WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 23, 184-197. Review Article ISSN 2277–7105

A REVIEW ON: ANGIOPLASTY

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Article Received on
07 October 2024,

Revised on 28 October 2024,
Accepted on 17 Nov. 2024

DOI: 10.20959/wjpr202423-34668

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ABSTRACT

Coronary angiography is a vital diagnostic tool used to visualize the coronary arteries and assess the presence and severity of coronary artery disease (CAD). In cases where significant blockages are identified, percutaneous coronary intervention (PCI) with stent placement is often indicated to restore blood flow and alleviate symptoms. This abstract reviews the indications, techniques, and outcomes associated with angiogram-guided stenting. Recent advancements in stent technology, including drug-eluting stents (DES) and bioresorbable vascular scaffolds, have improved long-term outcomes and reduced the rates of restenosis. The combination of angiographic evaluation and stent placement has demonstrated efficacy in enhancing patient quality of life and reducing cardiovascular events.

KEYWORDS: Angiogram, Coronary Angiography, Stent, Percutaneous Coronary Intervention (PCI), Atherosclerosis, Catheterization, Contrast Media, Balloon, Angioplasty, Vascular Imaging Cardiac Catheterization, Thrombosis, Plaque Buildup, Angioplasty, Drug-Eluting Stent, Bare-Metal Stent, Vascular Disease Blood Flow, Coronary Arteries, follow-up care.

INTRODUCTION

HEART: The heart is a fist-sized organ that pumps blood throughout your body. It's your circulatory system's main organ. Muscle and tissue make up this powerhouse organ. Your heart contains four muscular sections (chambers) that briefly hold blood before moving it. Electrical impulses make your heart beat, moving blood through these chambers. Your brain and nervous system direct your heart's function.

FUNCTION

Your heart's main function is to move blood throughout your body. Blood brings oxygen and nutrients to your cells. It also takes away carbon dioxide and other waste so other organs can dispose of them.

Your heart also: Controls the rhythm and speed of your heart rate. Maintains your blood pressure. Your heart works with these body systems to control your heart rate and other body functions.

Nervous system: Your nervous system helps control your heart rate. Itsends signals that tell your heart to beat slower during rest and faster duringstress.

Endocrine system: Your endocrine system sends out hormones. These hormones tell your blood vessels to constrict or relax, which affects your blood pressure. Hormones from your thyroid gland can also tell your heart to beat faster or slower.

ANATOMY OF HEART

The heart is a muscular organ that plays a crucial role in the circulatory system.

Here's an overview of its anatomy.

Chambers

Atria: The heart has two upper chambers.

- Right Atrium: Receives deoxygenated blood from the body via the superior and inferior venacave.
- Left Atrium: Receives oxygenated blood from the lungs through the pulmonary veins.

Ventricles: The two lower chambers.

- Right Ventricle: Pumps deoxygenated blood to the lungs via the pulmonary artery.
- Left Ventricle: Pumps oxygenated blood to the body through the aorta.

Valves

The heart contains four main valves that ensure unidirectional blood flow

- **Tricuspid Valve:** Between the right atrium and right ventricle.
- **Pulmonary Valve:** Between the right ventricle and pulmonary artery.
- **Mitral (Bicuspid) Valve:** Between the left atrium and left ventricle.

- **Aortic Valve:** Between the left ventricle and aorta.

Heart Wall

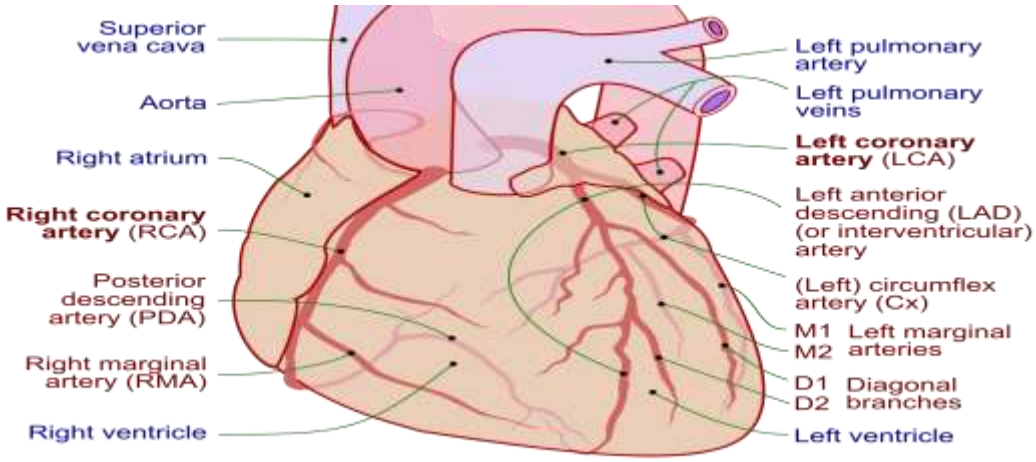
- **Epicardium:** The outer layer of the heart.
- **Myocardium:** The thick middle layer composed of cardiac muscle, responsible for contracting and pumping blood.
- **Endocardium:** The inner lining of the heart chambers and valves.

Conduction System

- **Sinoatrial (SA) Node:** The natural pacemaker located in the right atrium.
- **Atrioventricular (AV) Node:** Delays the electrical signal before passing it to the ventricles.
- **Bundle of His:** Transmits the electrical impulse to the ventricles.
- **Purkinje Fibers:** Spread the impulse throughout the ventricles, causing them to contract.
- **Pericardium:** A double-walled sac that surrounds the heart, providing protection and reducing friction as the heart beats.

Major Blood Vessels

- **Aorta:** Carries oxygenated blood from the left ventricle to the body.
- **Pulmonary Arteries:** Carry deoxygenated blood from the right ventricle to the lungs.
- **Pulmonary Veins:** Bring oxygenated blood from the lungs to the left atrium.
- **Superior and Inferior Vena Cava:** Bring deoxygenated blood from the body right atrium.



Angiogram

An angiogram is a diagnostic procedure that uses X-ray images to look for blockages in your blood vessels (arteries or veins). An angiogram test allows your healthcare provider to see how blood circulates in blood vessels at specific locations in your body. Providers use an angiogram of your heart, neck, kidneys, legs or other areas to locate the source of an artery or vein issue.

Why an angiogram is done

Your healthcare provider may want to do an angiogram procedure when you have signs of blocked, damaged or abnormal blood vessels. An angiogram test helps your provider determine the source of the problem and the extent of damage to your blood vessels. With an angiogram test, your provider can diagnose and/or plan treatment for conditions, such as:

- Coronary artery disease.
- Peripheral artery disease.
- Atherosclerosis.ef34e
- Blood clots.
- Aneurysm.

Who performs an angiogram?

An interventional cardiologist performs an angiogram. Interventional radiologists and vascular surgeons perform angiograms of peripheral arteries. Interventional neurologists perform cerebral angiograms. The provider who performs the angiogram can study your images and identify problem areas.

Test Details

How does an angiogram test work?

An angiogram involves injecting contrast material (dye) that your provider can see with an X-ray machine. Images on a screen show blood flow and blockages in your blood vessels.

How do I prepare for an angiogram test?

Before your angiogram test, your donor may want to check your blood to determine how well your blood clots. They also want to make sure your kidneys are working well.

Follow these guidelines after midnight the night before your test

Always consult with your provider before discontinuing any medication, especially antiplatelet agents and anticoagulants.

If your provider approves

- Don't take any aspirin or any products containing aspirin.
- Don't take blood thinners such as dipyridamole or warfarin (Coumadin® or Jantoven®) within 72 hours before the test and 24 hours after the test.
- Don't take clopidogrel for five days before your procedure.
- Take all other medications as usual.
- If you have diabetes, ask your provider for instructions about if and when to take your insulin and/or medicine.
- Don't eat anything after midnight the night before your angiogram. If you're having general anesthesia during the procedure, don't eat or drink anything after midnight.
- Drink only clear liquids for breakfast the day of your procedure. Clear liquids include clear broth, tea, black coffee and ginger ale.

Angioplasty

Angioplasty is a procedure used to open blocked coronary arteries caused by coronary artery disease. It restores blood flow to the heart muscle without open-heart surgery. Angioplasty can be done in an emergency setting, such as a heart attack. Or it can be done as elective surgery if your healthcare provider strongly suspects you have heart disease. Angioplasty is also called percutaneous coronary intervention.

For angioplasty, a long, thin tube (catheter) is put into a blood vessel. It is then guided to the blocked coronary artery. The catheter has a tiny balloon at its tip. Once the catheter is in place, the balloon is inflated at the narrowed area of the heart artery. This presses the plaque or blood clot against the sides of the artery. The result is more room for blood flow.

The healthcare provider uses fluoroscopy during the surgery. Fluoroscopy is a special type of X-ray that's like an X-ray "movie." It helps the healthcare provider find the blockages in the heart arteries as a contrast dye moves through the arteries. This is called coronary angiography.

Stents

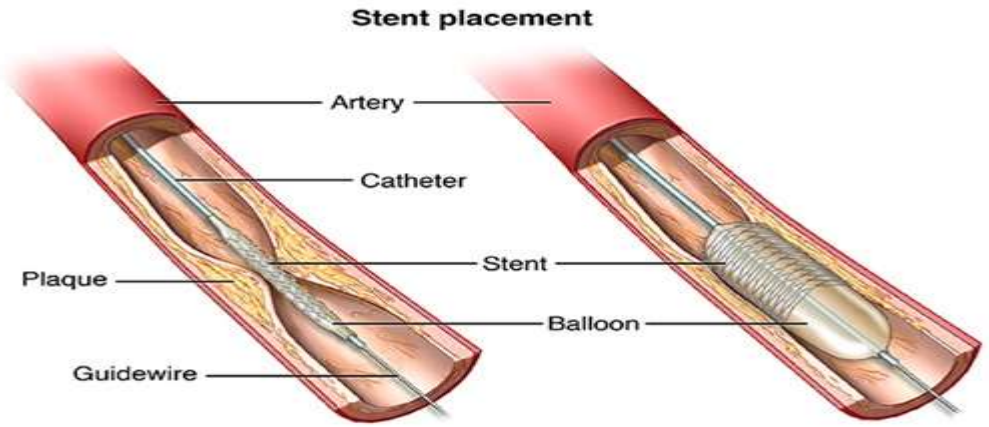
Coronary stents are now used in nearly all angioplasty procedures. A stent is a tiny, expandable metal mesh coil. It's put into the newly opened area of the artery to help keep the artery from narrowing or closing again.

Tissue will start to coat the stent like a layer of skin once the stent has been placed. The stent will be fully lined with tissue within 3 to 12 months. The length of time depends on if the stent has a medicine coating or not. You may be prescribed medicines called antiplatelets to decrease the "stickiness" of platelets. Platelets are special blood cells that clump together to stop bleeding. The medicine can also prevent blood clots from forming inside the stent. Your healthcare team will give specific instructions on which medicines need to be taken and for how long.

Most stents are coated with medicine to prevent scar tissue from forming inside the stent. These stents are called drug-eluting stents. They release medicine within the blood vessel that slows the overgrowth of tissue within the stent. This helps prevent the blood vessel from becoming narrow again. Some stents don't have this medicine coating and are called bare metal stents. They may have higher rates of stenosis. But they don't need long-term use of antiplatelet medicines. This may be the preferred stent in people who are at high risk of bleeding.

Stents can become blocked. It's important to talk with your healthcare team about what you need to do if you have chest pain after a stent placement.

You may need a repeat procedure if scar tissue does form inside the stent. This may be using either balloon angioplasty or with a second stent. In rare cases, radiation therapy may be given through a catheter placed near the scar tissue to stop the growth of scar tissue. It also opens up the vessel. This is called brachytherapy.



Why need angioplasty?

Angioplasty is done to restore coronary artery blood flow. This is done when the narrowed artery is in a place that can be reached in this manner. Not all coronary artery disease (CAD) can be treated with angioplasty. Your healthcare provider will decide the best way to treat your CAD based on your circumstance.

Risks of angioplasty

Possible risks linked to angioplasty, stenting, atherectomy, and related procedures include:

- Bleeding at the site where the catheter is put into the body (usually the groin, wrist, or arm)
- Blood clot or damage to the blood vessel from the catheter
- Blood clot within the treated blood vessel
- Infection at the catheter insertion site
- Abnormal heart rhythms
- Heart attack
- Stroke
- Chest pain or discomfort
- Rupture of the coronary artery or complete closing of the coronary artery, needing open-heart surgery
- Allergic reaction to the contrast dye used
- Kidney damage from the contrast dye

What happens during angioplasty?

Angioplasty may be done as part of your stay in a hospital. Procedures may vary depending on your condition and your healthcare provider's practices. Most people who have angioplasty and stent placement are kept track of overnight in the hospital.

Generally, angioplasty follows this process

1. You will be asked to remove any jewelry or other objects that may interfere with the procedure. You may wear your dentures or hearing aid if you use either of these.
2. You will be asked to remove your clothing and will be given a gown to wear.
3. You will be asked to empty your bladder before the procedure.
4. If there is a lot of hair at the area of the catheter insertion (often the groin area), the hair may be shaved off.
5. An IV (intravenous) line will be started in your hand or arm before the procedure. It will be used for injection of medicine and to give IV fluids, if needed.
6. You will be placed on your back on the procedure table.
7. You will be connected to an electrocardiogram (ECG) monitor that records the electrical activity of your heart and keeps track of your heart rate using electrodes that stick to your skin. Your vital signs (heart rate, blood pressure, breathing rate, and oxygen level) will be tracked during the procedure.
8. There will be several monitor screens in the room, showing your vital signs, the images of the catheter being moved through your body into your heart, and the structures of your heart as the dye is injected.

What happens after angioplasty?

In the hospital

- After the procedure, you may be taken to the recovery room for observation or returned to your hospital room. If the catheter was put in a blood vessel in your groin or leg, you will stay flat in bed for several hours after the procedure. A nurse will keep track of your vital signs, the insertion site, and circulation and sensation in the affected leg or arm.
- Tell your nurse right away if you feel any chest pain or tightness, or any other pain, as well as any feelings of warmth, bleeding, or pain at the insertion site.
- Bed rest may vary from 4 to 6 hours depending on your specific condition. If your healthcare provider placed a closure device, your bed rest may be shorter.

- In some cases, the sheath or introducer may be left in the insertion site. If so, the bed rest will last until the sheath is removed. After the sheath is removed, you may be given a light meal.
- You may feel the urge to urinate often because of the effects of the contrast dye and increased fluids. You will need to use a bedpan or urinal while on bed rest so that your affected leg will not be bent.
- You may get out of bed after the specified period of bed rest has been completed. The nurse will help you the first time you get up. The nurse will also check your blood pressure while you are lying in bed, sitting, and standing. You should move slowly when getting up to prevent any dizziness from the long period of bed rest.
- You may be given pain medicine for pain or discomfort at the insertion site or from having to lie flat and still for a long time.
- You will be encouraged to drink water and other fluids to help flush the contrast dye from your body.
- You may go back your usual diet after the procedure unless your healthcare provider decides otherwise.
- You may be able to go home the same day. Or you may spend the night in the hospital after your procedure. Your stay may be longer. It depends on your condition and the results of your procedure. You will get detailed instructions for your discharge and recovery period

AFTER ANGIOPLASTY

After your angioplasty/stenting, you should focus on eating a healthy diet. This will help your body to heal, reduce your risk of complications and enable you to recover well. A healthy diet will also reduce the risk of plaque building up in your arteries again.

Many studies have shown that a diet rich in fruits, vegetables, wholegrains, nuts and seeds can reduce your risk of heart disease.

A healthy diet provides your body with plenty of heart-protective nutrients - like vitamins, minerals, antioxidants and dietary fibre. Ideally, your diet should include.

- **Meat** - and/or meat alternatives such as eggs, tofu, legumes and nuts
- **Fish** - 2 serves of oily fish per week such as salmon, mackerel or sardines will help you get plenty of heart healthy omega-3 fats

- **Wholegrains** - good wholegrain choices include wholemeal or wholegrain bread or crackers, brown rice, wholemeal pasta, quinoa, freekah, barley, rye, rolled oats, polenta and couscous
- **Dairy** - preferably low fat
- **Healthy fats** - a small amount of healthy fats and oils from nuts, seeds, avocado and oily fish
- **Water** - avoid sugary soft drinks and drink alcohol only in moderation

Aim to consume 2 serves of fruit, 5 serves of vegetables and 4 or more serves of wholegrains - depending on your energy needs. Some other tips to help you eat well include

- **Reduce your salt intake** - use as little salt as possible when cooking as this will help to lower your blood pressure and help prevent fluid retention.
- **Avoid sugary foods** - these are often eaten in place of healthy foods and can contribute to weight gain.

SELF CARE AFTER ANGIOPLASTY

- The catheter is removed from the artery after the angioplasty process, and pressure is given to the spot. A suction device may be used to control bleeding at the wound site in some instances. In other circumstances, after the catheter is removed, the artery is sealed shut.
- To limit the danger of bleeding, the patient must lie flat and remain still for several hours. The patient will be kept in a recovery area where his or her blood pressure, heart rate, oxygen level, temperature, and puncture site will be closely monitored. If pain medication is required after the sedative drug wears off, it will be administered.
- After angioplasty, the majority of patients will spend the night in the hospital. The patient must be driven home by a friend or family member. The majority of patients is able to walk the day following their angioplasty and can resume their typical activities within a week, including returning to work. For a few days, driving, heavy lifting, and pushing or pulling is prohibited. Specific restrictions on activities should be negotiated with a physician.

MEDICINES FOR AFTER ANGIOPLASTY

medicine	uses
Medicine type: Anti-platelet Medicine names: Aspirin and ticagrelor, prasugrel or clopidogrel	Aspirin is used to thin the blood. Ticagrelor, prasugrel or clopidogrel works with aspirin to stop blood clots from forming in the stent/s.
Medicine type: Beta blockers	Beta blockers slow down the heart rate so the heart does not need to work as hard to pump blood around the body. They help to reduce the risk of more heart attacks and chest pain
Medicine type: ACE inhibitors or angiotensin receptor blockers	ACE inhibitors / angiotensin receptor blockers relax and widen blood vessels. This lowers blood pressure and the heart does not need to work as hard
Medicine type: Statins	Statins reduce the level of blood cholesterol. Blood cholesterol is a fat that can cause plaque formation in the blood vessels, increasing the risk of a heart attack.
Medicine type: GTN spray (glyceryl trinitrate) spray or tablets	GTN helps to improve blood flow to the heart and treat chest pain. We will give you GTN medication to take home with you when you leave hospital.

PRISCRIPTION FOR THE SAFTETY: After you undergo angioplasty and get a stent, your doctor may tell you to take aspirin plus another antiplatelet medicine. This might include.

- Clopidogrel (Plavix)
- Prasugrel (Effient)
- Ticagrelor (Brilinta)
- Ticlopidine (Ticlid)
- Eptfibatide (Integrilin)

All of these drugs, including aspirin, work in a similar way to prevent clots. A blood clot forms when a special category of adhesive cells in your blood, called platelets, start sticking together. A chemical called thromboxane sets this process in motion. Aspirin and other antiplatelet drugs reduce the body's ability to make thromboxane.

Although antiplatelet medicines can be very helpful, they can also cause side effects, including uncontrolled bleeding. Therefore, the goal is to take them long enough to reduce your risk of developing a dangerous blood clot—but no longer then necessary.

CONCLUSION

In conclusion, Percutaneous Transluminal Coronary Angioplasty (PTCA) stands as a life-saving procedure for individuals afflicted by coronary artery disease. It offers immediate

relief from symptoms, enhances quality of life, and reduces the necessity for more invasive surgeries. While there are risks associated with PTCA, they are generally rare and manageable.

Patients considering PTCA should consult their healthcare providers to determine their eligibility for the procedure. Additionally, adopting a healthy lifestyle and adhering to medical advice are essential for preventing CAD progression and maintaining a strong heart.

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