Coronary angiogram: An author view
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Abstract
Coronary angiogram is one of the most accurate tests in the diagnosis of coronary artery disease. It is relatively safe, though minimally invasive, test. Coronary angiogram is an x-ray of the coronary arteries with special contrast medium to diagnose coronary artery disease. This test helps to see if any of the arteries are blocked by fatty or atheromatous plaque. It is helpful for future plan of treatment for patients with coronary artery disease.

Key words
Coronary angiogram, author view

Introduction
Coronary angiogram is an x-ray of the coronary arteries with special contrast medium to diagnose coronary artery disease. This test helps to see if any of the arteries are blocked by fatty or atheromatous plaque.

A coronary angiogram is often conducted as part of cardiac catheterization, along with other catheter-based tests. These procedures may include measuring blood pressure, obtaining samples from different chambers for diagnostic testing, a left ventriculogram, root aortogram and renal angiogram.

During an angiogram, injects a contrast medium into the coronary arteries. For this purpose inserts a catheter through a blood vessel, usually through femoral artery or through radial or brachial arteries, and guides it all the way with guide wire up to the root of the aorta. Once the catheter is in place, inject the dye through the catheter and into the coronary arteries and an x-ray can be taken.

Although typically numbs the area for puncture and the catheter insertion, the patient is awake for the entire procedure. The patient receives a mild sedative before the procedure and does not ordinarily feel the movement of the catheter within the blood vessels.

Depending on the findings of angiogram, may recommend treatments such as medication, a catheter-based procedure (e.g. balloon angioplasty, coronary stenting) or surgery (e.g. bypass surgery) for patients with coronary artery disease.

When coronary angiogram done
Coronary angiogram is one of the most accurate tests in the diagnosis of coronary artery disease and over a million of them are conducted each year. The angiogram is used to pinpoint the location and severity of coronary artery disease. For example, it can reveal blockage in an artery due to either a buildup of plaque or abnormalities in the wall of the heart.

An angiogram is a relatively safe, though minimally invasive, test. The test may be done if coronary artery disease is suspected because of symptoms, such as:

- Certain types of chest pain, pressure or discomfort called angina, especially if the patient has a history of myocardial infarction
- Shortness of breath

An angiogram may also be done if the results of less invasive tests were abnormal. These tests may include-

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Electrocardiogram
Exercise stress test
Echocardiogram
Nuclear stress test

In patients with previous coronary artery bypass surgery, angiography of the grafts can detect any blockage or other abnormalities of these grafts.

Before angiogram test
Before the day of the coronary angiogram, patients should discuss their medical history with the physician and inform him or her of any medications currently being taken. Certain medications may need to be stopped or reduced. It is also recommended that patients with diabetes consult with a physician regarding food and insulin intake, because people are generally ordered not to eat or drink anything after midnight before the test. Individuals should talk with their physician if they have a blood-clotting disorder or an allergic reaction to any drug or Iodine.

Angiograms are typically completed as an outpatient procedure, meaning the patient is not required to stay overnight. On the day of the procedure, the patient will be admitted to the hospital. A nurse or physician will explain the procedure and recovery. At this time, the patient and any family members will have an opportunity to ask questions about the angiogram.

Before coronary angiogram complete blood count, bleeding time, clotting time, platelet count, blood sugar, serum creatinine, serum electrolyte, VDRL, HBsAg, anti HCV, HIV test, ECG, echocardiogram, x-ray chest may be done.

Need written inform consent before procedure.

During angiogram test
The procedure will begin with the inserting an intravenous (IV) line into the patient's arm. The IV line allows giving necessary medications during the procedure. Small electrodes will be taped to the patient's body, which allow monitoring the heart rate.

The groin or upper thigh area as the place of puncture to insert the catheter on its way to the heart, but some physicians may choose to begin at the arm or wrist. Whichever area is chosen will then be cleaned, shaved and numbed with a local anesthetic. The catheter is then fed through the artery in that area (e.g. the femoral artery in the groin or upper thigh) and up into the root of the aorta and heart. There may be some minor discomfort during this period.

When the catheter reaches the target area, the dye is injected through the catheter into a coronary artery. This dye will allow to clearly seeing the coronary arteries on the angiogram. The patient may feel hot and flushed for about 10 seconds as the dye is administered. Patients may also be asked by the physician to take certain actions, such as coughing or deep breaths, to help the dye travel through the coronary arteries. During this time, still or moving angiograms are taken to record the test results.

The dye is easily visible to monitoring the angiogram images. A "shadow" cast by the dye will show blockages of the arteries and abnormal motions of the heart walls. In the case of diseased arteries, for example, arterial walls may appear to be abnormally narrow or irregularly shaped.

Once the angiogram is completed, the catheter is removed from the body and the hole is sealed with a plug inserted under the skin or with pressure placed on the point of catheter entry. Stitches may also be necessary if the point of catheter insertion was in the elbow area. The entire process of taking angiograms lasts approximately 20 to 30 minutes, or a total of 1.5 hours from pre-procedural preparation to the removal of the catheter.

Other procedures such as angioplasty and stent placement can be performed during the same setting based on the finding of the diagnostic study and the feasibility of such intervention in a given patient.
After angiogram test

After the coronary angiogram, the patient will return to a hospital bed for recovery. The patient will lie in bed with legs straight for several hours and be discharged six to eight hours after the procedure. Reducing the period of immobilization has beneficial effects on patient comfort, particularly in terms of reduced back pain. Barkman directly compared ambulation at 3 and 6 hours and confirmed that patients with the faster ambulation time experienced significantly less back pain.

The sedative will have worn off and the catheter insertion point may be bruised and sore. It is highly recommended that patients drink extra fluids during this period of rest. Throughout the post-catheterization monitoring, the point of catheter entrance will be checked for bleeding, swelling or infection.

Patients will be given instructions from their physician that will address the following:

**Exercise and exertion:** Patients are reminded to refrain from lifting heavy objects and engaging in strenuous exercise or sexual activity for several days after the procedure.

**Care of the incision area:** Bruising and soreness is possible and normal. Severe pain or swelling may require medical attention.

**Medications:** For pain or as treatment for conditions found on the angiogram.

**Potential risks with coronary angiogram**

While there are some risks involved in any invasive or minimally invasive procedure, coronary angiograms are widely used and complications are low, occurring in less than 3% of patients. These potential complications include:

- Bleeding in the area of the puncture
- Abnormal heart rhythms, arrhythmias
- Infection
- Allergic reaction to the dye
- Damage to the arteries
- Chest pain, myocardial infarction
- Stroke
- Air embolism (when air gets into the bloodstream, where it could cause damage)
- Contrast induce nephropathy
- Death

The risk of complications is greater if people are over the age of 70 or have conditions such as diabetes, hardening of the arteries (atherosclerosis), kidney failure or carotid artery disease.

Overall complication rate in diagnostic coronary angiography is very low and related to the experience of the performing cardiologist and catheter size. The only predicting risk factors for major complications in coronary angiography were catheter size and body weight. Surgical intervention for complications was required in 0.23% of patients.

Female gender as an independent risk factor for the development of complications. Other studies have also identified female gender as a predictor of femoral access site complications.

**Treatments that may follow angiogram**

Based on the nature and extent of the coronary artery disease determine the most appropriate treatments, which may include:

**Medications:** (e.g. antiplatelate, beta blockers, nitrates, statins).

**Balloon angioplasty** (percutaneous transluminal coronary angioplasty or PTCA): A procedure in which the physician uses a balloon-tipped catheter to press plaque back against the artery wall to allow for better blood flow in the artery.

**Coronary stenting:** A small metal structure called a stent is inserted into the artery after angioplasty. Currently, stents are implanted in the majority of PTCA cases. The stent acts as scaffolding, keeping the artery wall stretched and maintaining adequate blood flow through the vessel. One of the risks in stenting and angioplasty is the restenosis of the artery. Ongoing attempts to prevent this complication include the development of stents coated with chemotherapeutic drugs that are released into the wall of the artery.
Approved by the U.S. Food and Drug Administration in April 2003, such drug-eluting stents have demonstrated an ability to minimize restenosis to less than 10% of cases. This success rate has contributed to the rapid acceptance of drug-eluting stents and possibly contributed to a 25% drop in the number of bypass surgeries performed. One uncommon complication of stenting is subacute thrombosis due to blood clots to form within the stent, resulting in a re-narrowing of the artery. It can occur with both drug-eluting and "bare metal" stenting. Antiplatelet and anticoagulant agents given after stenting significantly reduce this risk.

**Atherectomy** : A catheter is inserted with a device on the tip that destroys and removes plaque. This procedure is generally reserved for extremely calcified plaque or complex cases of atherosclerosis.

**Coronary bypass surgery** : A procedure in which a segment of a blood vessel from another part of the body (usually LIMA and the leg veins) is used to reroute blood flow around a blockage artery supplying blood to the heart.

**Magnetic resonance angiogram (MRA)**

Magnetic resonance angiogram (MRA) has evolved to a very sophisticated level, such that blood flow through the coronary (heart) or carotid (neck) arteries can be viewed without the use of catheter-based techniques, such as coronary angiograms.

Instead, the noninvasive MRA scan takes three-dimensional images of the blood flow, so the physician can detect any damage to the vessel walls. It can also reveal blockage or re-narrowing (restenosis) after vein graft procedures.

The test takes less time than an angiogram, requires less of a recovery period and does not entail the same risks as a more invasive procedure. As a result, MRA may eventually become an alternative to angiography for some patients, and may even become a screening tool for the detection of atherosclerosis and heart disease in their earliest stages.

**CT angiogram**

In recent years, CT scanning (computed tomography) has advanced rapidly to the point where it is becoming a valuable tool in the diagnosis and management of coronary artery disease. This noninvasive or minimally invasive test uses multiple x-ray scans to produce very high-resolution images of internal organs, including the coronary arteries.

Coronary computed tomography angiogram (Coronary CTA) can detect soft plaque or fatty matter that has not yet hardened in the arteries. It is used to determine the calcium score, or the degree of calcification in coronary arteries. Studies have shown that the coronary calcium score closely correlates to the degree of coronary artery disease and the likelihood of a major cardiac event. This test is less invasive than the angiogram and may be recommended for patients who are at high-risk for coronary artery disease but do not have typical symptoms. Coronary CTA continues to be an evaluated by medical professionals as a valuable tool for certain patients at risk for coronary artery disease.

**Conclusion**

Coronary angiogram is one of the most accurate tests in the diagnosis of coronary artery disease. It is relatively safe, though minimally invasive test. Coronary angiogram is an x-ray of the coronary arteries with special contrast medium to diagnose coronary artery disease. This test helps to see if any of the arteries are blocked by fatty or atheromatous plaque. It is helpful for future plan of treatment for patients with coronary artery disease. The risk of complications is greater if people are over the age of 70 or have conditions such as diabetes, hardening of the arteries (atherosclerosis), kidney failure or carotid artery disease. Depending on the findings of angiogram, may recommend treatments such as medication, a catheter-based procedure (e.g. balloon angioplasty, coronary stenting) or surgery (e.g. bypass surgery) for patients with coronary artery
disease. Magnetic resonance angiogram (MRA) and coronary computed tomography angiogram continues to be evaluated to detect coronary artery disease as a valuable tool for certain patients at risk for coronary artery disease.

References