

Warning! Cardiac cath complications

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Learn how to identify at-risk patients and complications.



Mr. S, 48, is admitted to your ICU for an acute myocardial infarction (MI). Before this event, he has no significant past medical history. After cardiac catheterization with angioplasty and stent placement to the right coronary artery, the patient returns to the ICU for overnight observation. He's seen by the cardiologist the next morning and scheduled for transfer to the telemetry unit. Just before transfer, Mr. S starts to complain of flank pain.

Your assessment finds that the patient has a small hematoma at the insertion site, increased bruising from the insertion site spreading across the thigh, and an absent pedal pulse in the right foot. You call the healthcare provider who orders a computed tomography (CT) scan and labs.

Test results show that Mr. S has a retroperitoneal bleed. Anticoagulation is stopped and blood cell counts are monitored. The patient spends an extra night in the ICU for monitoring and is able to transfer the next day. Because this complication was recognized quickly, Mr. S suffers no adverse effects.

Every year there are approximately 3 million cardiac catheterizations performed in the United States (see *Picturing cardiac catheterization*). Common indications for this procedure include the diagnosis and evaluation of coronary artery disease and acute MI, evaluation of overall cardiac function, and interventions such as angioplasty. As with all invasive procedures, there are risks involved, ranging from bleeding at the incision site to complications as severe as stroke and even death. Prevention of complications isn't always possible, but early recognition of the signs and early intervention when complications do occur has been shown to yield better patient outcomes. The key to early detection is twofold: You need

to know who's at risk and how to spot a problem.

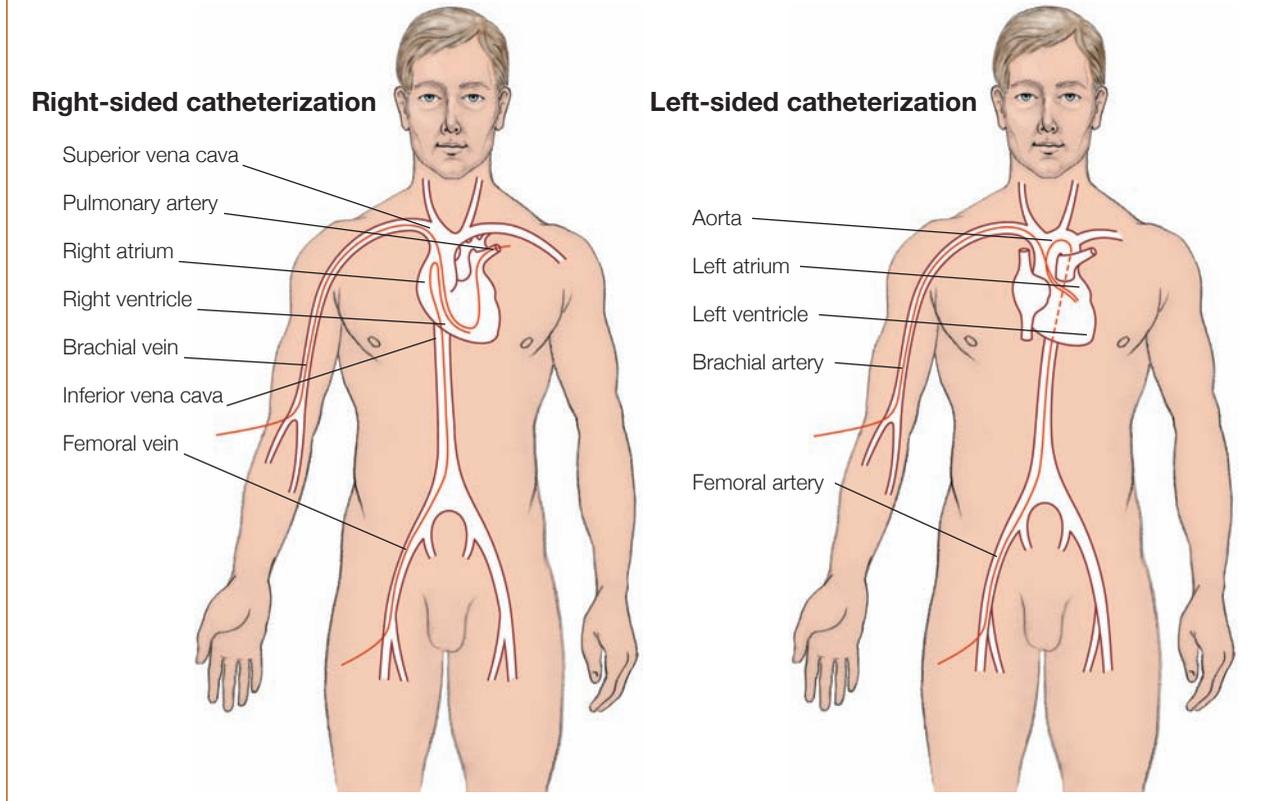
Who's at risk?

Several factors have been identified that increase a patient's chance of developing a complication after cardiac catheterization:

- **advanced age.** At age 70, the risk of developing complications increases; this risk increases further after age 80.
- **female sex.** There's no specific data why, but research shows women develop more complications postcatheterization than men.
- **renal failure/insufficiency.** The dye used during the procedure may cause an increased risk of renal complications.
- **venous sheath.** This can increase the risk of bleeding and other vascular complications.
- **previous cardiac intervention.** Complication risk is increased due to previous disease and previous access of the femoral artery.
- **urgency of procedure.** Complication risk is increased due to the instability of the patient and other contributing factors.

Knowing who's at high risk will help guide your assessment postprocedure. Some of this assessment will be directed by your hospital policy but should always include frequent vital sign monitoring (every 15 to 30 minutes); bilateral dorsalis pedis and posterior tibial pulses; site assessment; and limb monitoring, including color, temperature, and sensation. Postprocedure assessment should be performed every 10 to 30 minutes for the first 2 hours or until the patient is stable, then continue every hour for the next 8 hours. If there are any changes in the baseline assessment, more frequent monitoring is warranted and changes should be reported to the healthcare provider.

Picturing cardiac catheterization



Caught in the act

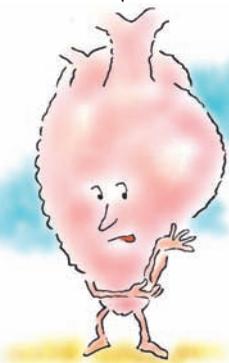
There are many different types of complications that can occur after cardiac catheterization. Vascular complications are the most common because access is frequently obtained through the femoral artery. The high intravascular pressure makes sealing off the puncture site challenging. Even when a good seal is obtained, movements such as leg bending or ambulation can lead to bleeding. The use of anticoagulation therapy is common after cardiac intervention and may also increase the risk and amount of bleeding.

Access site hematoma is the most common complication seen in postcardiac catheterization patients. It's caused by blood leaking and collecting in the space under the skin. With no space to expand, the blood forms a hard lump. To identify a hematoma, you'll want to look closely and assess the site for any signs of bleeding, such as blood oozing from the puncture site, the dressing soaked with blood, or bruising that spreads from the groin to the hip or thigh.

Next, touch the site and note what it feels like. A hematoma is very distinct and will feel like a raised hard lump with a distinct ridge where the blood has collected under the skin. A normal site will feel soft when pressed and the skin will feel flat and even throughout the groin and thigh area. Other signs may include pain that's described as moderate to severe and will increase when the site is palpated. After evaluating the groin, a full leg assessment should be completed, including the comparison of pedal pulses and assessment of the color and sensation of the affected leg.

Diagnosis is made by the healthcare provider assessment, but ultrasound should be performed to rule out the presence of a pseudoaneurysm or arteriovenous fistula. Treatment is manual compression at the femoral artery to control bleeding and continued close monitoring of the site. Assessment of the affected leg's color, temperature, and pedal pulses should also continue at 15 to 30 minute intervals for 2 to 4 hours after bleeding is controlled.

Help keep me complication free!



A **retroperitoneal bleed** is also caused by femoral artery leakage. Blood collects in the peritoneal cavity and exerts pressure on tissues within the space. Symptoms are usually vague and easily misinterpreted as normal discomfort after the procedure. Early signs include flank or lower abdominal pain, lower back pain, and possibly leg or flank bruising. Late symptoms are more obvious and include hypotension, tachycardia, and an obvious drop in hemoglobin.

On assessment, you're again looking for signs of bleeding or compromised circulation, including obvious bleeding at the puncture site, a palpable hematoma, or generalized bruising. If generalized bruising increases since the previous assessment, it's a key sign that bleeding isn't well controlled. Bruising that spreads to the flank area is highly suspicious for retroperitoneal bleed and should be reported immediately.

If bleeding is suspected, then hemoglobin and hematocrit levels should be checked and compared with preprocedure levels. Notify the healthcare provider if the drop is greater than 1 gm or the value less than 8 gm/dL. Diagnosis is confirmed by CT scan. Treatment of stable retroperitoneal bleed includes frequent assessment, blood transfusion if indicated, and reversal of anticoagulation. A patient who's unstable may need to undergo emergent angiography to identify and control bleeding.

An **arteriovenous fistula** occurs when blood is able to flow directly from an artery to a vein. This causes a "shunting" of blood and decreases the amount of blood that's available to the peripheral circulation. Symptoms include a new bruit and thrill at the access site, hematoma, and/or pain in the lower limbs. Diagnosis is made by Doppler ultrasound. The first line of treatment is monitoring and assessment for spontaneous closure. If this isn't effective, then compression is used to seal off the cross flow.

A **pseudoaneurysm** occurs when an area of an artery ruptures, causing an out-pouching in the artery that can lead to bleeding and hemorrhage. This weakness in the vessel is caused by insertion of the sheath. Signs to look for include a pulsatile groin mass, complaints of severe groin

pain, and a new arterial bruit. Diagnosis is made by ultrasound and may show the extra-arterial flow. Treatment depends on size; a small pseudoaneurysm may be monitored, but a larger one might require ultrasound-guided compression or thrombin injection.

Femoral artery occlusion is a fairly rare complication; however, it's urgent that it be recognized quickly so intervention can start immediately. Prolonged response can lead to decreased tissue perfusion, ischemia, and possibly loss of limb. When assessing for femoral occlusion, you'll need to evaluate both legs. You're looking for pallor of the affected leg compared with the unaffected leg. When you touch the affected leg, it will feel cool or cold and possibly clammy. Other symptoms include severe pain, paresthesia, and absent distal pulses. Verification of absent pulses should be validated using a Doppler. If any of these symptoms are present, notify the healthcare provider immediately. Diagnosis is made by ultrasound of the affected limb. Treatment is an emergent surgical exploration of the limb to restore blood flow as quickly as possible.

Early detection, quick treatment

Cardiac catheterization saves thousands of lives each year, but there are risks involved. Vascular complications can occur quickly and may be life threatening. By knowing who's at risk, the symptoms to look for, and how to treat complications, you can catch problems early and continue to improve patient outcomes. ■

Learn more about it

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