

# Virtual Mentor

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## CLINICAL PEARL

To Cath, or Not to Cath?

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Few phrases in the English language are so readily recognized as Hamlet's reflection on existence: "To be, or not to be: that is the question ... To die, to sleep—/No more—and by a sleep to say we end / The heartache and the thousand natural shocks / That flesh is heir to." Shakespeare's oft-quoted soliloquy owes its timelessness in part to a questioning of the worth of existence in the face of personal calamity. Hamlet raises perennial and universal questions about life, death, and quality of life. In the realm of medicine these questions have both personal and professional implications. The medical field's many advances over the past few decades have made it possible to improve both length and quality of life, and, as a result, medicine can mitigate suffering and perplexity in times of crisis. The exciting field of cardiology provides a prime example of the promise and peril of medical technology. To that end, we turn to coronary angiograms and the complexities of heart catheterization.

A coronary angiogram (also called a heart catheterization or simply a "cath") is a diagnostic imaging procedure. A patient's artery—usually the femoral artery—is cannulated and a sheath is placed at the entry site. Next, diagnostic catheters are placed over a guide wire into the ostium of the major coronary arteries. Utilizing fluoroscopy, contrast dye is then administered through the catheters, and the epicardial coronary arteries are visualized. Typically, once the images are obtained, one of three scenarios occurs: (1) there are no major blockages to explain the patient's symptoms or condition, and the procedure is completed; (2) there are a few blockages that are amenable to mechanical revascularization with either a balloon angioplasty or a stent; or (3) there are either too many blockages, or blockages that are critical (e.g., left main disease, three vessel disease in a diabetic patient) and the patient would benefit most from coronary bypass surgery.

### Indications for Coronary Angiography

In general, indications for coronary angiography include angina, heart failure, myocardial infarction, and the need to delineate coronary anatomy for prognostic information. The treatment of coronary blockages can involve three different modalities with varying degrees of invasiveness: (1) medical therapy with medicines such as aspirin, beta-blockers, statins, ace inhibitors, and nitrates, (2) percutaneous coronary intervention (PCI) with stents or balloons, and (3) surgical revascularization with coronary bypass. Medical therapy can be used alone, or in combination with either PCI or surgical bypass.

In patients with angina (chest pain with negative cardiac biomarkers), stents offer no greater mortality benefit or reduction in future risk of heart attack than medical therapy [1]. In this scenario, stents do the same thing as medical therapy: alleviate symptoms. A meta-analysis of several studies comparing angioplasty to medicine, however, suggests that angioplasty may be better at improving symptoms when compared to medicines alone [2].

In the setting of a non-ST elevation myocardial infarction, there are generally two approaches: (1) early invasive approach—that is, performing a coronary angiogram within 48 hours—or (2) a conservative approach that involves treating the patient with medical management.

Some studies, such as the TIMI 3B and the VANQUISH trials, favor the conservative approach with medical therapy [3, 4]. More recent trials, however, such as FRISC II, TACTICS-TIMI 18, RITA III, and ISAR-COOL, demonstrated the benefits of an invasive approach [5-8]. To aid clinicians in decision making grounded in evidence-based medicine, the American College of Cardiology and American Heart Association released guidelines that support performing a coronary angiography on patients who have an acute myocardial infarction, ECG changes suggesting ischemia (new ST depression), continuing symptoms of ongoing chest pain, heart failure, or evidence of hemodynamic or electrical instability (e.g. ventricular tachyarrhythmias) [9].

Lastly, there is the patient with an ST elevation myocardial infarction, a potentially life-threatening condition in which a coronary artery is completely occluded. The current standard of care is to open the artery as soon as possible, either by using medicines with fibrinolytics or with mechanical revascularization provided by coronary angiography. Several studies have demonstrated a mortality benefit with the utilization of mechanical reperfusion in this particular form of myocardial infarction [10].

### **Risks of Coronary Angiography**

As technologically dazzling as coronary angiograms can be, it is crucial to recognize the risks inherent in the procedure. These risks include, but are not limited to, pain and discomfort, bleeding, infection, life-threatening arrhythmias, renal failure, perforation or dissection of a vessel or of the heart itself, stroke, heart attack, and death. Given the serious nature of the potential complications, one must carefully weigh these risks against the potential benefit of a coronary angiogram for each particular patient. For some, the potential benefit of relieving angina or of mechanically restoring blood flow in the setting of a major heart attack outweighs the risks. In other patients, underlying serious conditions, such as chronic kidney disease, brain tumors, or malignancy may significantly increase the risks of the procedure. Furthermore, placement of stents requires dual antiplatelet therapy with aspirin and a thienopyridine, and this requirement must be factored into the decision-making process for patients who may not be able to take anticoagulants due to underlying conditions.

Thus the decision to take a patient to the cath lab can be a confusing one. To add to the complexity, one must acknowledge that practice styles vary from conservative to more aggressive among cardiologists, institutions, and regions throughout the United States. Furthermore, the magnitude of the decision can frighten and overwhelm the patient and his or her family. Therefore, I advocate two principles: communication and education. Patients should fully understand the potential benefits they may realize from the procedure and must also be made aware of the risk of an adverse event. Doctors must clarify expectations of what the procedure will accomplish.

It is not overstating the case to say that clinicians should, like Hamlet, contemplate the quality of existence, as well as existence itself, for each patient. They must then individualize the decision “to cath, or not to cath” to each patient, weigh the potential benefits of coronary angiography against the risks for that specific patient, and communicate these factors to the patient and to the rest of the medical staff and support team. When used appropriately, coronary angiography has the power to be a potent diagnostic and therapeutic tool.

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