

Mitral Regurgitation

Causes, symptoms, diagnosis, and treatment

This handout describes mitral regurgitation, a disease of the mitral valve. It explains how we diagnose and assess this disease, your treatment options, and how your doctor will decide what treatment is best for you.

What are heart valves?

The human heart has 4 chambers: 2 lower chambers called *ventricles* and 2 upper chambers called *atria*. (Atria is the plural form of *atrium*.) *Heart valves* are flaps of tissue that control the flow of blood between these chambers. Valves act like one-way doors that open and close with each heartbeat.

Heart valves have special structures called *leaflets*. The leaflets open and close to control the blood flow through the heart.

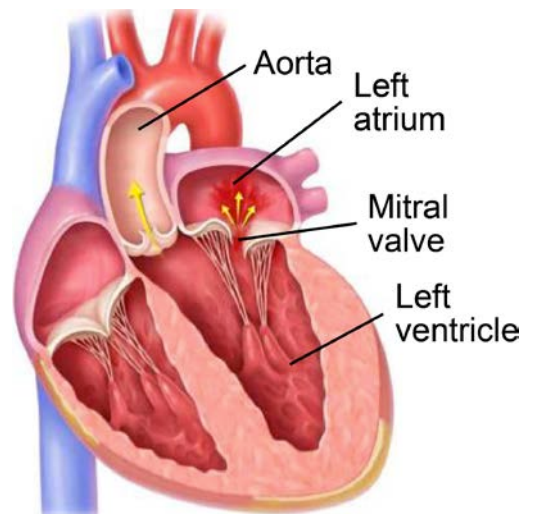
What is heart valve disease?

In heart valve disease, the leaflets can have problems opening (*stenosis*) or closing (*regurgitation*). These problems affect how the blood moves through the heart and to the rest of the body. Heart valve disease can occur in 1 or more of the heart valves.

What is the mitral valve?

One of the 4 heart valves is the *mitral valve*. It controls blood flow from the upper left atrium to the bottom left ventricle. As the mitral valve works, it helps blood move through the heart, into the *aorta* (main artery), and out to the rest of the body.

The mitral valve has 2 leaflets: the *anterior mitral valve leaflet* and *posterior mitral valve leaflet*. These leaflets must work well for blood to flow normally through the heart.



The mitral valve controls blood flow from the left atrium to the left ventricle.



In primary MR, abnormal valve structures keep the valve from closing as it should.



In secondary MR, the valve is normal, but there is a problem with the ventricle that keeps the valve from working as it should.

What is mitral regurgitation?

Mitral regurgitation (MR) occurs when there are problems with the mitral valve leaflets. Blood flows backwards into the left atrium, which then affects how blood flows through the heart and to the rest of the body.

There are 2 types of MR: *primary* and *secondary*.

- In **primary MR**, there is a problem with the mitral valve or its structures. The leaflets do not close normally, which allows blood to flow backwards through the valve.
- In **secondary MR**, the mitral valve looks normal, but the left ventricle is *dilated* (bigger than normal). This can occur with problems of the heart muscle called *cardiomyopathies*. Cardiomyopathies cause the heart muscle to get larger and weaker, which puts a strain on the mitral valve or its structures.

With secondary MR, the heart must work harder to pump blood through the aortic valve, and blood flow to the rest of your body is limited. The left side of the heart grows larger, and symptoms appear (see “What are the symptoms of MR?” below).

MR ranges from mild (grade 1+) to severe (grade 4+). If it is not treated, severe MR may cause problems such as heart failure. As it progresses, up to 50% of patients with severe MR may need to be hospitalized or may die.

What are the symptoms of MR?

The common symptoms of MR are:

- Abnormal heart sounds (*heart murmur*)
- Fast or uneven heartbeat (*palpitations*)
- Fluid buildup in the body from *congestive heart failure* (CHF)
- Tiredness that makes it hard to exercise and do other activities
- Shortness of breath
- Chest pain
- Lightheadedness, dizziness, or fainting

How common are heart valve disease and MR?

- More than 5 million Americans are diagnosed with heart valve disease each year. Almost half of these people have moderate to severe MR (grade 3+ to 4+).

- Over 4 million people in the U.S. have MR. Nearly 1.7 million of these people have moderate to severe MR (grade 3+ to 4+).

How is MR diagnosed and assessed?

Your healthcare provider may first ask you about your health history and give you a physical exam. When listening to your heart, your provider may hear abnormal sounds, like a heart murmur or an irregular heart rhythm. You might also have other symptoms of MR, such as shortness of breath, fluid in your lungs, or a swollen belly or ankles.

Your provider may ask you to have tests to help diagnose your MR:

Echocardiogram

An *echocardiogram* uses ultrasound (sound waves) to make images of your heart chambers and valves. This exam will show if you have MR, and how severe it is. There are different types of echocardiogram:

- A *transthoracic* echocardiogram (TTE) is the type of echocardiogram that is most often used. The TTE shows the severity of MR and assesses other heart structures and how well they work. During a TTE, an ultrasound probe is placed on your chest.
 - A TTE is done in the clinic and usually takes about 1 hour.
 - You do not need to prepare in any special way for this test.
 - A TTE is non-invasive and painless.
- A *transesophageal* echocardiogram (TEE) uses an ultrasound probe inserted into your mouth and into your *esophagus* (the tube that carries food to your stomach). Since the esophagus is right behind the heart, the probe gives a direct view of your heart without bone, muscle and other tissue in the way. A TEE gives very detailed images of the mitral valve. These images will help your provider better understand the type of MR you have, what is causing it, and how to treat it.
 - Your doctor will give you instructions about how to prepare for the TEE. Most patients are told not to eat or drink anything for 6 hours before a TEE.
 - The TEE may be done in the outpatient clinic, or, if the TEE is done with anesthesia, you may need to stay in a hospital unit for a couple of hours.
 - A TEE usually takes 1 hour.

- You will receive a *sedative* (medicine to help you relax) before and during the TEE. If you also need anesthesia, you will see our anesthesiologist before the test.
- Your healthcare provider will give you more information if you are having this test. Please tell your provider if you have any problems with your teeth or esophagus, or with swallowing.

Your provider may also want you to have other tests to help decide if your MR should be treated, and how:

Electrocardiogram

An *electrocardiogram* (ECG) records your heart's electrical activity. In this exam, small patches called *electrodes* are taped to your skin. A machine records your heartbeat and the electrical impulses that travel through your heart.

An ECG is done during a clinic visit and usually only takes a few minutes. This exam is painless. You do not need to prepare in any special way.

Cardiac Catheterization

A *cardiac catheterization* measures both the blood flow and the blood pressures of your heart. A doctor who specializes in heart health (*cardiologist*) will use X-rays to help guide small flexible tubes (*catheters*) to your heart and coronary arteries. This test is done in a cardiac catheterization laboratory. It usually takes 1 hour.

- You will receive a *sedative* (medicine to help you relax) before and during the test.
- Follow the special instructions your doctor gives you for eating, drinking, and taking medicines before this test.
- The test may be done during an outpatient visit, or you may need to stay overnight in the hospital.
- Your healthcare provider will give you more information if you are having this test.

Pulmonary (Lung) Function Testing

Sometimes, shortness of breath is caused by lung disease. *Pulmonary function testing* checks for a wide range of lung diseases that might affect your health and treatment plan. The test measures how much air you exhale, and how quickly.

- For the test, you will use a special mouthpiece that is connected to a device called a *spirometer*. You may also be asked to inhale a medicine to see how it changes your test results.
- This test is done in a pulmonary lab and takes about 1 hour.
- For 4 hours before this test:
 - Avoid heavy meals
 - Do not smoke

Carotid Artery Ultrasound

The *carotid arteries* are the blood vessels in your neck that take blood to your brain. Healthcare providers usually use a stethoscope to check blood flow through these arteries. But, the heart murmur that occurs with MR makes it hard to hear this blood flow through a stethoscope.

A carotid artery ultrasound shows if there is narrowing or blockage in the carotid artery. It may be done in a vascular imaging laboratory or at your bedside, if you are in the hospital. It takes about 30 minutes. This test is painless. You do not need to prepare in any special way.

Computerized Tomography (CT) Angiography of the Chest, Abdomen, and Pelvis

Computerized tomography (CT) creates very detailed images of tissues and organs inside your body, including your heart, valves, and arteries. CT uses radiation and *contrast (X-ray dye)* that is given through an *intravenous (IV)* line. If needed, your doctor may order this test to assess your heart valves, heart chambers, and major arteries of your body.

- CT is usually done in a radiology lab and takes about 1 hour.
- Do not eat anything for 4 hours before the test.
- Before having this test, tell your healthcare provider if you:
 - Are allergic to contrast
 - Take medicines such as metformin (Glucophage)
 - Have any problems with your kidneys.

Chest X-Ray

A chest X-ray uses radiation to make images of the inside of your chest. It shows whether the shape and size of your heart (*heart shadow*) is normal. It will also show if you have fluid in your lungs or other problems in your chest.

This X-ray is done in a radiology lab or at your bedside and usually takes only a few minutes. An X-ray is painless. You do not need to prepare in any special way.

Dental Examination

If you need to have your mitral valve treated, you will need to have a dental exam first. If there is a chance you could have tooth decay, an infection in your teeth, or any other problems with your teeth, we may need a letter from your dentist. Your dentist would need to state that you have had a dental exam in the last 6 months and that you are safe from dental-related problems that can pose concerns for infections.

How is MR treated?

How your MR is treated depends on what type of MR you have, your symptoms, and other factors.

Primary MR

Primary MR is a “mechanical” problem. Medicines can help manage your symptoms, but the only cure is a “mechanical” solution, either mitral valve **repair** (MVr) or **replacement** (MVR).

The American Heart Association (AHA) and the American College of Cardiology (ACC) recommend MVR if you have:

- Symptoms such as congestive heart failure or shortness of breath
- Other issues caused by MR, such as:
 - An enlarged or weak left ventricle
 - *New atrial fibrillation* (abnormal heart rhythm)
 - *Pulmonary hypertension* (increased pressure in the artery in the lung)

Secondary MR

Treatment for secondary MR can vary, depending on your test results. If tests show that you have:

- Blockages from coronary artery disease, the blockages may be opened, or you may be given medicines.
- Electrical abnormalities in your heart, a special device such as a *pacemaker* or *defibrillator* may be used. These are devices to keep your heart rate steady.

Other medicines to manage congestive heart failure are often used.



A MitraClip



A MitraClip being put into place using a catheter



Options for Treating Mitral Regurgitation

There are 2 options for treating mitral regurgitation:

- Open heart surgery – both *traditional* and *minimally invasive*
- Transcatheter mitral valve repair (TMVr) or transcatheter mitral valve replacement (TMVR)

Open Heart Surgery

Traditional Open Heart Surgery

Traditional open heart surgery is done by a heart surgeon and a surgical team in an operating room. The patient usually needs:

- *General anesthesia* (medicine that makes the patient sleep and blocks pain)
- A breathing tube and a breathing machine (*ventilator*)
- Blood-thinning medicines (*anticoagulants*) to prevent blood clots

Traditional open heart surgery usually includes:

- An incision called a *sternotomy* at the breastbone (*sternum*)
- A heart-lung machine called *cardiopulmonary bypass* that stops the heart and keeps blood flowing through the body during surgery
- Repairing or replacing the mitral valve, using a combination of incisions and *sutures* (stitches)
- Rebuilding the sternum, usually with wires
- Closing the chest incision

Minimally Invasive Open Heart Surgery

Minimally invasive open heart surgery to repair the mitral valve is done by a heart surgeon and a surgical team in an operating room. It includes the same steps as traditional open heart surgery, but it is done through a smaller incision at the breastbone. This surgery takes less time than traditional open heart surgery.

Transcatheter Mitral Valve Repair (TMVr) with the MitraClip

Transcatheter mitral valve repair (TMVr) is minimally invasive surgery. It is a safe treatment for people who have symptoms of severe primary MR who also would have significant risks with open heart surgery.

All hospitals that offer TMVr are required to have a specially trained Heart Team. This team includes a heart surgeon and a heart doctor called an *interventional cardiologist*. The team works with the patient to determine the best and safest treatment options.

UW Medical Center (UWMC) has the one of the most experienced Heart Teams in the U.S. We have the most experienced team in the region that includes Washington, Wyoming, Alaska, Montana, Idaho, and Oregon.

What is the MitraClip?

The MitraClip is the only device currently approved by the Food and Drug Administration (FDA) for TMVr. The MitraClip brings the 2 leaflets of the mitral valve together and helps the valve close. This reduces the leak and helps the heart pump more effectively.

TMVr with the MitraClip uses general anesthesia (medicine to make you sleep and block pain), a breathing tube, and a ventilator (breathing machine). Echocardiography and *fluoroscopy* (a type of X-ray) are used to guide the catheters.

During TMVr with the MitraClip, your Heart Team will:

- Place a catheter into a vein that leads to the right side of your heart
- Move the catheter from the right side of your heart to the left side of your heart
- Place the MitraClip in the best position to reduce MR

Other Options for TMVr or TMVR

There are other options for TMV repair or replacement, sometimes as part of a research study or registry. Some of these options involve the MitraClip. Others involve placing a *transcatheter valve* inside a failed surgical valve or surgical ring, or inside a native mitral valve.

The Heart Team will work with you and your doctor to determine what is the best and safest option for you.

Your Assessment and Consult Visits at UWMC

Your primary care provider (PCP) or your cardiologist may refer you for assessment and consult at UWMC. Our Heart Team will work with your doctors to plan your care and treatment.

Most people have their consult and tests on the same day. Some people want to visit with the doctor first. We will schedule your visits based on what works best for you and your family.

Heart Team Consult

Your consult at UWMC will be based on your specific medical history, previous tests, and records. Most patients follow this basic schedule:

- You will meet with an interventional cardiologist or cardiac surgeon (or both), and a nurse practitioner.
- You will have a transthoracic echocardiogram (see page 3).
- You may also have other tests that have not yet been done by your cardiologist or tests that you need for your specific treatment plan. These tests may be done on the same day as your consult, or at a later date.

Heart Team Review

Our Heart Team will review your health history and test results, and will make a treatment plan. The Heart Team will then talk with you and your other doctors about this treatment plan and explain your next steps.

If you need to have more tests, they are usually done at UWMC. If needed, your local doctors can manage these tests.

Making Your Treatment Decision

Mitral regurgitation is a serious condition. Talk with your doctor or other healthcare provider about what treatment is right for you. Ask questions about anything you do not understand.

Images in this handout are used courtesy of Abbott Vascular.

Questions?

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