

Chronic Total Occlusion (CTO)

Causes, symptoms, and treatments

This handout explains chronic total occlusion (CTO) of a coronary artery. It includes how CTO is diagnosed and evaluated, and treatment options.

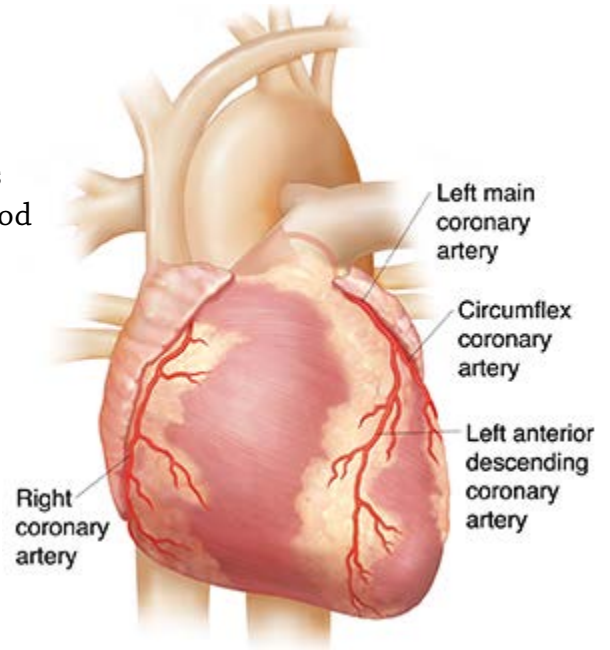
What is chronic total occlusion?

The main blood vessels of the heart are called the *coronary arteries*. As the heart pumps, it sends blood through these arteries to supply the heart with blood and oxygen.

In *chronic total occlusion (CTO)*, one of the coronary arteries is fully blocked. The block can be made of hard or soft *plaque* (deposits of fat and cholesterol). CTO restricts blood flow to your heart. It can be very serious.

What causes CTO?

CTO can be caused by *arteriosclerosis*, a buildup of plaque inside an artery. This plaque can block normal blood flow to the heart. This may result in chest pain called *angina*. If an artery is fully blocked, the heart may be damaged.



The coronary arteries

What are the symptoms of CTO?

Symptoms may include:

- Chest pain or pressure
- Shortness of breath
- Fatigue (feeling very tired)

How is CTO diagnosed?

A procedure called a *cardiac catheterization* is often used to diagnose heart conditions. In this procedure, a long, thin tube called a *catheter* is inserted into an artery in your groin or arm.

The tube is then threaded through your blood vessels to your heart. *Contrast* (X-ray dye) is injected into the tube. Contrast helps the blood vessels show more clearly on X-ray images.

We will then take X-rays. The images show how blood flows through your arteries and if there are blocks or restricted areas.

How is CTO treated?

At UW Medical Center (UWMC), we use the latest technologies to treat CTO. We use *minimally invasive* methods that do not use major incisions. Our success rates are almost 95% (almost 95 out of 100 procedures are successful).

Treatments for CTO include medical therapy, *bypass surgery*, and *percutaneous coronary intervention*

What is percutaneous coronary intervention?

In *percutaneous coronary intervention* (PCI), a *stent* (tube) is placed into your blocked artery. First, a catheter is inserted through the skin in your *femoral artery* (thigh) or *radial artery* (wrist), or both. The stent is at the leading tip of this catheter. The catheter and stent are moved through the artery to your coronary artery. The catheter is removed, but the stent is left inside your artery. The stent holds your artery open so that blood can reach your heart.

At UWMC, this procedure is done by a *cardiac interventionist*. This person is a radiologist with advanced training in treating CTO.

How do we know if PCI is right for you?

To find out if a PCI is the best treatment for you, we need to know if you have CTO and how severe the block is. To do this, we will review your records and check the results of these tests:

- A **coronary angiogram**. In this test, contrast is injected into the blood vessels of your heart. We then take a series of X-rays of the inside of your blood vessels.
- A **magnetic resonance imaging (MRI) exam of your heart**. MRI uses radio waves, magnets, and a computer to create pictures of your organs and tissues. A heart MRI creates both still and moving pictures of your heart and major blood vessels.
- A **nuclear stress test**. This test measures blood flow to your heart when you are at rest and while your heart is working harder as a result of exercise or medicine.

We will also assess:

- The medicines you take. These may be adjusted to help manage the symptoms caused by your blocked artery.
- How severe your lack of blood flow (*ischemia*) is.
- Your *myocardial viability*. This tells us if the cells around your coronary artery are alive or dead. It also tells us if you will benefit from opening the blocked artery.
- Where your CTO is located.

Based on all of these findings, your doctors will decide whether a PCI may be successful in treating your CTO.

Why treat a CTO?

By treating your CTO, we can:

- Ease your symptoms and improve your quality of life
- Improve your ability to exercise
- Improve your heart function
- Reduce your need for bypass surgery or improve your survival rate after surgery

Being Assessed at UWMC

Your primary care provider (PCP) or your *cardiologist* (heart doctor) will refer you to UWMC. Our Complex Coronary Team will work with your doctors to coordinate your care and treatment plan.

Complex Coronary Team members will review your medical records, angiograms, and other test results that you or your PCP sent us. After reviewing this data, we will set up a time for you to meet with a member of the Complex Coronary Team.

At this meeting, called a *consult*, we will talk about your options, risks, and benefits of having a PCI or other procedure.

What are the risks of a CTO PCI?

The greatest risks of a PCI include:

- Kidney damage from the contrast
- Bleeding where the catheter entered the artery in your groin or arm

Other risks are:

- Bleeding or damage to a blood vessel where the catheter entered your skin

- The coronary artery may suddenly close
- Small tear in the inner lining of the artery
- Heart attack
- Stroke
- Death

How do I prepare for my CTO PCI?

- Write down all the medicines you are now taking. Bring this list with you to your clinic visit. We will review them and tell you which ones to take and not take on the day of your procedure.
- At your clinic visit, be sure to ask any questions or share any concerns you have about your procedure.
- If you have family with you and you are from out of town, be sure they arrange to stay overnight in the Seattle area. Our Patient Care Coordinator can help you find options for you and your family.
- If you are taking warfarin (Coumadin) or another blood-thinning medicine, get detailed instructions from our clinic or your anticoagulation clinic about how to handle your doses on the day of your procedure.
- If you are taking diuretics, insulin, or oral diabetic medicine, get detailed instructions from one of our team members about if and when to stop these medicines.
- You will not be able to drive for 48 hours after your PCI. Plan for a responsible adult to take you home after your procedure. This person can drive a car, or take a bus or taxi with you.
- Make plans for someone to take care of your children and pets, if needed. You will stay overnight in the hospital after your procedure so that we can monitor you. You will be able to go home the next morning.
- If you have not received detailed instructions within 1 week of your procedure, or if you have any other questions or concerns, please call our Complex Coronary Patient Care Coordinator at 206.598.7126.

Night Before Your Procedure

- Pack an overnight bag.
- After midnight, do **not** eat or drink anything.

Procedure Day

- You may take your usual medicines with small sips of water unless you have been told otherwise.
- If you use a CPAP machine for sleep apnea or breathing problems, bring it with you to the hospital.
- Bring with you a list of medicines you are now taking.

At the Hospital

Check in at Admitting, on the main level (3rd floor) of the hospital. Admitting is near the lobby, to the right and behind the Information Desk. A staff person will direct you to the Cardiac Procedures Unit.

After you check in, you will:

- Change into a hospital gown.
- Have an *intravenous* (IV) tube placed in a vein in your arm. Fluids and medicines will be given to you through this tube during and after the procedure.
- Have an *electrocardiogram* (ECG) and lab tests.

Nursing staff will then take you to the cardiac catheterization lab. The other nurses and cardiovascular technicians involved in your procedure will greet you there.

To prepare you for your procedure, nurses will:

- Clean your wrist or groin with a special soap.
- Cover you with a drape to keep the area sterile.
- Give you medicines through your IV to keep you comfortable.

What can I expect after my procedure?

- After your procedure, you will be moved to the 4-South unit of the hospital. Nurses on this unit have special training in caring for heart patients. You will stay overnight in this unit so that our nurses can monitor you closely.
- The morning after your procedure, a member of the Complex Coronary Team will examine you. After this exam, you may leave the hospital.

Medicines

After your procedure, you will:

- Take aspirin to prevent blood clots in the artery where the stent was placed.

- Take another blood-thinning medicine such as clopidogrel (Plavix) to help prevent blood clots.
- Resume all heart medicines you were taking before your procedure. Your primary cardiologist will review your medicines at your follow-up visit within 2 to 4 weeks after your procedure.

Will I need any other procedures?

A PCI is successful for 95% of people (95 out of 100 people) who have the procedure. This means their coronary artery is opened and a stent is placed.

But, about 5% of people (5 out of 100 people) who have a PCI do not get a stent placed during their first procedure. For most of these patients, even though the artery is opened, the doctor believes the patient will have a better outcome if the stent is placed at a later time.

If this happens for you:

- We will allow your artery to heal for at least 8 weeks.
- The Complex Coronary Team will then schedule a new procedure to place the stent.
- You may or may not feel better between the first and second procedures.

Follow-up

- We will update your primary cardiologist about your procedure and the outcome. You will need to follow up with your primary cardiologist within 2 to 4 weeks after your procedure.
- A follow-up visit will be scheduled with your referring care provider within 2 weeks after your procedure.
- Your providers will also advise you to take steps to reduce your risk for heart problems. These include:
 - Managing blood sugar (*diabetes*), lipids (*cholesterol*), and blood pressure (*hypertension*)
 - Quitting smoking
 - Keeping your weight at a healthy level
 - Getting regular exercise
 - Making sure you are taking the medicines you need, in the correct doses

Questions?

Your questions are important. Call your doctor or healthcare provider if you have questions or concerns.

Complex Coronary Patient Care
Coordinator: 206.598.7126