

# When the Patient Asks

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## Q: What is a heart catheterization?

Cardiac catheterization is an invasive technique that is used as a clinical tool for assessing the anatomy and physiology of the heart and its associated vasculature. It is performed by passing a small catheter through a peripheral artery or vein, under local anesthesia, into the right and/or left side of the heart. Right-heart catheterization was once a routine part of each cardiac catheterization. However, because this adds little information to the workup of a patient with coronary artery disease (CAD), it is now performed in fewer than 25% of procedures.<sup>1</sup> Left-heart catheterization with coronary angiography is the gold standard for determining the presence of significant CAD. Heart catheterizations can be both diagnostic and therapeutic.

### ▶PERFORMING THE CATHETERIZATION

Cardiac catheterization is performed with local anesthesia administered at the catheter placement site. Mild sedation, with IV midazolam, lorazepam (Ativan, generics), or diphenhydramine (Benadryl, generics), is used frequently. IV fentanyl (Sublimaze, generics) or morphine can be used for additional pain relief.<sup>2</sup>

More than 95% of catheterizations are done using a femoral approach, in which a needle puncture is made in the femoral artery (left-heart catheterization) or the femoral vein (right-heart catheterization).

### ▶CLINICAL USES

The tips of the catheters are used to measure cardiac pressures or to inject radiographic contrast agents. Right-heart catheterization is useful for significant left and/or right ventricular dysfunction, valvular disease, myoperi-

cardial disease, or suspected intracardiac shunting; and it remains the gold standard for diagnosing pulmonary hypertension.<sup>3</sup> Left-heart catheterization is most commonly used for assessing coronary artery anatomy and defining the presence and degree of atherosclerosis (Table: Indications and contraindications for heart catheterization in the online version of this article). The findings of diagnostic catheterizations characterize the extent and severity of cardiac disease and help determine the most appropriate medical, surgical, or catheter-based treatment.

### ▶PATIENT PREPARATION

Before the procedure, the cardiologist performing the catheterization should fully explain the associated benefits and risks to the patient and obtain written informed consent. A pre-catheterization assessment should include a detailed history and physical examination, CBC, basic metabolic panel, coagulation studies if indicated, chest radiography, and ECG.

The patient should fast for 8 hours before the procedure. Certain medications such as warfarin (Coumadin, Jantoven, generics) and metformin should be withheld. Other medications may be held at the discretion of the referring clinician. Appropriate therapies may be necessary to minimize intraprocedure and postprocedure risk. Pretreatment with aspirin, 325 mg orally, may be given if coronary intervention is likely; and clopidogrel (Plavix), 300 mg loading dose,

may be given if there is a strong possibility of stenting.<sup>3</sup> Premedication with oral prednisone or IV hydrocortisone (A-Hydrocort, Solu-Cortef), cimetidine, and diphenhydramine may be necessary if the potential for a dye allergy exists. In addition, adequate IV hydration should be employed in all patients in order to avert the risk of contrast-induced nephropathy from the contrast load.

### ▶BOTTOM LINE

Left-heart catheterization is a crucial part of diagnostic cardiology. Right-heart catheterization may be helpful in selected patients. In spite of the availability of other imaging modalities, coronary angiography remains the clinical gold standard for determining the presence of significant CAD. Heart catheterization is an invasive procedure with inherent risks, so it is important to weigh the benefits and risks of the procedure with the patient before proceeding. [JAAPA](#)

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**Mary Hewett, MS, PA-C, department editor**

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• Table: Indications and contraindications for heart catheterization

**TABLE 1. Indications and contraindications for heart catheterization<sup>2,4</sup>**

Indications	Contraindications
<b>LEFT-HEART CATHETERIZATION</b>	
<ul style="list-style-type: none"> <li>• Abnormal stress test</li> <li>• Acute myocardial infarction</li> <li>• Chronic stable angina</li> <li>• Coronary artery disease</li> <li>• Left ventricular dysfunction</li> <li>• Preoperative assessment</li> <li>• Unstable angina</li> <li>• Valvular heart disease</li> <li>• Ventricular arrhythmia</li> </ul>	<p><b>Absolute</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Relative</b></p> <ul style="list-style-type: none"> <li>• Abdominal aortic aneurysm</li> <li>• Active GI bleed</li> <li>• Acute stroke</li> <li>• Coagulopathy</li> <li>• Decompensated heart failure</li> <li>• Dye allergy</li> <li>• Infection</li> <li>• Laboratory abnormalities</li> <li>• Renal failure</li> <li>• Severe peripheral vascular disease</li> <li>• Uncontrolled hypertension</li> </ul>
<b>RIGHT-HEART CATHETERIZATION</b>	
<ul style="list-style-type: none"> <li>• Acute myocardial infarction</li> <li>• Assessment of intracardiac shunt</li> <li>• Assessment of volume status</li> <li>• Cardiac tamponade</li> <li>• Differentiation between constrictive and restrictive cardiac physiology</li> <li>• Differentiation between shock states</li> <li>• High-risk cardiac status during pre-, intra-, and postoperative periods</li> <li>• Risk stratification for heart transplant evaluation</li> <li>• Severe left ventricular failure</li> <li>• Severe pulmonary hypertension</li> </ul>	<p><b>Absolute</b></p> <ul style="list-style-type: none"> <li>• Bioprosthetic tricuspid or pulmonic valve prosthesis</li> <li>• Left bundle-branch block</li> <li>• Mechanical tricuspid or mitral valve prosthesis</li> <li>• Newly implanted pacemaker or defibrillator</li> <li>• Profound coagulopathy</li> </ul> <p><b>Relative</b></p> <ul style="list-style-type: none"> <li>• Right-sided endocarditis</li> <li>• Terminal illness for which aggressive management is futile</li> <li>• Thrombus or tumor in a right heart chamber</li> </ul>

# Patient Information

## Q: What is a heart catheterization?

### ›WHAT IS THIS TEST FOR?

Heart catheterization is used to check blood flow to the heart and to see how well the heart is pumping. It can measure blood pressure in the heart and how much oxygen is in the blood. This test will help your doctor or PA see how well your heart valves work. And it will let them check for any defects in the wall of your heart.

### ›WHY DO I NEED THIS TEST?

This test can reveal whether you have coronary artery disease, also known as *CAD* or *atherosclerosis*. In CAD, the arteries of the heart become blocked by a fatty substance known as *plaque*. Over time, the plaque builds up and blocks blood flow to the heart muscle. CAD can cause chest pain (*angina*) and puts you at risk for a heart attack.

### ›HOW IS THE TEST DONE?

The test is done by a cardiologist and trained assistants. A small plastic tube

called a *catheter* is inserted into an artery or vein in your arm or groin. The catheter is used to inject a dye into your coronary arteries. If a blockage is found in your coronary arteries, then another catheter with a balloon tip may be used to insert a stent in order to widen the artery.

You will receive a mild sedative to help you relax before the test. You will be awake and able to follow directions during the test. The test may last 30 to 60 minutes. During this time, the doctor will take several pictures of your heart using special x-rays. After the test, the tube will be removed and pressure applied at the insertion site to prevent bleeding. If the tube was placed in your groin, you will be asked to lie flat for several hours after the test to avoid bleeding.

### ›HOW WILL THE TEST FEEL?

You will receive numbing medicine at the site where the tube will be placed. You may continue to feel some dis-

comfort or pressure once the tube is in place. You may feel a warm sensation once the doctor injects the dye through the tube. Some people feel nauseated or have chest pain or pressure. If you feel this, say so. The doctor or nurse can give you medicine to relieve it.

### ›IS IT HARMFUL?

Heart catheterization has a slightly higher risk than other heart tests, but it is very safe when performed by a well-trained staff. Some risks include heart attack, infection, irregular heart rhythms, low blood pressure, stroke, bleeding, blood clots, kidney damage, and allergic reaction to dye.

### ›HOW DO I PREPARE FOR THE TEST?

You will be asked not to eat or drink 6 to 8 hours before the test. The test will be performed in the hospital, and you will most likely go home 4 to 6 hours after the test is done. Or, you may be admitted to the hospital overnight for observation and then sent home the next morning. Tell your doctor before the test if you are allergic to iodine or seafood, have had a reaction to contrast dye, have kidney problems, or may be pregnant.

### ›BOTTOM LINE

Heart disease is the number one cause of death in the United States. A heart catheterization will help your PA or doctor predict your risk of a heart attack or other heart problems. The results will help your PA or doctor choose the best plan to lower your risk of heart attack. This plan may include eating healthy, exercising, and stopping smoking. **JAAPA**

