

Heart Valve Disease: Mitral and Tricuspid Valves

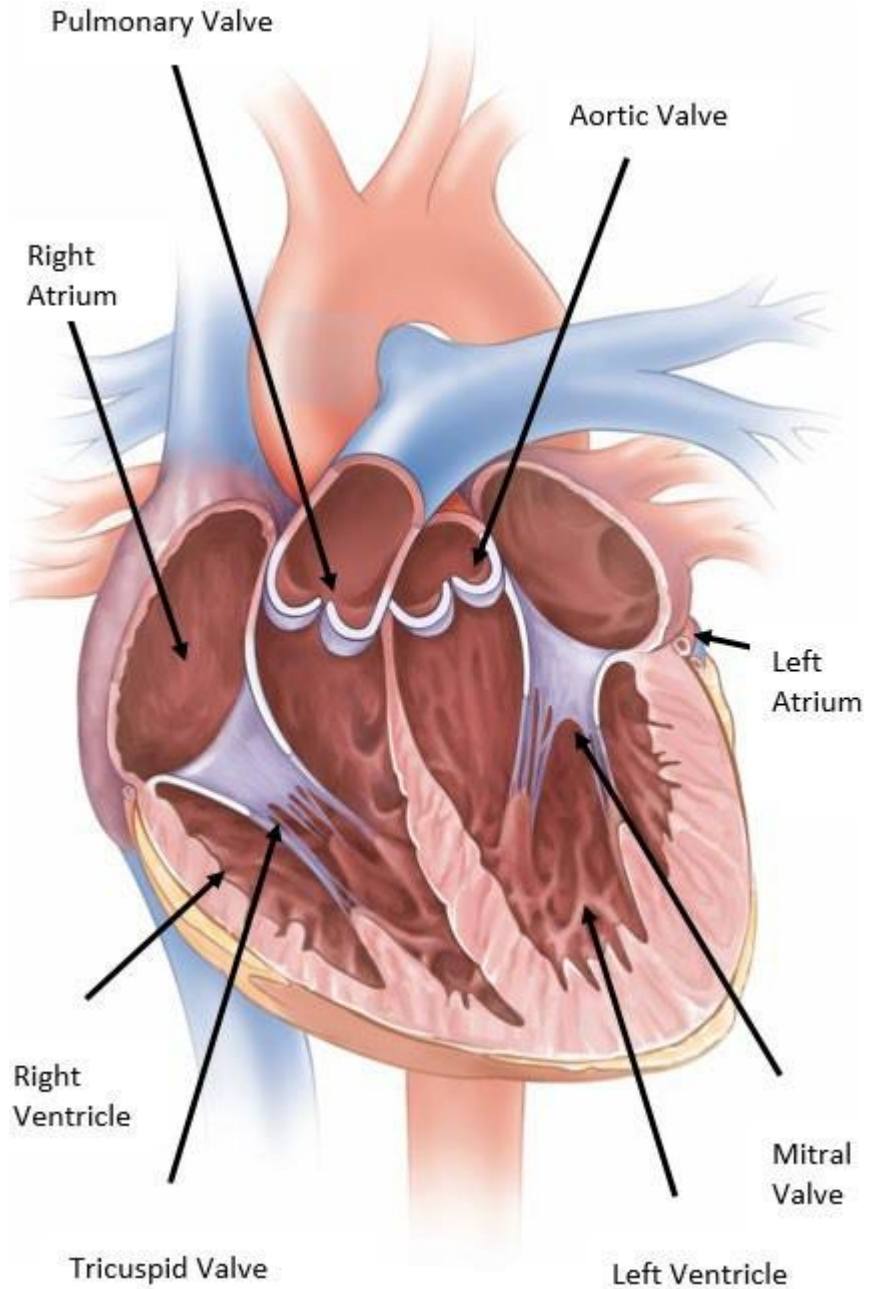
Heart anatomy

The heart has two sides, separated by an inner wall called the **septum**. The right side of the heart pumps blood to the lungs to pick up oxygen. The left side of the heart receives the oxygen-rich blood from the lungs and pumps it to the body.

The heart has four chambers and four valves that regulate blood flow. The upper chambers are called the **left and right atria**, and the lower chambers are called the **left and right ventricles**.

The **mitral valve** is located on the left side of the heart, between the left atrium and the left ventricle. This valve has two leaflets that allow blood to flow from the lungs to the heart.

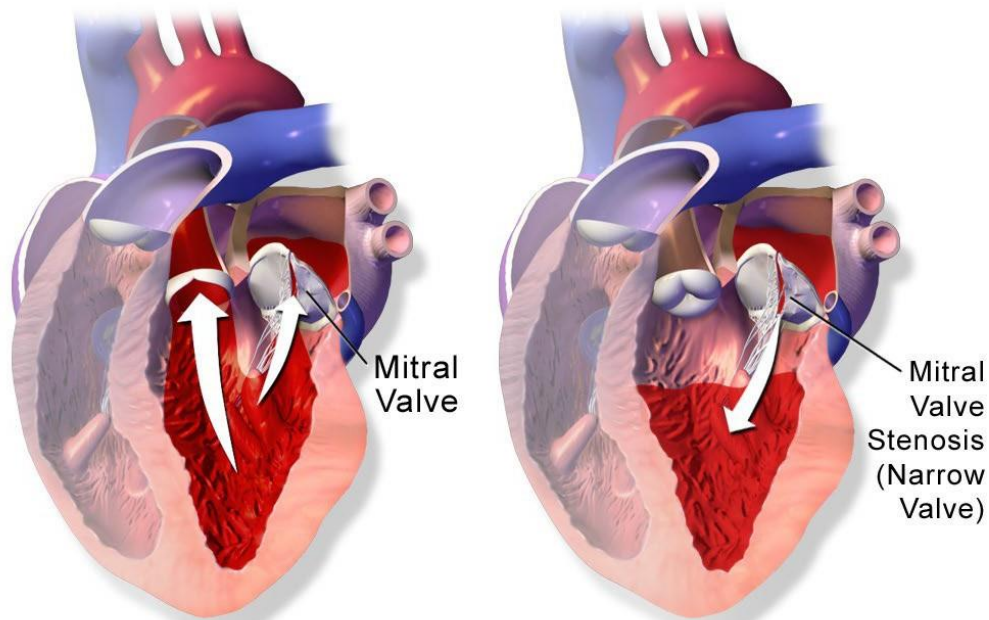
The **tricuspid valve** is located on the right side of the heart, between the right atrium and the right ventricle. This valve has three leaflets and its function is to prevent blood from leaking back into the right atrium.



What is heart valve disease?

In heart valve disease, one or more of the valves in your heart does not open or close properly. Heart valve problems may include:

- **Regurgitation** (also called insufficiency) - In this condition, the valve leaflets don't close properly, causing blood to leak backward in your heart.
- **Stenosis** - In valve stenosis, your valve leaflets become thick or stiff, and do not open wide enough. This reduces blood flow through the valve.



Mitral Valve Regurgitation

Mitral Valve Stenosis

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Mitral valve disease

The most common problems affecting the mitral valve are the inability for the valve to completely open (**stenosis**) or close (**regurgitation**).

When the mitral valve doesn't open properly (**stenosis**), blood flow through the left atrium to the left ventricle is reduced. As a result, the amount of blood

bringing oxygen from the lungs is reduced, which can make you feel tired and short of breath. The volume and pressure from blood remaining in the left atrium increases which then causes the left atrium to get bigger and fluid to build up in your lungs.

When blood flows backward through the mitral valve (**regurgitation**) into the left atrium, it is pushed into your lungs. This greatly increases the workload of the heart often causing shortness of breath. Mitral valve regurgitation falls into two general categories: **primary (degenerative) mitral regurgitation** and **secondary (functional) mitral regurgitation**. These two categories are defined below:

- **Primary (degenerative) mitral regurgitation** means there is something congenitally (from birth) wrong with the mitral valve that causes it to leak. The leak is usually the result of a floppy leaflet (the flap that opens and closes to keep blood flowing) (called a prolapse) or a ruptured cord that caused the leaflet to become partially detached (called a flail).
- **Secondary (functional) mitral regurgitation** does not involve anything wrong with the valve itself, but is a disease of the left ventricle of the heart. When heart disease causes the left ventricle to enlarge, the **papillary muscles that support the mitral valve's two leaflets** are moved and the valve opening (annulus) is stretched.

What are the causes of mitral valve disease?

Each form of mitral valve disease has its own set of causes. Injury to your mitral valve leaflets or chordae (small muscles that support the valve) can be caused by a heart attack, infection or illnesses such as rheumatic or scarlet fever.

Tricuspid valve disease

The two most common forms of tricuspid valve disease are regurgitation and stenosis.

- In **tricuspid stenosis** the valve is unable to open properly, which restricts the blood flow between the right atrium to the right ventricle of your heart. Over time, the right atrium becomes enlarged from trying to push the blood through an opening that is too small.
- With **tricuspid regurgitation** the valve leaks because the leaflets do not close properly. Instead of blood being pushed to the lungs, some blood leaks backward into the right atrium, which can change the pressure in the nearby chambers and blood vessels.

What are the causes of tricuspid valve disease?

The most common causes of tricuspid regurgitation are:

- Enlargement of the right ventricle due to high pressure in the lungs (pulmonary hypertension)
- Problems with the valves on the left side of the heart (mitral and/or aortic valves).
- Other causes of tricuspid regurgitation are endocarditis (infection in the lining of the heart), congenital defects such as Ebstein's anomaly, and carcinoid tumors.
- Rheumatic fever and endocarditis are the most common causes of tricuspid stenosis.

What are the symptoms of heart valve disease?

Signs and symptoms of heart valve disease may include:

- Dizziness
- Shortness of breath
- Fatigue
- Irregular heartbeats
- Swollen feet or legs
- Stroke
- Heart attack

How is heart valve disease diagnosed?

The following tests may be done to help us evaluate and make recommendations regarding your heart valve disease:

- **Transesophageal echocardiogram (TEE)** – This is an invasive test that looks at your heart valves, chambers and how well your heart is functioning with a small camera probe placed into your mouth and passed down into your throat.
- **Surface Echocardiogram (ECHO)** – This is a non-invasive test that looks at your heart valves, chambers and how well your heart is functioning.
- **Heart Catheterization (Cath)** – This is an invasive test that looks at the coronary blood vessels for any blockages (coronary artery disease) for which you may need an intervention before or at the time of your surgery.
- **Lab Tests** – Laboratory tests are done on samples of blood or urine to help diagnose disease or other conditions.
- **Chest X-Ray** – This test produces images of the chest, lungs, heart, blood vessels, ribs and diaphragm with one or two views.
- **Electrocardiogram (EKG)** – This test measures the electrical activity of the heart with electrodes placed on your chest, arms and legs.
- **Pulmonary Function Test (PFT)** – This test measures how well your lungs are working.
- **Carotid Doppler Ultrasound Study (“Carotids”)** – This test uses ultrasound to identify blockage or narrowing in your carotid arteries.
- **Dental Clearance** – Before heart surgery, you will be **asked to submit** a dental clearance letter from your dentist stating you have no dental infections. You will need a dental clearance exam, which may include X-rays, to determine damage and disease not visible during a regular dental examination.
- **Computerized Tomography Scan (CT or CAT scan)** – This test uses sophisticated x-ray technology that can see parts of your body that cannot be seen by regular x-ray.

How is heart valve disease treated?

- **Medication therapy**

Medications can help reduce your symptoms. Although helpful, medications cannot address the underlying problem with your heart valve. You may be referred to a heart failure doctor as part of your evaluation and treatment plan.

- **Open surgical repair**

Surgical options include:

- Valve Repair - consists of repairing the leaflets or chordae so that the valve opens and closes correctly and putting a reinforcing ring around the edge of the valve to help it maintain the proper size and shape.
- Valve Replacement - consists of replacing the valve with an artificial tissue valve or, less often, a mechanical valve.

- **Percutaneous interventions**

Patients with heart valve disease who are too high risk for open heart surgery may be candidates for less invasive, percutaneous (catheter-based) options. These can be delivery repair devices or replacement valves through a catheter inserted in your groin that is guided through a vein in your leg to reach your heart. Other procedures deliver the valve via a small incision under the left breast.

Below are a variety of new percutaneous techniques and devices offered at the Frankel Cardiovascular for eligible patients:

- Mitral Valve
 - Transcatheter edge-to-edge mitral valve repair
 - Mitral valve in valve replacement
 - Mitral valvuloplasty

- Transcatheter mitral valve replacement*
(* Only offered via Clinical Trial)
- Tricuspid Valve
 - Transcatheter tricuspid valve replacement
 - Tricuspid valve in valve replacement
 - Transcatheter edge to edge tricuspid valve repair*

What type of heart valve disease clinical trials are offered?

Experts at the Michigan Medicine Frankel Cardiovascular Center are involved in the latest clinical trials, which enable them to offer some of the most advanced treatment options for patients with mitral valve disease. Many of these options can't be found at other health systems. Discussions with your clinical team will determine if you are candidate who can participate in a specific clinical trial. Our experienced team will recommend the most appropriate treatment plan that will result in the best possible outcome for you.

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Heart image created by Lorie Gavulic

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