➔ **Left cardiac catheterization** may not be considered appropriate if **ANY** of the following is **TRUE**:

- Acute or chronic kidney disease; **OR**
- Coagulopathy; **OR**
- Fever; **OR**
- Systemic infection; **OR**
- Uncontrolled arrhythmia; **OR**
- Uncontrolled hypertension; **OR**
- Uncompensated heart failure; **OR**
- Radiopaque contrast agent allergies in patients who have not been appropriately premedicated; **OR**
- Pregnancy; **OR**
- Normal coronary angiogram or CCTA within the last two years and with no stenosis or plaque (For certain left heart catheterization scenarios)[2]; **OR**
- Normal stress test (given adequate stress) within the last year (for certain left heart catheterization scenarios)[2]

Level of Care Criteria

Outpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
93454	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and

	interpretation
93455	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with catheter placement in bypass graft, with intraprocedural injections for bypass graft angiography
93458	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with left heart catheterization, with intraprocedural injection for left ventriculography
93459	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision and interpretation, with left heart catheterization, catheter placement in bypass graft, with bypass graft angiography
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections

Medical Evidence

Choi et al. (2023) conducted a retrospective, single-center, observational study to evaluate the discriminatory and prognostic significance of invasively measured left ventricular end-diastolic pressure in patients suspected of having heart failure with preserved ejection fraction (HFpEF). The authors focus on patients with intermediate scores on the Heart Failure Association Pre-test Assessment, Echocardiography and Natriuretic Peptide, Functional Testing, Final Etiology (HFA-PEFF) scale. A total of 404 patients were included - all patients exhibited symptoms of heart failure and preserved left ventricular ejection fraction (greater than or equal to 50%) who underwent left heart catheterization (LHC). Exclusion criteria included patients who presented without definitive HF symptoms or with acute coronary syndrome (ACS), primary cardiomyopathies, significant valvular heart disease (beyond mild stenosis or moderate left-sided regurgitation), pulmonary arterial hypertension, heart transplantation, constrictive pericarditis, or stress-induced cardiomyopathy. The authors note that the diagnostic accuracy of the HFA-PEFF score in predicting HFpEF, confirmed through invasive hemodynamic measurement, is moderate, with an optimal cutoff value of 4.5. Also, a strong correlation was identified between the HFA-PEFF score and the 10-year risk of all-cause death or HF readmission. Finally, elevated left ventricular end-diastolic pressure (LVEDP) is linked to a significantly higher 10-year risk of all-cause death or HF readmission in patients suspected of having HFpEF, especially among those with intermediate HFA-PEFF scores. This association remains even after adjusting for multiple variables, including the HFA-PEFF score. (Clinicaltrial.gov, NCT04505449).[12]

Otto et al. (2021) reviewed published guidelines from the American College of Cardiology (ACC) and the American Heart Association (AHA) on the management of patients with valvular heart disease. When noninvasive testing results are inconclusive, especially in symptomatic patients, or when there's a discrepancy between noninvasive tests and clinical findings, cardiac catheterization with direct intracardiac measurements becomes crucial. Catheterization provides valuable information, particularly in assessing transvalvular pressure gradients and cardiac output. Imaging difficulties or misalignment of the Doppler beam can lead to underestimation of stenosis severity, while suboptimal image or Doppler data quality can cause overestimation or underestimation of valve regurgitation severity. In such cases, contrast angiography may be helpful for semiquantitative assessment, especially when noninvasive results conflict with physical examination findings. Cardiac catheterization offers the advantage of measuring intracardiac pressures and pulmonary

vascular resistance, aiding in decision-making regarding valve intervention.[9]

Ruiz-Rodriguez et al. (2016) performed a systematic review and meta-analysis to compare radial artery (RA) access versus femoral artery (FA) access during LHC. Percutaneous coronary interventions (PCIs) were also analyzed. The authors included 15 randomized controlled trials (RCTs) and 17 cohort studies with a total of 44,854 patients with ACS. Complications related to bleeding (odds ratio [OR] 0.45, 95% confidence interval [CI] 0.33–0.61; P less than 0.001), access to the artery (OR 0.27, 95% CI 0.18–0.39; P less than 0.001), mortality (OR 0.64, 95% CI 0.54–0.75; P less than 0.001), and major adverse cardiac events (OR 0.70, 95% CI 0.57–0.85; P less than 0.001) were reduced with RA versus FA during LHC.[13]

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Clinical Guideline Revision History/Information

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